

正 本

發文方式：郵寄

檔 號：

保存年限：

## 高雄市政府環境保護局 函

83164

高雄市大寮區華西路8-1號

地址：83347高雄市鳥松區澄清路834號

承辦單位：空污與噪音防制科

承辦人：熊庭誼

電話：7351500#2708

電子信箱：tp01782@kcg.gov.tw

受文者：大連化學工業股份有限公司大發廠

發文日期：中華民國109年4月13日

發文字號：高市環局空字第10932983800號

速別：普通件

密等及解密條件或保密期限：

附件：

主旨：貴廠申請廢氣燃燒塔（A404、A602）使用計畫書變更一案，業經本局審查通過，復如說明，請查照。

說明：

- 一、依據「揮發性有機物空氣污染物管制及排放標準」第7條規定辦理，暨復貴廠109年4月1日(109)連發字第0037號函。
- 二、正常操作下之排放廢氣不得導入廢氣燃燒塔處理，請貴廠確依廢使用計畫書內容進行操作，以符合前揭法規規定。

正本：大連化學工業股份有限公司大發廠

副本：慧群環境科技股份有限公司

局長 王 珏

本案依分層負責規定授權業務主管判發

# 廢氣燃燒塔使用計畫書

公私場所名稱：大連化學工業股份有限公司大發廠

公私場所地址：高雄市大寮區過溪里華西路 8-1 號

所屬行業名稱：化學原料製造業 設置日期：91 年 3 月

管 制 編 號：

|   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|
| S | 2 | 0 | 0 | 5 | 6 | 5 | 2 |
|---|---|---|---|---|---|---|---|

負責人姓名：張 覺 光 負責人電話：7881165

聯絡人姓名：沈 明 宗 聯絡人電話：7881165#976

填 表 日 期：109 年 3 月 24 日

公私場所蓋章：

負責人職稱：廠長

蓋章：

填表人職稱：資深工程師

蓋章：

|      |   |   |   |   |   |   |   |   |
|------|---|---|---|---|---|---|---|---|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 |
|------|---|---|---|---|---|---|---|---|

| 目錄                                            |  |  |  |  |     |   |               |    |
|-----------------------------------------------|--|--|--|--|-----|---|---------------|----|
| 項目                                            |  |  |  |  |     |   | 頁次            |    |
| 一、廢氣燃燒塔設計及操作條件說明                              |  |  |  |  |     |   | 2~13          |    |
| 二、廢氣燃燒塔監測設施說明                                 |  |  |  |  |     |   | 14~19         |    |
| 三、進廢氣採樣位置及分析作業說明                              |  |  |  |  |     |   | 20~21         |    |
| 四、廢氣燃燒塔上游管線與製程及附屬設施設計規格                       |  |  |  |  |     |   | 22~33         |    |
| 五、廢氣燃燒塔使用情形分析                                 |  |  |  |  |     |   | 34~37         |    |
| 六、燃燒塔廢氣減量措施                                   |  |  |  |  |     |   | 38~39         |    |
| 七、監測設施失效之替代方式                                 |  |  |  |  |     |   | 40            |    |
| 八、其他主管機關指定之項目                                 |  |  |  |  |     |   | 41~42         |    |
| 附件一：導入廢氣燃燒塔之釋壓閥使用情形                           |  |  |  |  |     |   | A1-1~A1-3     |    |
| 附件二：各母火實際量測溫度、母火燃料流量、水封槽水位及未納入廢氣流量之吹驅氣體流量實測說明 |  |  |  |  |     |   | A2-1~ A2-7    |    |
| 附件三：蒸氣量廢氣量重量比之推估說明                            |  |  |  |  |     |   | A3-1          |    |
| 附件四：A602 蒸氣實際使用量及蒸氣量廢氣量重量比計算說明                |  |  |  |  |     |   | A4-1          |    |
| 附件五：A404 及 A602 未納入廢氣流量之吹驅氣體流量說明              |  |  |  |  |     |   | A5-1          |    |
| 附件六：104 年上半年 A602 廢氣累計值                       |  |  |  |  |     |   | A6-1~A6-3     |    |
| 附件七：廢氣燃燒塔進廢氣硫化氫含量分析                           |  |  |  |  |     |   | A7-1          |    |
| 附件八：本廠 2019 年 Flare 進廢氣檢驗紀錄彙整                 |  |  |  |  |     |   | A8-1~A8-2     |    |
| 附件九：排氣尾氣流量與組成分析資料                             |  |  |  |  |     |   | A9-1          |    |
| 附件十：廢氣燃燒塔 A404 原廠設計資料                         |  |  |  |  |     |   | A10-1~A10-21  |    |
| 附件十一：廢氣燃燒塔 A602 原廠設計資料                        |  |  |  |  |     |   | A11-1~A11-4   |    |
| 附件十二：A602 因製程歲(停)修使用時機廢氣量之估算方式                |  |  |  |  |     |   | A12-1~A12-3   |    |
| 附件十二-1、E712 氧化爐清爐 A602 廢氣燃燒塔使用事件報告書           |  |  |  |  |     |   | A121-1~A121-2 |    |
| 附件十二-2、2015 年 1 月 31 日廢氣燃燒塔使用報告書              |  |  |  |  |     |   | A122-1        |    |
| 附件十三：製程開車使用時機廢氣量之估算方式                         |  |  |  |  |     |   | A13-1~A13-11  |    |
| 附件十四：標準氣體分析報告                                 |  |  |  |  |     |   | A14-1~A14-3   |    |
| 附件十五：檢量校正計畫表及校正結果                             |  |  |  |  |     |   | A15-1~A15-5   |    |
| 附件十六：各監測設施規格證明文件                              |  |  |  |  |     |   | A16-1~A16-19  |    |
| 附件十七：廢氣自行採樣位置說明                               |  |  |  |  |     |   | A17-1~A17-2   |    |
| 附件十八：採樣人員教育訓練佐證資料                             |  |  |  |  |     |   | A18-1~A18-2   |    |
| 附件十九：檢驗人員本質能力評鑑表                              |  |  |  |  |     |   | A19-1         |    |
| 附件二十：物質淨熱值參考資料                                |  |  |  |  |     |   | A20-1         |    |
| 附件二十一：本廠 Flare 進廢氣檢驗紀錄登載管理系統                  |  |  |  |  |     |   | A21-1         |    |
| 附件二十二：最近一季每六日採樣檢測結果                           |  |  |  |  |     |   | A22-1         |    |
| 附件二十三：吹驅氬氣流量計設置位置示意圖                          |  |  |  |  |     |   | A23-1~A23-3   |    |
| 附件二十四：天然氣 SDS                                 |  |  |  |  |     |   | A24-1~A24-7   |    |
| 附件二十五：廢氣燃燒塔 PID 圖                             |  |  |  |  |     |   | A25-1~A25-5   |    |
| 附件二十六：M04M06M07 歲修期間廢氣燃燒塔排放量統計                |  |  |  |  |     |   | A26-1         |    |
| * 本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號，右下角填寫頁次。 |  |  |  |  | 本頁次 | 1 | 總頁次           | 42 |

|      |   |   |   |   |   |   |   |   |
|------|---|---|---|---|---|---|---|---|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 |
|------|---|---|---|---|---|---|---|---|

## 一、廢氣燃燒塔設計及操作條件說明(一)

### 廢氣燃燒塔使用清單

|    |                                         |                          |                          |
|----|-----------------------------------------|--------------------------|--------------------------|
| 1  | 設備編號                                    | A404                     | A602                     |
| 2  | 設置日期                                    | 91 年 3 月                 | 103 年 12 月               |
| 3  | 位置<br>(TM2 度座標)                         | X:190854                 | X:190876                 |
|    |                                         | Y:2497322                | Y:2497381                |
| 4  | 高度(公尺)                                  | 20                       | 35                       |
| 5  | 廢氣燃燒塔型式(地面、高架)                          | 高架                       | 地面                       |
| 6  | 裝設進廢氣回收系統(是、否)                          | 否                        | 否                        |
| 7  | 具石油煉製製程或輕油裂解製程(是、否)                     | 否                        | 否                        |
| 8  | 使用事件之流量填報門檻(Nm <sup>3</sup> /日)         | 15000                    | 15000                    |
| 9  | 母火數量(實際操作)                              | 1                        | 6                        |
| 10 | 母火數量(備用)                                | 1                        | 6                        |
| 11 | 母火溫度(°C)                                | >250                     | >250                     |
| 12 | 母火燃料成分                                  | NG                       | NG                       |
| 13 | 各母火燃料流量(Nm <sup>3</sup> /hr)            | 2.5<br>(108 年實測值，詳附件二)   | 64.5<br>(108 年實測值，詳附件二)  |
| 14 | 輔助燃燒型式(蒸氣輔助、空氣輔助、無輔助)                   | 無輔助                      | 蒸氣輔助                     |
| 15 | 輔助燃燒蒸氣量推估值(kg/hr)                       | -                        | 32045                    |
| 16 | 輔助燃燒蒸氣量實測值(kg/hr)                       | -                        | 162.5                    |
| 17 | 蒸氣量廢氣量重量比(%)                            | -                        | 26.6%<br>(以設計值估算，詳附件三)   |
| 18 | 水封槽水位或壓力(mmH <sub>2</sub> O)            | >30%<br>(>LL 警報設定值，詳附件二) | >30%<br>(>LL 警報設定值，詳附件二) |
| 19 | 未納入廢氣流量之吹驅氣體流量<br>(Nm <sup>3</sup> /hr) | 16.7<br>(108 年實測值，詳附件二)  | 86.5<br>(108 年實測值，詳附件二)  |
| 20 | 未納入廢氣流量之吹驅氣體成分                          | 氮氣                       | 氮氣                       |
| 21 | 進廢氣含硫(是、否)                              | 否                        | 否                        |
| 22 | 108 年廢氣燃燒塔進廢氣量(Nm <sup>3</sup> /年)      | 591,083                  | 990,092                  |
| 23 | 處理觸媒再生之廢氣(是、否)                          | 否                        | 否                        |
| 24 | 裝設 VOCs 成分及濃度監測設備(是、否)                  | 否                        | 否                        |
| 25 | 裝設總硫濃度監測設備(是、否)                         | 否                        | 否                        |

\*本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號，  
右下角填寫頁次。

|     |   |     |    |
|-----|---|-----|----|
| 本頁次 | 2 | 總頁次 | 42 |
|-----|---|-----|----|

填表人： 沈明宗



|      |   |   |   |   |   |   |   |   |
|------|---|---|---|---|---|---|---|---|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 |
|------|---|---|---|---|---|---|---|---|

一、廢氣燃燒塔設計及操作條件說明(二)

公私場所平面配置圖及廢氣燃燒塔位置圖



說明：公私場所平面配置圖指公私場所內部相關作業區、污染防治設施區，並標明固定空氣污染源、空氣污染防治設備、排放口及有害廢棄物儲存、處理設施，以及主要道路、大門口等重要設施。可參考固定污染源設置許可證申請資料 AP-YO2「公私場所平面配置圖說」填寫，並標明廢氣燃燒塔位置。全廠僅須填寫一份。

\*本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號，右下角填寫頁次。

|     |   |     |    |
|-----|---|-----|----|
| 本頁次 | 3 | 總頁次 | 42 |
|-----|---|-----|----|

填表人： 沈明宗

|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A404 |
|------|---|---|---|---|---|---|---|---|------|------|

### 一、廢氣燃燒塔設計及操作條件說明(三)

#### 原廠設計條件

| 項次 | a.成分                                     | b.濃度(ppm) | c.淨熱值(kcal/ g-mole) | 項目                              | 數值    |
|----|------------------------------------------|-----------|---------------------|---------------------------------|-------|
| 1  | 甲烷<br>(methane)                          | 31800     | 191.85              | d.分子量                           | 11.11 |
| 2  | 二氧化碳+<br>水 (Carbon<br>dioxide<br>+water) | 5400      | 0                   | e.總淨熱值(MJ/Nm <sup>3</sup> )     | 12.13 |
| 3  | 氫氣<br>(hydrogen)                         | 641900    | 57.79               | f.排放流量(Nm <sup>3</sup> /sec)    | 2.57  |
| 4  | 一氧化碳<br>(Carbon<br>monoxide)             | 320900    | 67.61               | g.排放口直徑(m)                      | 0.46  |
| 5  |                                          |           |                     | h.塔頂端截面積(m <sup>2</sup> )       | 0.166 |
| 6  |                                          |           |                     | i.排放速度(m/sec)                   | 17.18 |
| 7  |                                          |           |                     | j.最大允許排放速度(m/sec)               | 17.23 |
| 8  |                                          |           |                     | k.無煙燃燒設計量(Nm <sup>3</sup> /sec) | 2.57  |
| 9  |                                          |           |                     | l.揮發性有機物削減率(%)                  | 98    |
| 10 |                                          |           |                     |                                 |       |
| 11 |                                          |           |                     |                                 |       |
| 12 |                                          |           |                     |                                 |       |
| 13 |                                          |           |                     |                                 |       |

計算說明：

1.排氣總淨熱值計算：

依『揮發性有機物空氣污染管制及排放標準』第二條定義，本廠廢氣燃燒塔所處理之氣體，並非為揮發性有機物，因此利用該法規之規定之公式計算總淨熱值、最大允許排放速度並不適當，若進行估算，計算如下：

$$H_T = \text{設計總淨熱值(MJ/Nm}^3\text{)} = 1.87 \times 10^{-7} C_i H_i = 1.87 \times 10^{-7} \times ((31800 \times 191.85) + (641900 \times 57.79) + (320900 \times 67.61)) \\ = 12.13 \text{ MJ/Nm}^3$$

2.廢氣平均分子量 =  $(16 \times 0.0318) + (62 \times 0.0054) + (2 \times 0.6419) + (28 \times 0.3209) = 11.11$

3.最大設計流量 4590kg/hr，出口內徑 0.46m，排氣溫度 30°C

$$\text{排放流量} = (4590 \text{ kg/hr}) / (11.11 \text{ kg/kg-mole}) \times (22.4 \text{ Nm}^3/\text{mole}) / (3600 \text{ sec/hr}) = 2.57 \text{ Nm}^3/\text{sec}$$

$$\text{實際排放流量} = 2.57 \times (273 + 30) / 273 = 2.85 \text{ m}^3/\text{sec}$$

$$\text{排放速度} = 2.85 \text{ m}^3/\text{sec} \div (0.23 \times 0.23 \times 3.1416) = 17.18 \text{ m/sec}$$

4.最大允許排放速度：

$$\text{Log}_{10}(V_{\max}) = (H_T + 29.9) / 34.0 = (12.13 + 29.9) / 34.0 = 1.236$$

$$V_{\max} = 17.23 \text{ m/s}$$

5.無煙燃燒設計量(Nm<sup>3</sup>/sec)=最大設計流量=  $(4590 \text{ kg/hr}) / (11.11 \text{ kg/kg-mole}) \times (22.4 \text{ Nm}^3/\text{mole}) / (3600 \text{ sec/hr}) \\ = 2.57 \text{ Nm}^3/\text{sec}$

\* 本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

|     |   |     |    |
|-----|---|-----|----|
| 本頁次 | 4 | 總頁次 | 42 |
|-----|---|-----|----|

填表人：沈明宗

|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A404 |
|------|---|---|---|---|---|---|---|---|------|------|

### 一、廢氣燃燒塔設計及操作條件說明(三)

#### 操作條件：緊急狀況

| 項次 | a.成分                      | b.濃度(ppm) | c.淨熱值(kcal/ g-mole) | 項目                              | 數值    |
|----|---------------------------|-----------|---------------------|---------------------------------|-------|
| 1  | 氫氣<br>(hydrogen)          | 492030    | 57.79               | d.分子量                           | 13.16 |
| 2  | 氧氣<br>(Oxygen)            | 28870     | 0                   | e.總淨熱值(MJ/Nm <sup>3</sup> )     | 12.84 |
| 3  | 氮氣<br>(nitrogen)          | 309400    | 0                   | f.排放流量(Nm <sup>3</sup> /sec)    | 0.314 |
| 4  | 甲烷<br>(methane)           | 94040     | 191.85              | g.排放口直徑(m)                      | 0.46  |
| 5  | 一氧化碳<br>(Carbon monoxide) | 38710     | 67.61               | h.塔頂端截面積(m <sup>2</sup> )       | 0.166 |
| 6  | 乙烷<br>(ethane)            | 4630      | 341.44              | i.排放速度(m/sec)                   | 2.1   |
| 7  | 丙烷<br>(propane)           | 16790     | 488.3               | j.最大允許排放速度(m/sec)               | 18.07 |
| 8  | 丙烯<br>(propylene)         | 10550     | 634.23              | k.無煙燃燒設計量(Nm <sup>3</sup> /sec) | 2.17  |
| 9  | 異丁烷<br>(isobutane)        | 3130      | 634.23              | l.揮發性有機物削減率(%)                  | 98    |
| 10 | 正丁烷<br>(butane)           | 240       | 634.23              |                                 |       |
| 11 | 環己烷<br>(CHN)              | 10        | 873.78              |                                 |       |
| 12 | 正丙醛<br>(propanal)         | 240       | 402.88              |                                 |       |
| 13 | 二甲基環己<br>烷(DMC)           | 180       | 1162.47             |                                 |       |
| 14 | 四氫呋喃<br>(THF)             | 920       | 550.54              |                                 |       |
| 15 | 正丙醇<br>(NPA)              | 260       | 440.67              |                                 |       |

計算說明：

因 M04 製程或 E712 突發事故、無法預期且不可抗力之事件，導致公私場所產生安全危害之虞，需立即採取緊急處理行動，以回復正常安全操作之狀況，故須將 M04 製程之廢氣導入 A404 或 A602 處理，其製程排氣成分與廢氣燃燒塔尚未管制使用前之排氣成分及歲修二相同，總淨熱值依據附件八、2019 年 FLARE 採樣分析紀錄之歲修二平均值計算如下：

1.一般排氣總淨熱值計算：以  $H_T(MJ/Nm^3)=1.87 \times 10^{-7} C_i H_i$  計算如下：

$$HT = \text{總淨熱值}(MJ/Nm^3) = 1.87 \times 10^{-7} C_i H_i = 1.87 \times 10^{-7} \times ((492030 \times 57.79) + (94040 \times 191.85) + (38710 \times 67.61) + (4630 \times 341.44) + (16790 \times 488.3) + (10550 \times 634.23) + (3370 \times 634.23) + (10 \times 873.78) + (240 \times 402.88) + (180 \times 1162.47) + (920 \times 550.54) + (260 \times 440.67)) = 12.84 MJ/Nm^3$$

2.廢氣平均分子量  $= (2 \times 0.492) + (32 \times 0.0289) + (28 \times 0.3094) + (16 \times 0.09404) + (28 \times 0.0387) = 13.16$

3.常態排放平均流量(依據附件九-排氣尾氣流量與組成分析資料，一般排氣 O<sub>2</sub>、N<sub>2</sub>、H<sub>2</sub>、CO、CH<sub>4</sub> 佔廢氣成分 95% 以上，依此值假設為常態下的廢氣質量流率)  $= 7.49 + 179.87 + 101.27 + 604.73 + 67.48 = 960.84 \text{ kg/hr}$ ，

4.出口內徑 0.46m，排氣溫度 30℃

$$\text{排放流量} = (960.84 \text{ kg/hr}) / (13.16 \text{ kg/kg-mole}) \times (22.4 \text{ Nm}^3/\text{mole}) / (3600 \text{ sec/hr}) = 0.314 \text{ Nm}^3/\text{sec}$$

$$\text{實際排放流量} = 0.314 \times (273 + 30) / 273 = 0.349 \text{ m}^3/\text{sec} ; \text{排放速度} = 0.349 \text{ m}^3/\text{sec} \div (0.23 \times 0.23 \times 3.1416) = 2.1 \text{ m/sec}$$

5.最大允許排放速度：

$$\text{Log}_{10}(V_{\max}) = (H_T + 29.9) / 34.0 = (12.84 + 29.9) / 34.0 = 1.257$$

$$V_{\max} = 18.07 \text{ m/s}$$

※故符合法規  $40 MJ/Nm^3 \geq H_T \geq 8 MJ/Nm^3$ ， $V < V_{\max}$  且  $V < 114 \text{ m/sec}$

6.無煙燃燒設計量(Nm<sup>3</sup>/sec) = 最大設計流量 =  $(4590 \text{ kg/hr}) / (13.16 \text{ kg/kg-mole}) \times (22.4 \text{ Nm}^3/\text{mole}) / (3600 \text{ sec/hr}) = 2.17 \text{ Nm}^3/\text{sec}$

\* 本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

|     |   |     |    |
|-----|---|-----|----|
| 本頁次 | 5 | 總頁次 | 42 |
|-----|---|-----|----|

填表人：沈明宗

|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A404 |
|------|---|---|---|---|---|---|---|---|------|------|

### 一、廢氣燃燒塔設計及操作條件說明(三)

#### 操作條件：開車(M04 製程開車)

| 項次 | a.成分                         | b.濃度(ppm) | c.淨熱值(kcal/ g-mole) | 項目                              | 數值    |
|----|------------------------------|-----------|---------------------|---------------------------------|-------|
| 1  | 氫氣<br>(hydrogen)             | 570120    | 57.79               | d.分子量                           | 13.31 |
| 2  | 氧氣<br>(Oxygen)               | 6250      | 0                   | e.總淨熱值(MJ/Nm <sup>3</sup> )     | 10.28 |
| 3  | 氮氣<br>(nitrogen)             | 192240    | 0                   | f.排放流量(Nm <sup>3</sup> /sec)    | 0.449 |
| 4  | 甲烷<br>(methane)              | 7240      | 191.85              | g.排放口直徑(m)                      | 0.46  |
| 5  | 一氧化碳<br>(Carbon<br>monoxide) | 211160    | 67.61               | h.塔頂端截面積(m <sup>2</sup> )       | 0.166 |
| 6  | 乙烷<br>(ethane)               | 530       | 341.44              | i.排放速度(m/sec)                   | 3.00  |
| 7  | 丙烷<br>(propane)              | 10770     | 488.3               | j.最大允許排放速度(m/sec)               | 15.21 |
| 8  | 丙烯<br>(propylene)            | 970       | 634.23              | k.無煙燃燒設計量(Nm <sup>3</sup> /sec) | 2.15  |
| 9  | 正丙醇<br>(NPA)                 | 430       | 440.67              | l.揮發性有機物削減率(%)                  | 98    |
| 10 | 二甲基環己<br>烷(DMC)              | 110       | 1162.47             |                                 |       |

計算說明：

製程排空停產超過 1 個月再重新開車時，因 M04 製程之製程氣來自甲醇裂解，製程氣成分主要為 H<sub>2</sub>、CO、CO<sub>2</sub> 及 CH<sub>4</sub> 等非 VOCs 氣體，後續會經過 TSA(變溫吸附純化器)與 PSA(變壓吸附純化器)進行氣體純化與分離，初開車期間在各股氣體組成未達醛化反應與氫化反應需求標準前無法引入製程反應，故初開車期間產生排放之不合格製程氣將會排放至 flare 燃燒處理直至 TSA 與 PSA 產出符合反應要求的氣體組成。

總淨熱值依據附件十三檢附 105 年 7 月 18~20 日 M04 製程開車廢氣採樣分析結果計算如下：

1.一般排氣總淨熱值計算：以  $H_T(\text{MJ/Nm}^3)=1.87 \times 10^{-7} \text{CiHi}$  計算如下：

$$H_T = \text{總淨熱值}(\text{MJ/Nm}^3) = 1.87 \times 10^{-7} \text{CiHi} = 1.87 \times 10^{-7} \times ((570120 \times 57.79) + (7240 \times 191.85) + (211160 \times 67.61) + (530 \times 341.44) + (10770 \times 488.3) + (970 \times 634.23) + (430 \times 440.67) + (110 \times 1162.47)) = 10.28 \text{ MJ/Nm}^3$$

$$2. \text{廢氣分子量} = (2 \times 0.5779) + (32 \times 0.00625) + (28 \times 0.19224) + (16 \times 0.00724) + (28 \times 0.21116) + (30 \times 0.00053) + (44 \times 0.01077) + (42 \times 0.00097) + (112 \times 0.00011) = 13.31$$

3.常態排放平均流量(依據附件九-排氣尾氣流量與組成分析資料，一般排氣 O<sub>2</sub>、N<sub>2</sub>、H<sub>2</sub>、CO、CH<sub>4</sub> 佔廢氣成分 95% 以上，依此值假設為常態下的廢氣質量流率)=7.49+179.87+101.27+604.73+67.48=960.84 kg/hr，

4.出口內徑 0.46m，排氣溫度 30℃

$$\text{排放流量} = (960.84 \text{ kg/hr}) / (13.31 \text{ kg/kg-mole}) \times (22.4 \text{ Nm}^3/\text{mole}) / (3600 \text{ sec/hr}) = 0.449 \text{ Nm}^3/\text{sec}$$

$$\text{實際排放流量} = 0.449 \times (273 + 30) / 273 = 0.498 \text{ m}^3/\text{sec}$$

$$\text{排放速度} = 0.498 \text{ m}^3/\text{sec} \div (0.23 \times 0.23 \times 3.1416) = 3.00 \text{ m/sec}$$

5.最大允許排放速度：

$$\text{Log}_{10}(V_{\max}) = (H_T + 29.9) / 34.0 = (10.28 + 29.9) / 34.0 = 1.182$$

$$V_{\max} = 15.21 \text{ m/s} \quad \text{※故符合法規 } 40 \text{ MJ/Nm}^3 \geq H_T \geq 8 \text{ MJ/Nm}^3, V < V_{\max} \text{ 且 } V < 114 \text{ m/sec}$$

$$6. \text{無煙燃燒設計量}(\text{Nm}^3/\text{sec}) = \text{最大設計流量} = (4590 \text{ kg/hr}) / (13.31 \text{ kg/kg-mole}) \times (22.4 \text{ Nm}^3/\text{mole}) / (3600 \text{ sec/hr}) = 2.15 \text{ Nm}^3/\text{sec}$$

\* 本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

|     |   |     |    |
|-----|---|-----|----|
| 本頁次 | 6 | 總頁次 | 42 |
|-----|---|-----|----|

填表人：沈明宗

|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A404 |
|------|---|---|---|---|---|---|---|---|------|------|

### 一、廢氣燃燒塔設計及操作條件說明(三)

#### 操作條件：歲修一(M04 製程歲修或停修)

| 項次 | a.成分                         | b.濃度(ppm) | c.淨熱值(kcal/ g-mole) | 項目                              | 數值    |
|----|------------------------------|-----------|---------------------|---------------------------------|-------|
| 1  | 氫氣<br>(hydrogen)             | 542600    | 57.79               | d.分子量                           | 13.91 |
| 2  | 氧氣<br>(Oxygen)               | 13850     | 0                   | e.總淨熱值(MJ/Nm <sup>3</sup> )     | 8.64  |
| 3  | 氮氣<br>(nitrogen)             | 232910    | 0                   | f.排放流量(Nm <sup>3</sup> /sec)    | 0.43  |
| 4  | 甲烷<br>(methane)              | 0         | 191.85              | g.排放口直徑(m)                      | 0.46  |
| 5  | 一氧化碳<br>(Carbon<br>monoxide) | 209190    | 67.61               | h.塔頂端截面積(m <sup>2</sup> )       | 0.166 |
| 6  | 乙烷<br>(ethane)               | 110       | 341.44              | i.排放速度(m/sec)                   | 2.87  |
| 7  | 丙烷<br>(propane)              | 1070      | 488.3               | j.最大允許排放速度(m/sec)               | 13.49 |
| 8  | 丙烯<br>(propylene)            | 70        | 634.23              | k.無煙燃燒設計量(Nm <sup>3</sup> /sec) | 2.05  |
| 9  | 異丁烷<br>(isobutane)           | 20        | 634.23              | l.揮發性有機物削減率(%)                  | 98    |
| 10 | 正丁烷<br>(butane)              | 0         | 634.23              |                                 |       |
| 11 | 環己烷<br>(CHN)                 | 0         | 873.78              |                                 |       |
| 12 | 正丙醛<br>(propanal)            | 110       | 402.88              |                                 |       |
| 13 | 二甲基環己<br>烷(DMC)              | 30        | 1162.47             |                                 |       |
| 14 | 四氫呋喃<br>(THF)                | 50        | 550.54              |                                 |       |
| 15 | 正丙醇<br>(NPA)                 | 0         | 440.67              |                                 |       |

計算說明：

總淨熱值依據附件八、2019 年 FLARE 採樣分析紀錄之 M04 製程歲修廢氣採樣分析結果計算如下：

1.一般排氣總淨熱值計算：以 HT(MJ/Nm<sup>3</sup>)=1.87×10<sup>-7</sup>CiHi 計算如下：

$$\begin{aligned}
 HT &= \text{總淨熱值(MJ/Nm}^3\text{)} = 1.87 \times 10^{-7} \text{CiHi} = 1.87 \times 10^{-7} \times ((542600 \times 57.79) + (209190 \times 67.61) \\
 &\quad + (110 \times 341.44) + (1070 \times 488.3) + (70 \times 634.23) + (20 \times 634.23) + (110 \times 402.88) + (30 \times 1162.47) + (50 \times 550.54)) \\
 &= 8.64 \text{ MJ/Nm}^3
 \end{aligned}$$

2.廢氣分子量=(2×0.5426)+(32×0.01385)+(28×0.23291)+(28×0.20919)=13.91

3.常態排放平均流量(依據附件九-排氣尾氣流量與組成分析資料，一般排氣 O<sub>2</sub>、N<sub>2</sub>、H<sub>2</sub>、CO、CH<sub>4</sub> 佔廢氣成分 95%以上，依此值假設為常態下的廢氣質量流率)=7.49+179.87+101.27+604.73+67.48=960.84 kg/hr，

4.出口內徑 0.46m，排氣溫度 30℃

$$\text{排放流量} = (960.84 \text{ kg/hr}) / (13.91 \text{ kg/kg-mole}) \times (22.4 \text{ Nm}^3/\text{mole}) / (3600 \text{ sec/hr}) = 0.43 \text{ Nm}^3/\text{sec}$$

$$\text{實際排放流量} = 0.43 \times (273 + 30) / 273 = 0.477 \text{ m}^3/\text{sec}$$

$$\text{排放速度} = 0.477 / \text{sec} \div (0.23 \times 0.23 \times 3.1416) = 2.87 \text{ m/sec}$$

5.最大允許排放速度：

$$\text{Log}_{10}(V_{\text{max}}) = (HT + 29.9) / 34.0 = (8.64 + 29.9) / 34.0 = 1.13$$

$$V_{\text{max}} = 13.49 \text{ m/s} \quad \text{※故符合法規 } 40 \text{ MJ/Nm}^3 \geq HT \geq 8 \text{ MJ/Nm}^3, V < V_{\text{max}} \text{ 且 } V < 114 \text{ m/sec}$$

6.無煙燃燒設計量(Nm<sup>3</sup>/sec)=最大設計流量=(4590 kg/hr)/(13.91kg/kg-mole)×(22.4Nm<sup>3</sup>/mole)/(3600 sec/hr)  
=2.05 Nm<sup>3</sup>/sec

\*本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

|     |   |     |    |
|-----|---|-----|----|
| 本頁次 | 7 | 總頁次 | 42 |
|-----|---|-----|----|

填表人：沈明宗

### 一、廢氣燃燒塔設計及操作條件說明(三)

#### 操作條件：歲修二(E712 氧化爐清爐)

| 項次 | a.成分                         | b.濃度(ppm) | c.淨熱值(kcal/ g-mole) | 項目                              | 數值    |
|----|------------------------------|-----------|---------------------|---------------------------------|-------|
| 1  | 氫氣<br>(hydrogen)             | 492030    | 57.79               | d.分子量                           | 13.16 |
| 2  | 氧氣<br>(Oxygen)               | 28870     | 0                   | e.總淨熱值(MJ/Nm <sup>3</sup> )     | 12.84 |
| 3  | 氮氣<br>(nitrogen)             | 309400    | 0                   | f.排放流量(Nm <sup>3</sup> /sec)    | 0.314 |
| 4  | 甲烷<br>(methane)              | 94040     | 191.85              | g.排放口直徑(m)                      | 0.46  |
| 5  | 一氧化碳<br>(Carbon<br>monoxide) | 38710     | 67.61               | h.塔頂端截面積(m <sup>2</sup> )       | 0.166 |
| 6  | 乙烷<br>(ethane)               | 4630      | 341.44              | i.排放速度(m/sec)                   | 2.1   |
| 7  | 丙烷<br>(propane)              | 16790     | 488.3               | j.最大允許排放速度(m/sec)               | 18.07 |
| 8  | 丙烯<br>(propylene)            | 10550     | 634.23              | k.無煙燃燒設計量(Nm <sup>3</sup> /sec) | 2.17  |
| 9  | 異丁烷<br>(isobutane)           | 3130      | 634.23              | l.揮發性有機物削減率(%)                  | 98    |
| 10 | 正丁烷<br>(butane)              | 240       | 634.23              |                                 |       |
| 11 | 環己烷<br>(CHN)                 | 10        | 873.78              |                                 |       |
| 12 | 正丙醛<br>(propanal)            | 240       | 402.88              |                                 |       |
| 13 | 二甲基環己<br>烷(DMC)              | 180       | 1162.47             |                                 |       |
| 14 | 四氫呋喃<br>(THF)                | 920       | 550.54              |                                 |       |
| 15 | 正丙醇<br>(NPA)                 | 260       | 440.67              |                                 |       |

#### 計算說明：

廢液燃料中原本含有高濃度鹽類，本廠增設除鹽系統(以樹脂將鹽類吸附去除)將廢液燃料中鹽類去除至<500ppm 後才投料至高溫氧化爐處理回收熱能，高溫氧化爐操作約 2~3 個月後因鹽類卡在爐管上之厚度增加，造成爐壓上升，基於操作安全上之考量，因而需停爐清洗爐管，於 E712(高溫氧化爐) 停爐清洗爐管至烘爐完成到開始處理廢氣期間，為確保 M04 製程操作之安全，故須將 M04 製程之廢氣導入 A404 或 A602 處理，其製程排氣成分與廢氣燃燒塔尚未管制使用前之排氣成分相同，總淨熱值依據附件八、2019 年 FLARE 採樣分析紀錄之歲修二平均值計算如下：

1.一般排氣總淨熱值計算：以  $H_T(MJ/Nm^3)=1.87 \times 10^{-7} \sum C_i H_i$  計算如下：

$$HT = \text{總淨熱值}(MJ/Nm^3) = 1.87 \times 10^{-7} \sum C_i H_i = 1.87 \times 10^{-7} \times ((492030 \times 57.79) + (94040 \times 191.85) + (38710 \times 67.61) + (4630 \times 341.44) + (16790 \times 488.3) + (10550 \times 634.23) + (3370 \times 634.23) + (10 \times 873.78) + (240 \times 402.88) + (180 \times 1162.47) + (920 \times 550.54) + (260 \times 440.67)) = 12.84 MJ/Nm^3$$

2.廢氣平均分子量 $= (2 \times 0.492) + (32 \times 0.0289) + (28 \times 0.3094) + (16 \times 0.09404) + (28 \times 0.0387) = 13.16$

3.常態排放平均流量(依據附件九-排氣尾氣流量與組成分析資料，一般排氣  $O_2$ 、 $N_2$ 、 $H_2$ 、 $CO$ 、 $CH_4$  佔廢氣成分 95% 以上，依此值假設為常態下的廢氣質量流率) $= 7.49 + 179.87 + 101.27 + 604.73 + 67.48 = 960.84 \text{ kg/hr}$ ，

4.出口內徑 0.46m，排氣溫度 30℃

$$\text{排放流量} = (960.84 \text{ kg/hr}) / (13.16 \text{ kg/kg-mole}) \times (22.4 \text{ Nm}^3/\text{mole}) / (3600 \text{ sec/hr}) = 0.314 \text{ Nm}^3/\text{sec}$$

$$\text{實際排放流量} = 0.314 \times (273 + 30) / 273 = 0.349 \text{ m}^3/\text{sec} ; \text{排放速度} = 0.349 \text{ m}^3/\text{sec} \div (0.23 \times 0.23 \times 3.1416) = 2.1 \text{ m/sec}$$

5.最大允許排放速度：

$$\text{Log}_{10}(V_{\max}) = (H_T + 29.9) / 34.0 = (12.84 + 29.9) / 34.0 = 1.257$$

$$V_{\max} = 18.07 \text{ m/s}$$

※故符合法規  $40 MJ/Nm^3 \geq H_T \geq 8 MJ/Nm^3$ ， $V < V_{\max}$  且  $V < 114 \text{ m/sec}$

6.無煙燃燒設計量(Nm<sup>3</sup>/sec) = 最大設計流量 =  $(4590 \text{ kg/hr}) / (13.16 \text{ kg/kg-mole}) \times (22.4 \text{ Nm}^3/\text{mole}) / (3600 \text{ sec/hr}) = 2.17 \text{ Nm}^3/\text{sec}$

\* 本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

|     |   |     |    |
|-----|---|-----|----|
| 本頁次 | 8 | 總頁次 | 42 |
|-----|---|-----|----|

填表人：沈明宗

|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A602 |
|------|---|---|---|---|---|---|---|---|------|------|

### 一、廢氣燃燒塔設計及操作條件說明(三)

#### 原廠設計條件

| 項次 | a.成分                         | b.濃度(ppm) | c.淨熱值(kcal/ g-mole) | 項目                              | 數值                 |
|----|------------------------------|-----------|---------------------|---------------------------------|--------------------|
| 1  | 氫氣<br>(hydrogen)             | 291988    | 57.79               | d.分子量                           | 26.22              |
| 2  | 一氧化碳<br>(Carbon<br>monoxide) | 145971    | 67.61               | e.總淨熱值(MJ/Nm <sup>3</sup> )     | 30.91              |
| 3  | 甲烷<br>(methane)              | 14465     | 191.85              | f.排放流量(Nm <sup>3</sup> /sec)    | 28.55              |
| 4  | 二氧化碳<br>(Carbon<br>dioxide)  | 102220    | 0                   | g.排放口直徑(m)                      | 0.062.m<br>0.211.m |
| 5  | 水<br>(water)                 | 80489     | 0                   | h.塔頂端截面積(m <sup>2</sup> )       | 0.871              |
| 6  | 丙烯<br>(Propene)              | 251547    | 460.34              | i.排放速度(m/sec)                   | 38.98              |
| 7  | 氮氣<br>(nitrogen)             | 44041     | 0                   | j.最大允許排放速度(m/sec)               | 61.5               |
| 8  | 丙烷<br>(propane)              | 37718     | 488.35              | k.無煙燃燒設計量(Nm <sup>3</sup> /sec) | 28.55              |
| 9  | 氧氣<br>(Oxygen)               | 18859     | 0                   | l.揮發性有機物削減率(%)                  | 99.7(設計值)          |
| 10 | 醋酸丙烯<br>酯(AAC)               | 12700     | 121.31              |                                 |                    |
|    |                              |           |                     |                                 |                    |
|    |                              |           |                     |                                 |                    |
|    |                              |           |                     |                                 |                    |
|    |                              |           |                     |                                 |                    |

計算說明：參照附件十一、A602 相關設計佐證資料

1.廢氣平均分子量=26.22

2.排氣總淨熱值計算：

$$H_T = \text{設計總淨熱值 (MJ/Nm}^3\text{)} = 1.87 \times 10^{-7} C_i H_i = 1.87 \times 10^{-7} \times ((291988 \times 57.79) + (145971 \times 67.61) + (14465 \times 191.85) + (251547 \times 460.34) + (37718 \times 488.35) + (12700 \times 121.31)) = 30.91 \text{ MJ/Nm}^3$$

3.最大設計流量 120306kg/hr，燃燒器出口內徑 0.062.m(115 支)，0.211.m(15 支)，排氣溫度 51.95℃

$$\text{排放流量} = (120306 \text{ kg/hr}) / (26.22 \text{ kg/kg-mole}) \times (22.4 \text{ Nm}^3/\text{mole}) / (3600 \text{ sec/hr}) = 28.55 \text{ Nm}^3/\text{sec} (\text{無煙燃燒設計量})$$

$$\text{實際排放流量} = 28.55 \times (273 + 51.95) / 273 = 33.98 \text{ m}^3/\text{sec}$$

$$\text{排放速度} = 33.98 \text{ m}^3/\text{sec} \div ((0.031 \times 0.031 \times 3.1416 \times 115) + (0.1055 \times 0.1055 \times 3.1416 \times 15)) = 38.98 \text{ m/sec}$$

4.最大允許排放速度：

$$\text{Log}_{10}(V_{\max}) = (H_T + 29.9) / 34.0 = (30.91 + 29.9) / 34.0 = 1.789$$

$$V_{\max} = 61.5 \text{ m/s}$$

$$\text{※故符合法規 } 40 \text{ MJ/Nm}^3 \geq H_T \geq 8 \text{ MJ/Nm}^3, V < V_{\max} \text{ 且 } V < 114 \text{ m/sec}$$

\* 本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

|     |   |     |    |
|-----|---|-----|----|
| 本頁次 | 9 | 總頁次 | 42 |
|-----|---|-----|----|

填表人：沈明宗

|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A602 |
|------|---|---|---|---|---|---|---|---|------|------|

### 一、廢氣燃燒塔設計及操作條件說明(三)

#### 操作條件：緊急狀況

| 項次 | a.成分                  | b.濃度(ppm) | c.淨熱值(kcal/g-mole) | 項目                              | 數值                 |
|----|-----------------------|-----------|--------------------|---------------------------------|--------------------|
| 1  | 氫氣(hydrogen)          | 328193    | 57.79              | d.分子量                           | 17.9               |
| 2  | 氧氣(Oxygen)            | 9397      | 0                  | e.總淨熱值(MJ/Nm <sup>3</sup> )     | 13.07              |
| 3  | 氮氣(nitrogen)          | 352013    | 0                  | f.排放流量(Nm <sup>3</sup> /sec)    | 0.228              |
| 4  | 甲烷(methane)           | 119186    | 191.85             | g.排放口直徑(m)                      | 0.062.m<br>0.211.m |
| 5  | 一氧化碳(Carbon monoxide) | 153200    | 67.61              | h.塔頂端截面積(m <sup>2</sup> )       | 0.871              |
| 6  | 乙烷(Ethane)            | 4258      | 341.44             | i.排放速度(m/sec)                   | 0.291              |
| 7  | 二甲基環己烷(DMC)           | 10        | 1162.47            | j.最大允許排放速度(m/sec)               | 18.4               |
| 8  | 丙烷(propane)           | 14111     | 488.3              | k.無煙燃燒設計量(Nm <sup>3</sup> /sec) | 28.55              |
| 9  | 丙烯(Propene)           | 7031      | 460.34             | l.揮發性有機物削減率(%)                  | 99.7(設計值)          |
| 10 | 異丁烷(isobutane)        | 3375      | 634.23             |                                 |                    |
| 11 | 正丁烷(butane)           | 226       | 634.23             |                                 |                    |
| 12 | 環己烷(CHN)              | 21        | 873.78             |                                 |                    |
| 13 | 正丙醛(propanal)         | 7387      | 402.88             |                                 |                    |
| 14 | 四氫呋喃(THF)             | 1422      | 550.54             |                                 |                    |
| 15 | 正丙醇(NPA)              | 170       | 440.67             |                                 |                    |

計算說明：

因 M06/M07 製程或 E712 突發事故、無法預期且不可抗力之事件，導致公私場所產生安全危害之虞，需立即採取緊急處理行動，以回復正常安全操作之狀況，故須將 M06 及 M07 製程之廢氣導入 A602 處理，總淨熱值依據附件十二-1 檢附 107 年 12 月 28 日廢氣燃燒塔使用報告書廢氣採樣分析結果計算如下：

1.一般排氣總淨熱值計算：以  $HT(MJ/Nm^3)=1.87 \times 10^{-7} \sum C_i H_i$  計算如下：

$HT = \text{總淨熱值}(MJ/Nm^3) = 1.87 \times 10^{-7} \sum C_i H_i = 1.87 \times 10^{-7} \times ((328193 \times 57.79) + (119186 \times 191.85) + (153200 \times 67.61) + (4258 \times 341.44) + (10 \times 1162.47) + (14111 \times 488.3) + (7031 \times 460.34) + (3375 \times 634.23) + (226 \times 634.23) + (21 \times 873.78) + (7387 \times 402.88) + (1422 \times 550.54) + (170 \times 440.67)) = 13.07 MJ/Nm^3$

2.廢氣分子量  $(2 \times 0.328193) + (32 \times 0.009397) + (28 \times 0.352013) + (44 \times 0) + (16 \times 0.119186) + (42 \times 0.014111) + (42 \times 0.007031) + (28 \times 0.1532) = 17.9$

3.依據附件十二-2 104 年 1 月 31 日廢氣燃燒塔使用報告書，當日廢氣排放量為  $46007.19 Nm^3/日 = 1917 Nm^3/hr$

4.燃燒器出口內徑 0.062.m(115 支)，0.211.m(15 支)，排氣溫度 30℃

排放流量 =  $(821 Nm^3/hr) / (3600 sec/hr) = 0.228 Nm^3/sec$

實際排放流量 =  $0.228 \times (273 + 30) / 273 = 0.253 m^3/sec$

排放速度 =  $0.253 m^3/sec \div ((0.031 \times 0.031 \times 3.1416 \times 115) + (0.1055 \times 0.1055 \times 3.1416 \times 15)) = 0.291 m/sec$

5.最大允許排放速度：

$\log_{10}(V_{max}) = (HT + 29.9) / 34.0 = (13.07 + 29.9) / 34.0 = 1.264$

$V_{max} = 18.4 m/s$  ※故符合法規  $40 MJ/Nm^3 \geq HT \geq 8 MJ/Nm^3$ ， $V < V_{max}$  且  $V < 114 m/sec$

\* 本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

|     |    |     |    |
|-----|----|-----|----|
| 本頁次 | 10 | 總頁次 | 42 |
|-----|----|-----|----|

填表人：沈明宗



|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A602 |
|------|---|---|---|---|---|---|---|---|------|------|

### 一、廢氣燃燒塔設計及操作條件說明(三)

#### 操作條件：開車(M06 製程開車)

| 項次 | a.成分                         | b.濃度(ppm) | c.淨熱值(kcal/ g-mole) | 項目                              | 數值                 |
|----|------------------------------|-----------|---------------------|---------------------------------|--------------------|
| 1  | 氫氣<br>(hydrogen)             | 510430    | 57.79               | d.分子量                           | 14.36              |
| 2  | 氧氣<br>(Oxygen)               | 13240     | 0                   | e.總淨熱值(MJ/Nm <sup>3</sup> )     | 12.08              |
| 3  | 氮氣<br>(nitrogen)             | 150810    | 0                   | f.排放流量(Nm <sup>3</sup> /sec)    | 0.416              |
| 4  | 甲烷<br>(methane)              | 10260     | 191.85              | g.排放口直徑(m)                      | 0.062.m<br>0.211.m |
| 5  | 一氧化碳<br>(Carbon<br>monoxide) | 300330    | 67.61               | h.塔頂端截面積(m <sup>2</sup> )       | 0.871              |
| 6  | 乙烷<br>(ethane)               | 1020      | 341.44              | i.排放速度(m/sec)                   | 0.53               |
| 7  | 丙烷<br>(propane)              | 1460      | 488.3               | j.最大允許排放速度(m/sec)               | 17.18              |
| 8  | 丙烯<br>(propylene)            | 60        | 634.23              | k.無煙燃燒設計量(Nm <sup>3</sup> /sec) | 28.55              |
| 9  | 正丙醇<br>(NPA)                 | 11190     | 440.67              | l.揮發性有機物削減率(%)                  | 99.7<br>(設計值)      |
| 10 | 環己烷<br>(CHN)                 | 50        | 873.78              |                                 |                    |
| 11 | 二甲基環己<br>烷(DMC)              | 160       | 1162.47             |                                 |                    |

計算說明：

製程排空停產超過 1 個月再重新開車時，因 M06 製程之製程氣來自甲醇裂解，製程氣成分主要為 H<sub>2</sub>、CO、CO<sub>2</sub> 及 CH<sub>4</sub> 等非 VOCs 氣體，後續會經過 TSA(變溫吸附純化器)與 PSA(變壓吸附純化器)進行氣體純化與分離，初開車期間在各股氣體組成未達醛化反應與氫化反應需求標準前無法引入製程反應，故初開車期間產生排放之不合格製程氣將會排放至 flare 燃燒處理直至 TSA 與 PSA 產出符合反應要求的氣體組成。

總淨熱值依據附件十三檢附 105 年 11 月 18~21 日及 11 月 30 日 M06 製程開車廢氣採樣分析結果計算如下：

1.一般排氣總淨熱值計算：以  $H_T(\text{MJ/Nm}^3)=1.87 \times 10^{-7} \text{CiHi}$  計算如下：

$$H_T = \text{總淨熱值}(\text{MJ/Nm}^3) = 1.87 \times 10^{-7} \text{CiHi} = 1.87 \times 10^{-7} \times ((510430 \times 57.79) + (10260 \times 191.85) + (300330 \times 87.61) + (1020 \times 341.44) + (1460 \times 488.3) + (60 \times 634.23) + (11190 \times 440.67) + (50 \times 873.78) + (160 \times 1162.47)) = 12.08 \text{ MJ/Nm}^3$$

$$2. \text{廢氣分子量} = (2 \times 0.51043) + (32 \times 0.01324) + (28 \times 0.15081) + (16 \times 0.01026) + (28 \times 0.30033) + (30 \times 0.00102) + (44 \times 0.00146) + (42 \times 0.00006) + (112 \times 0.00016) = 14.36$$

3.常態排放平均流量(依據附件九-排氣尾氣流量與組成分析資料，一般排氣 O<sub>2</sub>、N<sub>2</sub>、H<sub>2</sub>、CO、CH<sub>4</sub> 佔廢氣成分 95% 以上，依此值假設為常態下的廢氣質量流率)=7.49+179.87+101.27+604.73+67.48=960.84 kg/hr，

4. 燃燒器出口內徑 0.062.m(115 支)，0.211.m(15 支)，排氣溫度 30℃

$$\text{排放流量} = (960.84 \text{ kg/hr}) / (14.36 \text{ kg/kg-mole}) \times (22.4 \text{ Nm}^3/\text{mole}) / (3600 \text{ sec/hr}) = 0.416 \text{ Nm}^3/\text{sec}$$

$$\text{實際排放流量} = 0.416 \times (273 + 30) / 273 = 0.462 \text{ m}^3/\text{sec}$$

$$\text{排放速度} = 0.462 \text{ m}^3/\text{sec} \div ((0.031 \times 0.031 \times 3.1416 \times 115) + (0.1055 \times 0.1055 \times 3.1416 \times 15)) = 0.53 \text{ m/sec}$$

5.最大允許排放速度：

$$\text{Log}_{10}(V_{\max}) = (H_T + 29.9) / 34.0 = (12.08 + 29.9) / 34.0 = 1.235$$

$$V_{\max} = 17.18 \text{ m/s} \quad \text{※故符合法規 } 40 \text{ MJ/Nm}^3 \geq H_T \geq 8 \text{ MJ/Nm}^3, V < V_{\max} \text{ 且 } V < 114 \text{ m/sec}$$

\* 本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

|     |    |     |    |
|-----|----|-----|----|
| 本頁次 | 11 | 總頁次 | 42 |
|-----|----|-----|----|

填表人：沈明宗

|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A602 |
|------|---|---|---|---|---|---|---|---|------|------|

### 一、廢氣燃燒塔設計及操作條件說明(三)

#### 操作條件：歲修一(M06 或 M07 製程歲修)

| 項次 | a.成分                         | b.濃度(ppm) | c.淨熱值(kcal/ g-mole) | 項目                              | 數值                 |
|----|------------------------------|-----------|---------------------|---------------------------------|--------------------|
| 1  | 氫氣<br>(hydrogen)             | 312391    | 57.79               | d.分子量                           | 20.2               |
| 2  | 氧氣<br>(Oxygen)               | 11702.5   | 0                   | e.總淨熱值(MJ/Nm <sup>3</sup> )     | 12.28              |
| 3  | 氮氣<br>(nitrogen)             | 468284    | 0                   | f.排放流量(Nm <sup>3</sup> /sec)    | 0.296              |
| 4  | 甲烷<br>(methane)              | 43354.5   | 191.85              | g.排放口直徑(m)                      | 0.062.m<br>0.211.m |
| 5  | 一氧化碳<br>(Carbon<br>monoxide) | 79088     | 67.61               | h.塔頂端截面積(m <sup>2</sup> )       | 0.871              |
| 6  | 乙烷<br>(Ethane)               | 0         | 341.44              | i.排放速度(m/sec)                   | 0.377              |
| 7  | 二甲基環<br>己烷<br>(DMC)          | 108.5     | 1162.47             | j.最大允許排放速度(m/sec)               | 17.4               |
| 8  | 丙烷<br>(propane)              | 64032     | 488.3               | k.無煙燃燒設計量(Nm <sup>3</sup> /sec) | 28.55              |
| 9  | 丙烯<br>(Propene)              | 18490     | 460.34              | l.揮發性有機物削減率(%)                  | 99.7<br>(設計值)      |
| 10 | 異丁烷<br>(isobutane)           | 2122      | 634.23              |                                 |                    |
| 11 | 正丁烷<br>(butane)              | 93        | 634.23              |                                 |                    |
| 12 | 環己烷<br>(CHN)                 | 1         | 873.78              |                                 |                    |
| 13 | 正丙醛<br>(propanal)            | 53.5      | 402.88              |                                 |                    |
| 14 | 四氫呋喃<br>(THF)                | 196       | 550.54              |                                 |                    |
| 15 | 正丙醇<br>(NPA)                 | 84        | 440.67              |                                 |                    |

計算說明：

包含 M06 製程歲修作業期間之停車、設備管路吹驅及開車等作業，總淨熱值依據附件十二檢附 107 年 10 月 2~3 日 M06 製程歲修廢氣採樣分析結果計算如下：

1.一般排氣總淨熱值計算：以  $H_i(\text{MJ/Nm}^3)=1.87 \times 10^{-7} \text{CiHi}$  計算如下：

$$\begin{aligned} HT = \text{總淨熱值}(\text{MJ/Nm}^3) &= 1.87 \times 10^{-7} \text{CiHi} = 1.87 \times 10^{-7} \times (312391 \times 57.79) + (43354.5 \times 191.85) + (79088 \times 67.61) \\ &+ (0 \times 341.44) + (108.5 \times 1162.47) + (64032 \times 488.3) + (18490 \times 460.34) + (2122 \times 634.23) + (93 \times 634.23) + (1 \times 873.78) + (53.5 \times 402.88) + (196 \times 550.54) + (84 \times 440.67) \\ &= 12.28 \text{ MJ/Nm}^3 \end{aligned}$$

2.廢氣分子量  $(2 \times 0.217) + (32 \times 0.0006) + (28 \times 0.551935) + (44 \times 0) + (16 \times 0.05318) + (42 \times 0.062252) + (42 \times 0.00449) + (28 \times 0.10505) = 20.2$

3.常態排放平均流量(依據附件九-排氣尾氣流量與組成分析資料，一般排氣  $\text{O}_2$ 、 $\text{N}_2$ 、 $\text{H}_2$ 、 $\text{CO}$ 、 $\text{CH}_4$  佔廢氣成分 95%以上，依此值假設為常態下的廢氣質量流率)= $7.49+179.87+101.27+604.73+67.48=960.84 \text{ kg/hr}$ ，

4. 燃燒器出口內徑 0.062.m(115 支)，0.211.m(15 支)，排氣溫度  $30^\circ\text{C}$

$$\text{排放流量} = (960.84 \text{ kg/hr}) / (20.2 \text{ kg/kg-mole}) \times (22.4 \text{ Nm}^3/\text{mole}) / (3600 \text{ sec/hr}) = 0.296 \text{ Nm}^3/\text{sec}$$

$$\text{實際排放流量} = 0.296 \times (273+30) / 273 = 0.329 \text{ m}^3/\text{sec}$$

$$\text{排放速度} = 0.329 \text{ m}^3/\text{sec} \div ((0.031 \times 0.031 \times 3.1416 \times 115) + (0.1055 \times 0.1055 \times 3.1416 \times 15)) = 0.377 \text{ m/sec}$$

5.最大允許排放速度：

$$\text{Log}_{10}(V_{\max}) = (H_i + 29.9) / 34.0 = (12.28 + 29.9) / 34.0 = 1.241$$

$$V_{\max} = 17.4 \text{ m/s} \quad \text{※故符合法規 } 40 \text{ MJ/Nm}^3 \geq H_i \geq 8 \text{ MJ/Nm}^3, V < V_{\max} \text{ 且 } V < 114 \text{ m/sec}$$

\* 本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

|     |    |     |    |
|-----|----|-----|----|
| 本頁次 | 12 | 總頁次 | 42 |
|-----|----|-----|----|

填表人：沈明宗

|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A602 |
|------|---|---|---|---|---|---|---|---|------|------|

### 一、廢氣燃燒塔設計及操作條件說明(三)

#### 操作條件：歲修二(E712 氧化爐清爐)

| 項次 | a.成分                      | b.濃度(ppm) | c.淨熱值(kcal/g-mole) | 項目                              | 數值                 |
|----|---------------------------|-----------|--------------------|---------------------------------|--------------------|
| 1  | 氫氣<br>(hydrogen)          | 185950    | 57.79              | d.分子量                           | 17.9               |
| 2  | 氧氣<br>(Oxygen)            | 14429     | 0                  | e.總淨熱值(MJ/Nm <sup>3</sup> )     | 13.07              |
| 3  | 氮氣<br>(nitrogen)          | 285222    | 0                  | f.排放流量(Nm <sup>3</sup> /sec)    | 0.228              |
| 4  | 甲烷<br>(methane)           | 19554     | 191.85             | g.排放口直徑(m)                      | 0.062.m<br>0.211.m |
| 5  | 一氧化碳<br>(Carbon monoxide) | 241708    | 67.61              | h.塔頂端截面積(m <sup>2</sup> )       | 0.871              |
| 6  | 氫氣<br>(hydrogen)          | 56724.5   | 0                  | i.排放速度(m/sec)                   | 0.291              |
| 7  | 乙烷<br>(Ethane)            | 5230      | 341.44             | j.最大允許排放速度(m/sec)               | 18.4               |
| 8  | 乙烯<br>(Ethene)            | 395       | 316.3              | k.無煙燃燒設計量(Nm <sup>3</sup> /sec) | 28.55              |
| 9  | 丙烷<br>(propane)           | 61075     | 488.3              | l.揮發性有機物削減率(%)                  | 99.7(設計值)          |
| 10 | 丙烯<br>(Propene)           | 124728    | 460.34             |                                 |                    |
| 11 | 異丁烷<br>(isobutane)        | 770       | 634.23             |                                 |                    |
| 12 | 正丁烷<br>(butane)           | 55        | 634.23             |                                 |                    |
| 13 | 環己烷<br>(CHN)              | 70        | 873.78             |                                 |                    |
| 14 | 正丙醛<br>(propanal)         | 770       | 402.88             |                                 |                    |
| 15 | 四氫呋喃<br>(THF)             | 37        | 550.54             |                                 |                    |
| 16 | 正丙醇<br>(NPA)              | 30        | 440.67             |                                 |                    |

計算說明：

廢液燃料中原本含有高濃度鹽類，本廠增設除鹽系統(以樹脂將鹽類吸附去除)將廢液燃料中鹽類去除至<500ppm 後才投料至高溫氧化爐處理回收熱能，高溫氧化爐操作約二~三個月後因鹽類卡在爐管上之厚度增加，造成爐壓上升，基於操作安全上之考量，因而需停爐清洗爐管，於E712(高溫氧化爐) 停爐清洗爐管至烘爐完成到開始處理廢氣期間，因確保M06 及 M07 製程操作之安全，故須將M06 及 M07 製程之廢氣導入A602 處理，總淨熱值依據附件十二-1 檢附 107 年 12 月 28 日廢氣燃燒塔使用報告書廢氣採樣分析結果計算如下：

1.一般排氣總淨熱值計算：以 HT(MJ/Nm<sup>3</sup>)=1.87×10-7CiHi 計算如下：

HT=總淨熱值(MJ/Nm<sup>3</sup>)=1.87×10-7CiHi=1.87×10-7×((328193×57.79)+(119186×191.85)+(153200×67.61)+(4258×341.44)+(10×1162.47)+(14111×488.3)+(7031×460.34)+(3375×634.23)+(226×634.23)+(21×873.78)+(7387×402.88)+(1422×550.54)+(170×440.67))=13.07 MJ/Nm<sup>3</sup>

2.廢氣分子量(2×0.328193)+(32×0.009397)+(28×0.352013)+(44×0)+(16×0.119186)+(42×0.014111)+(42×0.007031)+(28×0.1532)=17.9

3.依據附件十二-1 107 年 12 月 28 日廢氣燃燒塔使用報告書，當日廢氣排放量為 19702 Nm<sup>3</sup>/日=821 Nm<sup>3</sup>/hr

4.燃燒器出口內徑 0.062.m(115 支)，0.211.m(15 支)，排氣溫度 30℃

排放流量=(821 Nm<sup>3</sup>/hr)/(3600sec/hr)=0.228Nm<sup>3</sup>/sec

實際排放流量=0.228×(273+30)/273=0.253 m<sup>3</sup>/sec

排放速度=0.253m<sup>3</sup>/sec÷((0.031×0.031×3.1416\*115)+(0.1055×0.1055×3.1416\*15))=0.291 m/sec

5.最大允許排放速度：

Log10(Vmax)=(HT+29.9)/34.0=(13.07+29.9)/34.0=1.264

Vmax=18.4 m/s

※故符合法規 40MJ/Nm<sup>3</sup>≥HT≥8MJ/Nm<sup>3</sup>，V<Vmax 且 V<114m/sec

\* 本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

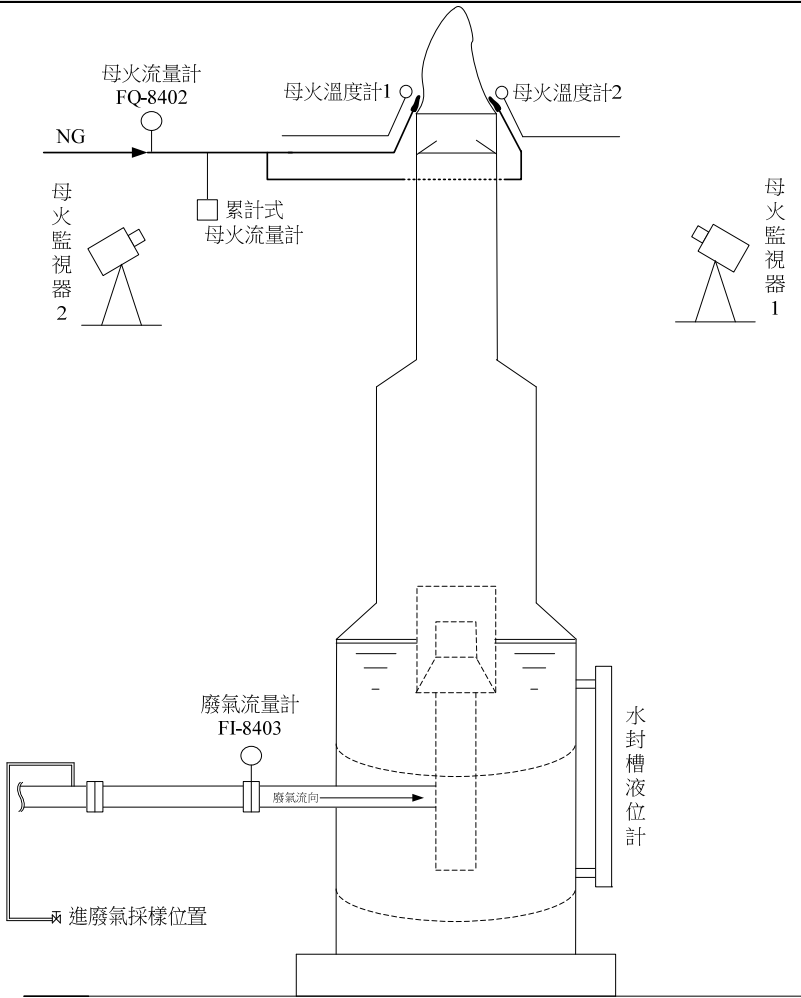
|     |    |     |    |
|-----|----|-----|----|
| 本頁次 | 13 | 總頁次 | 42 |
|-----|----|-----|----|

填表人：沈明宗

|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A404 |
|------|---|---|---|---|---|---|---|---|------|------|

## 二、廢氣燃燒塔監測設施說明(一)

### 進廢氣相關監(檢)測設施設置點繪製



說明：1、請以圖示標明廢氣燃燒塔進廢氣成分監測、檢測採樣口及進廢氣、吹驅氣體、母火、蒸氣流量計設置位置。  
 2、應確保前項採樣口所採樣品具代表性。  
 3、請填寫預定裝設監(檢)測設施位置圖。依揮發性有機物空氣污染管制及排放標準第 6 條規定，具備廢氣燃燒塔，除母火監視器及導入廢氣管線之流量計外，應設置之監測設施及其申報規定於 102 年 1 月 1 日起生效，若預定裝設監（檢）測設施與實際裝設情形不同者，應重新提報。

\*本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

|     |    |     |    |
|-----|----|-----|----|
| 本頁次 | 14 | 總頁次 | 42 |
|-----|----|-----|----|

填表人： 沈明宗

管制編號

S

2

0

0

5

6

5

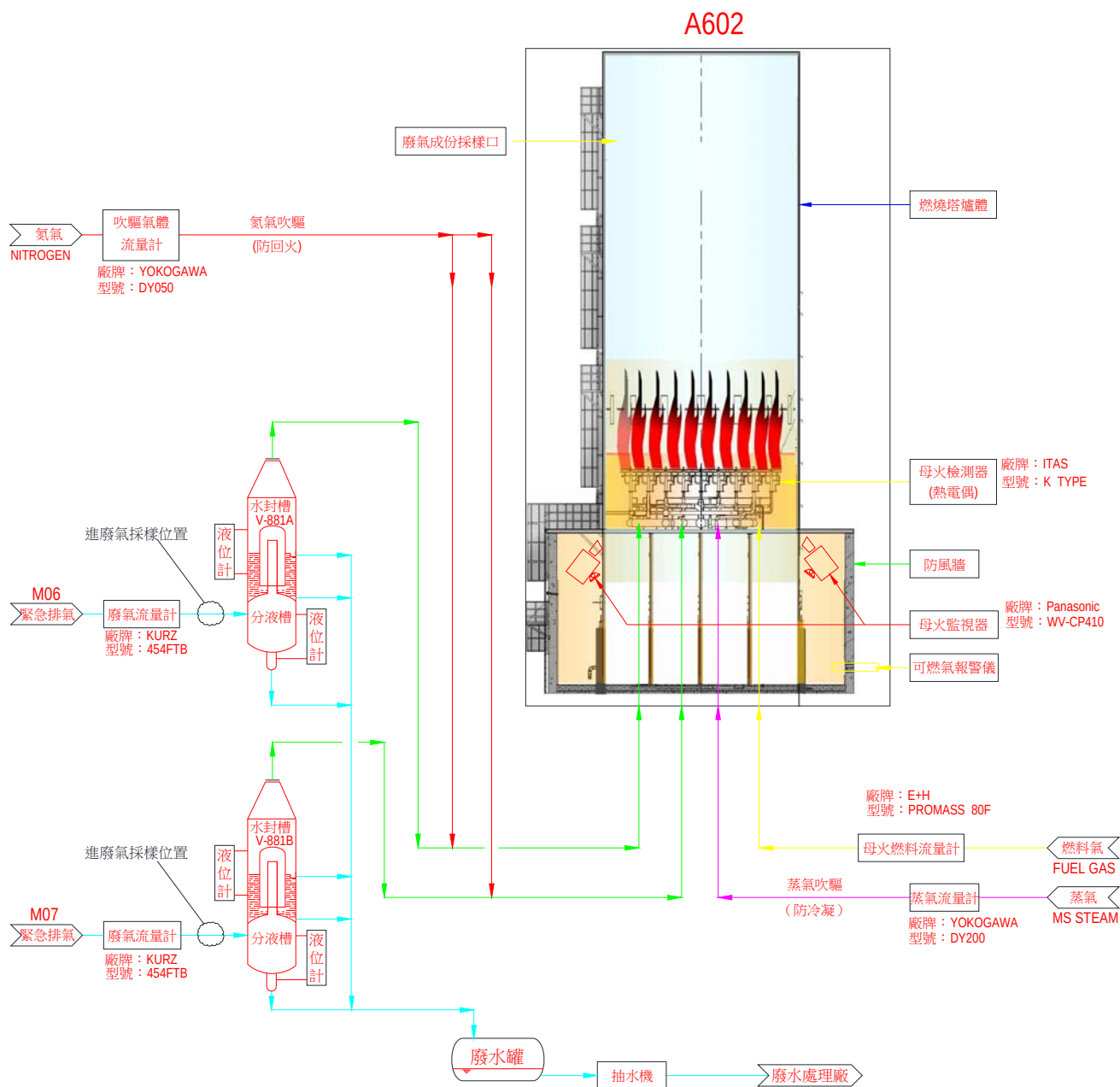
2

設備編號

A602

## 二、廢氣燃燒塔監測設施說明(一)

## 進廢氣相關監(檢)測設施設置點繪製



- 說明：1、請以圖示標明廢氣燃燒塔進廢氣成分監測、檢測採樣口及進廢氣、吹驅氣體、母火、蒸氣流量計設置位置。
- 2、應確保前項採樣口所採樣品具代表性。
- 3、請填寫預定裝設監(檢)測設施位置圖。依揮發性有機物空氣污染管制及排放標準第6條規定，具備廢氣燃燒塔，除母火監視器及導入廢氣管線之流量計外，應設置之監測設施及其申報規定於102年1月1日起生效，若預定裝設監(檢)測設施與實際裝設情形不同者，應重新提報。

\*本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

本頁次

15

總頁次

42

填表人：沈明宗

|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A404 |
|------|---|---|---|---|---|---|---|---|------|------|

## 二、廢氣燃燒塔監測設施說明(二)

### 母火溫度量測器及監視器

| 監視器       |          |                  | 母火溫度量測器        |             |
|-----------|----------|------------------|----------------|-------------|
| 廠牌        | 型式       | 資料儲存方式           | 廠牌             | 型式          |
| Panasonic | WV-CP410 | 電腦資料儲存(每月光碟燒錄備份) | JOHN ZINK A.P. | 熱電偶式 K Type |

### 水封槽之水位計或壓力計

| 廠牌   | 型式  | 量測範圍        | 準確度     | 紀錄頻率 |
|------|-----|-------------|---------|------|
| 台灣橫河 | 差壓式 | 0~1000mmH2O | ±0.065% | 連續   |

### 進廢氣成分及濃度、總硫濃度監測設施

| 廠牌 | 型式 |  |  | 紀錄頻率 |
|----|----|--|--|------|
| 無  | -  |  |  | -    |

說明：本廠 99 年廢氣燃燒塔處理廢氣流量總計為 2,693,771 立方公尺低於五百萬立方公尺，且無第四條第二項第六款情形，故可免設置廢氣成分及濃度監測設施，本廠會依據第六條第六項規定自行每六天採樣檢測乙次。108 年第一、二季自行採樣分析數據如下：

| 進廢氣成分                                  | 單位                 | 濃度範圍  | 量測範圍   | 準確度 |
|----------------------------------------|--------------------|-------|--------|-----|
| 氫氣 Hydrogen (H <sub>2</sub> )          | %                  | 53.35 | 0~64.1 | ±5% |
| 氧氣 Oxygen (O <sub>2</sub> )            | %                  | 1.83  | 0~21   | ±5% |
| 氮氣 Nitrogen (N <sub>2</sub> )          | %                  | 13.51 | 0~78.1 | ±5% |
| 二氧化碳 Carbon Dioxide (CO <sub>2</sub> ) | %                  | 0     | 0~6    | ±5% |
| 甲烷 Methane (C1)                        | %                  | 0.76  | 0~9.95 | ±5% |
| 乙烷 Ethane (C2)                         | %                  |       | 0~0.8  | ±5% |
| 乙烯 Ethylene (C2=)                      | %                  | 0.05  | 0~0.05 | ±5% |
| 丙烷 Propane (C3)                        | %                  | 0     | 0~5    | ±5% |
| 丙烯 Propylene (C3=)                     | %                  | 0.14  | 0~12   | ±5% |
| 四個碳之碳氫化合物 C4's                         | %                  |       | 0~0.5  | ±5% |
| 五個碳之碳氫化合物 C5's                         | %                  | 0.04  | 0~2    | ±5% |
| 六個碳以上之碳氫化合物 C6+                        | %                  |       | 0~2    | ±5% |
| 硫化氫 H <sub>2</sub> S                   | ppm                | 0.09  | 0-10   | ±5% |
| 一氧化碳 CO                                | %                  | 0     | 0~60   | ±5% |
|                                        |                    |       |        |     |
| 總淨熱值                                   | MJ/Nm <sup>3</sup> | 10.14 |        |     |

說明：請填寫預定裝設監測設施資料。依揮發性有機物空氣污染管制及排放標準第 6 條規定，具備廢氣燃燒塔，除母火監視器及導入廢氣管線之流量計外，應設置之監測設施及其申報規定於 102 年 1 月 1 日起生效，若預定裝設監（檢）測設施與實際裝設情形不同者，應重新提報。

\*本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

本頁次

16

總頁次

42

填表人：沈明宗

|      |   |   |   |   |   |   |   |   |      |   |   |   |   |
|------|---|---|---|---|---|---|---|---|------|---|---|---|---|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A | 6 | 0 | 2 |
|------|---|---|---|---|---|---|---|---|------|---|---|---|---|

## 二、廢氣燃燒塔監測設施說明(二)

### 母火溫度量測器及監視器

| 監視器       |          |                  | 母火溫度量測器 |             |
|-----------|----------|------------------|---------|-------------|
| 廠牌        | 型式       | 資料儲存方式           | 廠牌      | 型式          |
| Panasonic | WV-CP410 | 電腦資料儲存(每月光碟燒錄備份) | ITAS    | 熱電偶式 K Type |

### 水封槽之水位計或壓力計

| 廠牌   | 型式  | 量測範圍                     | 準確度     | 紀錄頻率 |
|------|-----|--------------------------|---------|------|
| 台灣橫河 | 差壓式 | 0~1000mmH <sub>2</sub> O | ±0.065% | 連續   |

### 進廢氣成分及濃度、總硫濃度監測設施

| 廠牌 | 型式 |  |  | 紀錄頻率 |
|----|----|--|--|------|
| 無  |    |  |  |      |

說明：新設製程 M06 及 M07 平時製程廢氣排至氧化爐燃燒遇緊急狀況時才排至 A602 處理，因 A602 為新設並無一年實際排放量，參考附件六為 104 年上半年廢氣燃燒塔排放量為 1,610,548 立方公尺，預估整廠合計排放量為=103 年 A404 廢氣量+104 年 A602 廢氣預估量=4,670,736 立方公尺低於五百萬立方公尺，故申請可免設置廢氣成分及濃度監測設施，本廠會依據第六條第五項規定自行每六天採樣檢測乙次。108 年第一、二季自行採樣分析數據如下：

| 進廢氣成分                                  | 單位                 | M06 濃度 | M07 濃度 | 量測範圍   | 準確度 |
|----------------------------------------|--------------------|--------|--------|--------|-----|
| 氫氣 Hydrogen (H <sub>2</sub> )          | %                  | 49.2   | 0      | 0~64.1 | ±5% |
| 氧氣 Oxygen (O <sub>2</sub> )            | %                  | 2.89   | 4.19   | 0~21   | ±5% |
| 氮氣 Nitrogen (N <sub>2</sub> )          | %                  | 20.94  | 46.35  | 0~78.1 | ±5% |
| 二氧化碳 Carbon Dioxide (CO <sub>2</sub> ) | %                  | 0      | 19.05  | 0~6    | ±5% |
| 甲烷 Methane (C1)                        | %                  | 9.4    | 0.46   | 0~9.95 | ±5% |
| 乙烷 Ethane (C2)                         | %                  | 0.46   | 0.28   | 0~0.8  | ±5% |
| 乙烯 Ethylene (C2=)                      | %                  | 0      | 0.11   | 0~0.05 | ±5% |
| 丙烷 Propane (C3)                        | %                  | 1.68   | 8.73   | 0~5    | ±5% |
| 丙烯 Propylene (C3=)                     | %                  |        |        | 0~12   | ±5% |
| 四個碳之碳氫化合物 C4's                         | %                  | 1.06   | 20.83  | 0~0.5  | ±5% |
| 五個碳之碳氫化合物 C5's                         | %                  |        |        | 0~2    | ±5% |
| 六個碳以上之碳氫化合物 C6+                        | %                  | 0.48   | 0      | 0~2    | ±5% |
| 硫化氫 H <sub>2</sub> S                   | ppm                | 0      | 0      | 0-10   | ±5% |
| 一氧化碳 CO                                | %                  | 0.02   | 0      | 0~60   | ±5% |
|                                        |                    |        |        |        |     |
| 總淨熱值                                   | MJ/Nm <sup>3</sup> | 19.56  |        |        |     |

說明：請填寫預定裝設監測設施資料。依揮發性有機物空氣污染管制及排放標準第 6 條規定，具備廢氣燃燒塔，除母火監視器及導入廢氣管線之流量計外，應設置之監測設施及其申報規定於 102 年 1 月 1 日起生效，若預定裝設監（檢）測設施與實際裝設情形不同者，應重新提報。

\*本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

|     |    |     |    |
|-----|----|-----|----|
| 本頁次 | 17 | 總頁次 | 42 |
|-----|----|-----|----|

填表人：沈明宗

|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A404 |
|------|---|---|---|---|---|---|---|---|------|------|

## 二、廢氣燃燒塔監測設施說明(三)

### 進廢氣、母火燃料系統、未納入廢氣流量之吹驅氣體、蒸氣輔助燃燒型式燃燒塔之蒸氣流量計

| 流量計種類                           |                                 | 進廢氣                                                                       | 母火燃料                                                                      | 未納入廢氣流量之吹驅氣體                                                              |
|---------------------------------|---------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|
| 基本資料                            | a.本監測設施是否同時監測其他排氣煙道             | <input type="checkbox"/> 是，P____<br><input checked="" type="checkbox"/> 否 | <input type="checkbox"/> 是，P____<br><input checked="" type="checkbox"/> 否 | <input type="checkbox"/> 是，P____<br><input checked="" type="checkbox"/> 否 |
|                                 | b.監測設施之製造商或代理商                  | KURZ                                                                      | 台灣橫河                                                                      | NEW-FLOW                                                                  |
|                                 | c.型號                            | 454FTB                                                                    | 差壓流量傳送器                                                                   | 差壓流量傳送器                                                                   |
|                                 | d.序號                            | FI-8403                                                                   | FQ-8402                                                                   | FI2-1411、FI2-6551、FI2-8511、FI2-8321                                       |
|                                 | e.安 日 期                         | 101年4月                                                                    | 91年3月                                                                     | 104年6月                                                                    |
|                                 | f.量測方式說明                        | 熱傳導式                                                                      | 差壓式                                                                       | 差壓式                                                                       |
| 安裝位置                            | g.監測設施設置位置是否符合規定                | <input checked="" type="checkbox"/> 是， <input type="checkbox"/> 否         | <input checked="" type="checkbox"/> 是， <input type="checkbox"/> 否         | <input checked="" type="checkbox"/> 是， <input type="checkbox"/> 否         |
|                                 | h.取樣位置離最近上游擾流之距離                | 7公尺                                                                       | 15公尺                                                                      | 0.513 公尺                                                                  |
|                                 | i.取樣位置離最近下游擾流之距離                | 18公尺                                                                      | 10公尺                                                                      | 0.221 公尺                                                                  |
| 設施規格                            | j.量測範圍                          | 0.03~80 m/s                                                               | 0~5 m <sup>3</sup> /hr                                                    | 0~218 m <sup>3</sup> /hr                                                  |
|                                 | k.應答時間                          | 2 ~ 3 s                                                                   | 2 ~ 3 s                                                                   | 1 s                                                                       |
|                                 | l.24小時零點(低值)偏移<br>(請填寫連續七之零點偏移) | 0.01 %全幅                                                                  | - %全幅                                                                     | - %全幅                                                                     |
|                                 |                                 | 0.01 %全幅                                                                  | - %全幅                                                                     | - %全幅                                                                     |
|                                 |                                 | 0.02 %全幅                                                                  | - %全幅                                                                     | - %全幅                                                                     |
|                                 |                                 | 0.01 %全幅                                                                  | - %全幅                                                                     | - %全幅                                                                     |
|                                 |                                 | 0.01 %全幅                                                                  | - %全幅                                                                     | - %全幅                                                                     |
|                                 |                                 | 0.01 %全幅                                                                  | - %全幅                                                                     | - %全幅                                                                     |
|                                 | m.24小時全幅(高值)偏移<br>(請填寫連續七之點偏移)  | 0.06 %全幅                                                                  | - %全幅                                                                     | - %全幅                                                                     |
|                                 |                                 | 0.05 %全幅                                                                  | - %全幅                                                                     | - %全幅                                                                     |
|                                 |                                 | 0.05 %全幅                                                                  | - %全幅                                                                     | - %全幅                                                                     |
|                                 |                                 | 0.05 %全幅                                                                  | - %全幅                                                                     | - %全幅                                                                     |
|                                 |                                 | 0.06 %全幅                                                                  | - %全幅                                                                     | - %全幅                                                                     |
| 0.06 %全幅                        |                                 | - %全幅                                                                     | - %全幅                                                                     |                                                                           |
| n.相對準確度                         | ±1 %                            | ±1 %                                                                      | ±1 %                                                                      |                                                                           |
| o.紀錄器應答範圍                       | 0.03~80 m/s                     | 0~5 m <sup>3</sup> /hr                                                    | 0~218 m <sup>3</sup> /hr                                                  |                                                                           |
| p.紀錄器解析度                        | 連續性偵測                           | 連續性偵測                                                                     | 連續性偵測                                                                     |                                                                           |
| q.監測設施之量測頻率                     | 1 分鐘                            | 1 分鐘                                                                      | 1 分鐘                                                                      |                                                                           |
| r.小時(或六分鐘)數據紀錄值為幾個等時距量測數據之算術平均值 | 60 個                            | 60 個                                                                      | 60 個                                                                      |                                                                           |

說明：1、請填寫預定裝設監測設施資料。依揮發性有機物空氣污染管制及排放標準第6條規定，具備廢氣燃燒塔，除母火監視器及導入廢氣管線之流量計外，應設置之監測設施及其申報規定於102年1月1日起生效，若預定裝設監（檢）測設施與實際裝設情形不同者，應重新提報。

2、量測方式說明：請說明流量計之量測方式。

配合進廢氣量調整蒸氣噴注量 ☒無 ☐有:請檢附佐證資料

備 註 ※監測設施規格證明文件，請以 A4 尺寸或折疊成 A4 尺寸檢附於本文件內。

\*本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

本頁次 18 總頁次 42

填表人：沈明宗



|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A602 |
|------|---|---|---|---|---|---|---|---|------|------|

## 二、廢氣燃燒塔監測設施說明(三)

### 進廢氣、母火燃料系統、未納入廢氣流量之吹驅氣體、蒸氣輔助燃燒型式燃燒塔之蒸氣流量計

| 流量計種類                           |                                  | 進廢氣                                                                       | 進廢氣                                                                       | 母火燃料                                                                      | 未納入廢氣流量之吹驅氣體                                                              | 蒸氣                                                                        |
|---------------------------------|----------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|
| 基本資料                            | a.本監測設施是否同時監測其他排氣煙道              | <input type="checkbox"/> 是，P____<br><input checked="" type="checkbox"/> 否 | <input type="checkbox"/> 是，P____<br><input checked="" type="checkbox"/> 否 | <input type="checkbox"/> 是，P____<br><input checked="" type="checkbox"/> 否 | <input type="checkbox"/> 是，P____<br><input checked="" type="checkbox"/> 否 | <input type="checkbox"/> 是，P____<br><input checked="" type="checkbox"/> 否 |
|                                 | b.監測設施之製造商或代理商                   | KURZ                                                                      | KURZ                                                                      | E+H                                                                       | NEW-FLOW                                                                  | YOKOGAWA                                                                  |
|                                 | c.型號                             | 454FTB                                                                    | 454FTB                                                                    | PROMASS 80F                                                               | 差壓流量傳送器                                                                   | DY200                                                                     |
|                                 | d.序號                             | FI-8192(M06)                                                              | FI-5321(M07)                                                              | FI-8411                                                                   | FQ-5316、FI6-8321、FI6-5017                                                 | FI-E062                                                                   |
|                                 | e.安裝日期                           | 103年6月                                                                    | 103年6月                                                                    | 103年6月                                                                    | 104年6月                                                                    | 103年6月                                                                    |
|                                 | f.量測方式說明                         | 熱傳導式                                                                      | 熱傳導式                                                                      | 科氏力                                                                       | 差壓式                                                                       | 渦流式                                                                       |
| 安裝位置                            | g.監測設施設置位置是否符合規定                 | <input checked="" type="checkbox"/> 是， <input type="checkbox"/> 否         | <input checked="" type="checkbox"/> 是， <input type="checkbox"/> 否         | <input checked="" type="checkbox"/> 是， <input type="checkbox"/> 否         | <input checked="" type="checkbox"/> 是， <input type="checkbox"/> 否         | <input checked="" type="checkbox"/> 是， <input type="checkbox"/> 否         |
|                                 | h.取樣位置離最近上游擾流之距離                 | 5尺                                                                        | 5尺                                                                        | 7公尺                                                                       | 0.513 公尺                                                                  | 10公尺                                                                      |
|                                 | i.取樣位置離最近下游擾流之距離                 | 20公尺                                                                      | 20公尺                                                                      | 18公尺                                                                      | 0.221 公尺                                                                  | 10公尺                                                                      |
| 設施規格                            | j.量測範圍                           | 0~112m/s                                                                  | 0~112m/s                                                                  | 0~370.853 m³/hr                                                           | 0~200 m³/hr                                                               | 0~32.05 ton/hr                                                            |
|                                 | k.應答時間                           | 1s                                                                        | 1s                                                                        | 0.05s                                                                     | 1 s                                                                       | 0.8s                                                                      |
|                                 | l.24小時零點(低值)偏移<br>(請填寫連續七日之零點偏移) | 0.01 %全幅                                                                  | 0.01 %全幅                                                                  | - %全幅                                                                     | - %全幅                                                                     | - %全幅                                                                     |
|                                 |                                  | 0.01 %全幅                                                                  | 0.01 %全幅                                                                  | - %全幅                                                                     | - %全幅                                                                     | - %全幅                                                                     |
|                                 |                                  | 0.01 %全幅                                                                  | 0.01 %全幅                                                                  | - %全幅                                                                     | - %全幅                                                                     | - %全幅                                                                     |
|                                 |                                  | 0.01 %全幅                                                                  | 0.01 %全幅                                                                  | - %全幅                                                                     | - %全幅                                                                     | - %全幅                                                                     |
|                                 |                                  | 0.02 %全幅                                                                  | 0.01 %全幅                                                                  | - %全幅                                                                     | - %全幅                                                                     | - %全幅                                                                     |
|                                 |                                  | 0.01 %全幅                                                                  | 0.01 %全幅                                                                  | - %全幅                                                                     | - %全幅                                                                     | - %全幅                                                                     |
|                                 |                                  | 0.01 %全幅                                                                  | 0.01 %全幅                                                                  | - %全幅                                                                     | - %全幅                                                                     | - %全幅                                                                     |
|                                 | m.24小時全幅(高值)偏移<br>(請填寫連續七日之零點偏移) | 0.05 %全幅                                                                  | 0.06 %全幅                                                                  | - %全幅                                                                     | - %全幅                                                                     | - %全幅                                                                     |
|                                 |                                  | 0.06 %全幅                                                                  | 0.05 %全幅                                                                  | - %全幅                                                                     | - %全幅                                                                     | - %全幅                                                                     |
|                                 |                                  | 0.06 %全幅                                                                  | 0.05 %全幅                                                                  | - %全幅                                                                     | - %全幅                                                                     | - %全幅                                                                     |
|                                 |                                  | 0.06 %全幅                                                                  | 0.05 %全幅                                                                  | - %全幅                                                                     | - %全幅                                                                     | - %全幅                                                                     |
|                                 |                                  | 0.05 %全幅                                                                  | 0.05 %全幅                                                                  | - %全幅                                                                     | - %全幅                                                                     | - %全幅                                                                     |
| 0.05 %全幅                        |                                  | 0.06 %全幅                                                                  | - %全幅                                                                     | - %全幅                                                                     | - %全幅                                                                     |                                                                           |
| 0.06 %全幅                        |                                  | 0.05 %全幅                                                                  | - %全幅                                                                     | - %全幅                                                                     | - %全幅                                                                     |                                                                           |
| n.相對準確度                         | ±1 %                             | ±1 %                                                                      | ±0.65 %                                                                   | ±1 %                                                                      | ±1 %                                                                      |                                                                           |
| o.紀錄器應答範圍                       | 0~112 m/s                        | 0~112 m/s                                                                 | 0~370.853 m³/hr                                                           | 0~200 m³/hr                                                               | 0~32.05 ton/hr                                                            |                                                                           |
| p.紀錄器解析度                        | 0.001                            | 0.001                                                                     | 0.001                                                                     | 連續性偵測                                                                     | 0.001                                                                     |                                                                           |
| q.監測設施之量測頻率                     | 1 分鐘                             | 1 分鐘                                                                      | 1 分鐘                                                                      | 1 分鐘                                                                      | 1 分鐘                                                                      |                                                                           |
| r.小時(或六分鐘)數據紀錄值為幾個等時距量測數據之算術平均值 | 60 個                             | 60 個                                                                      | 60 個                                                                      | 60 個                                                                      | 60 個                                                                      |                                                                           |
| 配合進廢氣量調整蒸氣噴注量                   |                                  | <input checked="" type="checkbox"/> 無 <input type="checkbox"/> 有:請檢附佐證資料  |                                                                           |                                                                           |                                                                           |                                                                           |
| 備註                              |                                  | ※監測設施規格證明文件，請以 A4 尺寸或折疊成 A4 尺寸檢附於本文件內。                                    |                                                                           |                                                                           |                                                                           |                                                                           |

\*本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

本頁次 19 總頁次 42

填表人：沈明宗

|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A404 |
|------|---|---|---|---|---|---|---|---|------|------|

### 三、進廢氣採樣位置及分析作業說明

#### 1、樣品採集方式：

☒ 採樣袋：材質 TEDLAR(PVF)，耐溫限度 100 °C；

☐ 採樣瓶：材質 \_\_\_\_\_，耐溫限度 \_\_\_\_\_ °C；

☐ 其他：材質 \_\_\_\_\_，耐溫限度 \_\_\_\_\_ °C；

#### 2、樣品保存方式：

☒ 立即分析； ☐ 存放方式：\_\_\_\_\_；存放時間：\_\_\_\_\_

#### 3、採集樣本數與位置：

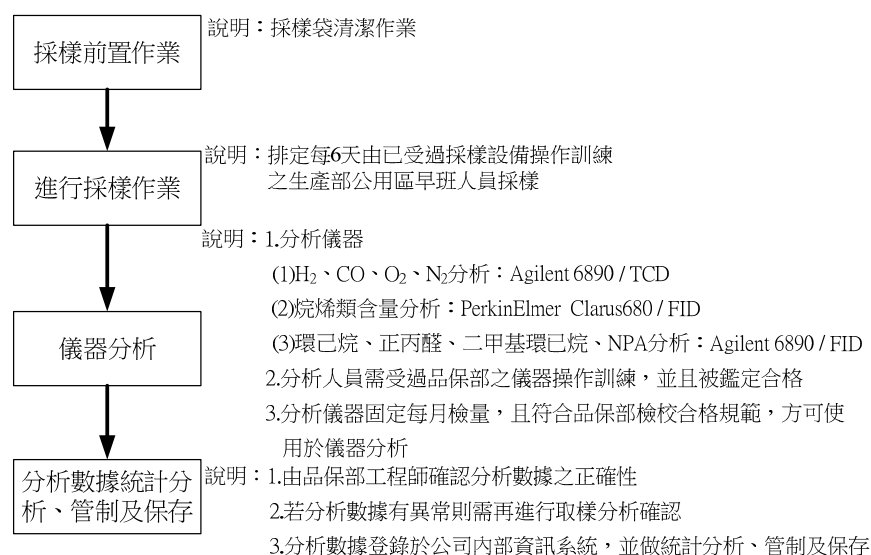
| 流水號 | 採集位置描述                         | 備註           |
|-----|--------------------------------|--------------|
| 1   | Flare 管路壓力偵測器(PI-8401)之導管靠近錶頭處 | 詳細位置參考附件十七說明 |

#### 4、檢測方式

- ☒ 自行檢測,分析儀器：(1)H<sub>2</sub>、CO、O<sub>2</sub>、N<sub>2</sub>分析：Agilent 6890/TCD  
 Columu：Molecular Sieve 5A 60/80 mesh(2m\*1/8)；  
 MDL：0.05%(v/v)  
 (2)烷烯類含量分析：PerkinElmer Clarus680/FID  
 Column：HP-AL/S(50m\*0.53mm\*15um)  
 MDL：1ppm(v/v)  
 (3)環己烷、正丙醛、二甲基環己烷、NPA 分析：Agilent 6890/FID  
 Column：BP-20(30m\*0.53mm\*1.0um)  
 MDL：1ppm(v/v)

☐ 委託檢測

#### 5、檢附詳細採樣分析作業流程(以流程圖方式表示)



說明：進廢氣採樣位置請一併繪製於「二、廢氣燃燒塔監測設施說明(一)」

\* 本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

|     |    |     |    |
|-----|----|-----|----|
| 本頁次 | 20 | 總頁次 | 42 |
|-----|----|-----|----|

填表人： 沈明宗

|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A602 |
|------|---|---|---|---|---|---|---|---|------|------|

### 三、進廢氣採樣位置及分析作業說明

#### 1、樣品採集方式：

- ☒ 採樣袋：材質 TEDLAR(PVF)，耐溫限度 100 °C；  
☐ 採樣瓶：材質 \_\_\_\_\_，耐溫限度 \_\_\_\_\_ °C；  
☐ 其他：材質 \_\_\_\_\_，耐溫限度 \_\_\_\_\_ °C；

#### 2、樣品保存方式：

- ☒ 立即分析；  
☐ 存放方式：\_\_\_\_\_；存放時間：\_\_\_\_\_

#### 3、採集樣本數與位置：

| 流水號 | 採集位置描述           | 備註       |
|-----|------------------|----------|
| 1   | M06 進廢氣流量計後，水封槽前 | 參照附件十七說明 |
| 2   | M07 進廢氣流量計後，水封槽前 | 參照附件十七說明 |

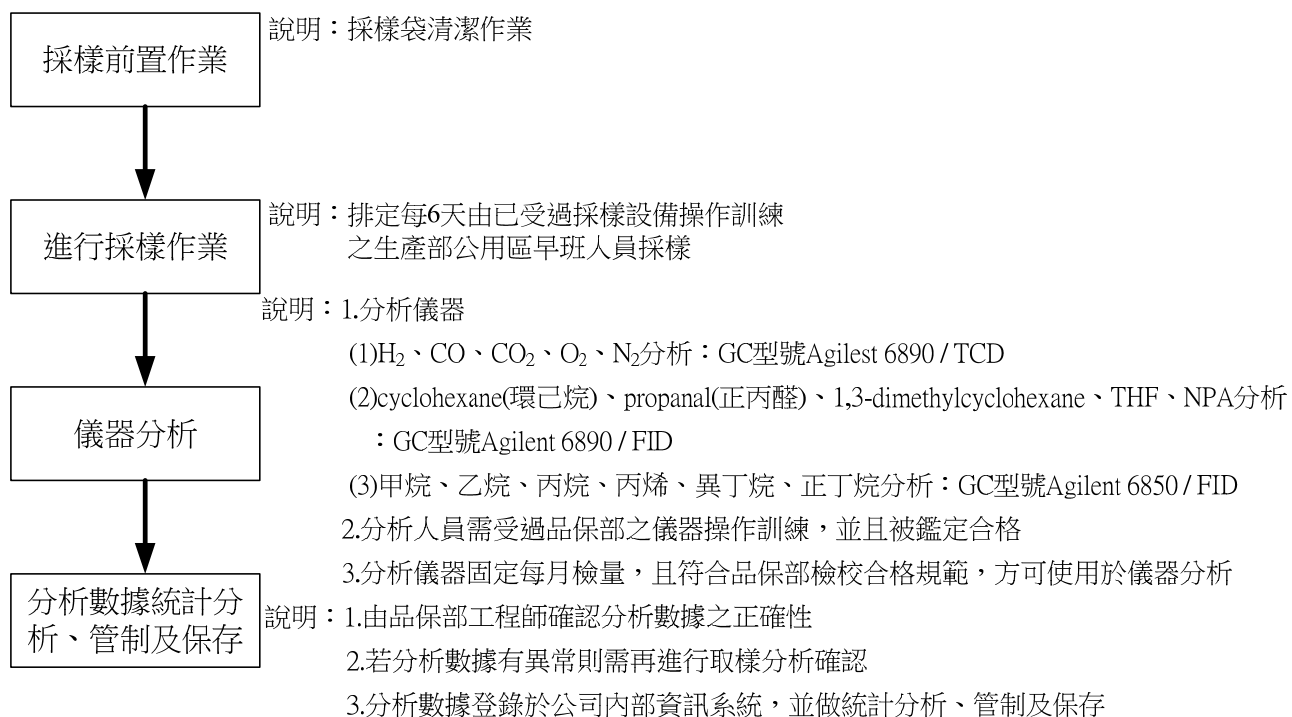
#### 4、檢測方式

- ☒ 自行檢測,分析儀器：

- (1)H<sub>2</sub>、CO、CO<sub>2</sub>、O<sub>2</sub>、N<sub>2</sub>分析：Agilent 6890(TCD)；Column：Molecular Sieve 5A 60/80 mesh(2m\*1/8)；MDL：0.05%(v/v)。  
 (2)cyclohexane(環己烷)、propanal(正丙醛)、1,3-dimethylcyclohexane、THF、NPA分析：Agilent 6890(FID)；Column：BP-20(dimension:30m\*0.53mm\*1.0 μm)；MDL：10ppm(v/v)。  
 (3)甲烷、乙烷、丙烷、丙烯、異丁烷、正丁烷分析：Agilent 6850(FID)；Column：HP-PLOT/Al<sub>2</sub>O<sub>3</sub>(dimension:50m\*0.53mm\*15um)；MDL：5ppm(v/v)。

- ☐ 委託檢測

#### 5、檢附詳細採樣分析作業流程(以流程圖方式表示)



說明：進廢氣採樣位置請一併繪製於「二、廢氣燃燒塔監測設施說明(一)」

\*本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

|     |    |     |    |
|-----|----|-----|----|
| 本頁次 | 21 | 總頁次 | 42 |
|-----|----|-----|----|

填表人： 沈明宗

|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A404 |
|------|---|---|---|---|---|---|---|---|------|------|

#### 四、廢氣燃燒塔上游管線與製程及附屬設施設計規格(一)

M04 製程在緊急狀況、開車、歲修一及歲修二狀況下的廢氣會導入廢氣燃燒塔 A404 進行處理，而一般正常操作產生的製程廢氣將排往 M07 製程的 E712 處理，另外當 E712 故障、跳車或清洗爐管等不能使用的情形之下，M04 製程常態廢氣則會排往廢氣燃燒塔 A404 或 A602 處理。以下針對各使用狀況下，廢氣需排往 A404 之情形進行繪製說明：

| 大連化學工業股份有限公司大發廠                     |       |               |           |     |
|-------------------------------------|-------|---------------|-----------|-----|
| 歲修二(E712 清爐/緊急狀況(製程設備或E712故障/異常停修)) |       |               |           |     |
| 製程名稱                                | 污染源名稱 | 設備名稱          | 元件(閥)名稱   | 型式  |
| M04                                 | E403  | V2-731A/B/C/D | 無         | -   |
|                                     | E403  | V2-732A/B     | 無         | -   |
|                                     | E404  | V2-751~5      | XV-7551   | 控制閥 |
|                                     | E408  | R2-201A       | FV-2331   | 控制閥 |
|                                     | E451  | R2-201B       | FV-2331   | 控制閥 |
|                                     | E409  | R2-211        | FV-2331   | 控制閥 |
|                                     | E410  | R2-221        | FV-2331   | 控制閥 |
|                                     | E455  | T2-301        | PC-3011   | 控制閥 |
|                                     | E456  | V2-409        | PC-4093V2 | 控制閥 |
|                                     | E457  | V2-761        | PC-7611   | 控制閥 |
|                                     | E458  | V2-783        | PC-7832   | 控制閥 |
|                                     | E419  | T2-541        | 無         | -   |
|                                     | E420  | T2-551        | 無         | -   |
|                                     | E421  | T2-571        | 無         | -   |
|                                     | E422  | T2-581        | 無         | -   |
|                                     | E426  | T2-555        | 無         | -   |
|                                     | E427  | T2-561        | 無         | -   |
|                                     | E444  | T2-545        | 無         | -   |
|                                     | E434  | 真空泵           | 無         | -   |
|                                     | E433  | T2-738        | 無         | -   |
|                                     | E429  | H2-203A       | 無         | -   |
|                                     | E450  | H2-203B       | 無         | -   |
|                                     |       |               |           |     |
|                                     |       |               |           |     |
|                                     |       |               |           |     |
|                                     |       |               |           |     |

| 大連化學工業股份有限公司大發廠 |       |         |           |     |      |       |         |           |     |
|-----------------|-------|---------|-----------|-----|------|-------|---------|-----------|-----|
| 緊急狀況            |       |         |           |     |      |       |         |           |     |
| 製程名稱            | 污染源名稱 | 設備名稱    | 元件(閥)名稱   | 型式  | 製程名稱 | 污染源名稱 | 設備名稱    | 元件(閥)名稱   | 型式  |
| M04             | -     | V2-141  | SV2-141   | 安全閥 | M04  | E404  | V2-752  | SV2-7510B | 安全閥 |
|                 | E438  | V2-155  | SV2-155   | 安全閥 |      | E404  | V2-753  | SV2-7510C | 安全閥 |
|                 | E408  | R2-201A | SV2-201   | 安全閥 |      | E404  | V2-754  | SV2-7510D | 安全閥 |
|                 | E451  | R2-201B | SV2-201   | 安全閥 |      | E404  | V2-755  | SV2-7510E | 安全閥 |
|                 | -     | V2-231  | SV2-231   | 安全閥 |      | E457  | V2-761  | SV2-761   | 安全閥 |
|                 | -     | V2-234  | -         | 手閥  |      | -     | C2-763A | SV2-764A  | 安全閥 |
|                 | -     | C2-235A | SV2-2351A | 安全閥 |      | -     | C2-763B | SV2-764B  | 安全閥 |
|                 | -     | C2-235B | SV2-2351B | 安全閥 |      | -     | C2-766A | SV2-766A  | 安全閥 |
|                 | -     | V2-236  | -         | 手閥  |      | -     | C2-766B | SV2-766B  | 安全閥 |
|                 | E455  | T2-301  | SV2-301   | 安全閥 |      | -     | V2-781  | SV2-781   | 安全閥 |
|                 | -     | R2-405A | SV2-405   | 安全閥 | M06  | -     | H2-851  | 無         | -   |
|                 | -     | R2-405B | SV2-405B  | 安全閥 |      | -     | H6-538  | SV6-5381  | 安全閥 |
|                 | -     | R2-407  | SV2-407   | 安全閥 |      | -     | H6-548  | SV6-5481  | 安全閥 |
|                 | -     | R2-408  | SV2-4081  | 安全閥 |      | -     | H6-538  | SV6-5581  | 安全閥 |
|                 | -     | V2-409  | SV2-409   | 安全閥 |      | -     | H6-568  | SV6-5681  | 安全閥 |
|                 | -     | V2-411  | SV2-411   | 安全閥 |      | -     | H6-577  | SV6-5771  | 安全閥 |
|                 | -     | C2-412A | SV2-412A  | 安全閥 |      | -     | H6-588  | SV6-5881  | 安全閥 |
|                 | -     | C2-412B | SV2-412B  | 安全閥 |      | -     | H6-583  | SV6-583B1 | 安全閥 |
|                 | -     | C2-414A | SV2-414A  | 安全閥 |      | -     | H6-584D | SV6-584D1 | 安全閥 |
|                 | -     | C2-414B | SV2-414B  | 安全閥 |      | -     | H6-586  | SV6-5861  | 安全閥 |
|                 | -     | V2-502  | SV2-502   | 安全閥 |      | -     | V6-589  | SV6-589B1 | 安全閥 |
|                 | -     | V2-611  | SV2-611   | 安全閥 |      | -     | V6-594  | SV6-594B1 | 安全閥 |
|                 | -     | V2-655  | SV2-655   | 安全閥 |      | -     | V6-598  | SV6-5981  | 安全閥 |
|                 | -     | H2-704  | SV2-704   | 安全閥 |      | -     | V6-599  | SV6-5991  | 安全閥 |
|                 | -     | H2-708  | SV2-708   | 安全閥 |      | -     | H6-518  | SV6-5181  | 安全閥 |
|                 | -     | H2-739  | SV2-739   | 安全閥 |      | -     | H6-519  | SV6-5191  | 安全閥 |
|                 | E404  | V2-751  | SV2-7510A | 安全閥 |      | -     | V6-808  | SV6-8081  | 安全閥 |

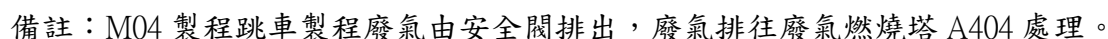


\*本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

|     |    |     |    |
|-----|----|-----|----|
| 本頁次 | 22 | 總頁次 | 42 |
|-----|----|-----|----|

填表人：沈明宗

#### 四、廢氣燃燒塔上游管線與製程及附屬設施設計規格(二)



說明:提供燃燒塔所屬上游管線與製程流程簡圖、燃燒塔 P&ID 總圖及其他主管機關指定之 P&ID 圖, 可以 A4 尺寸或折疊成 A4 尺寸檢附於本文件內。

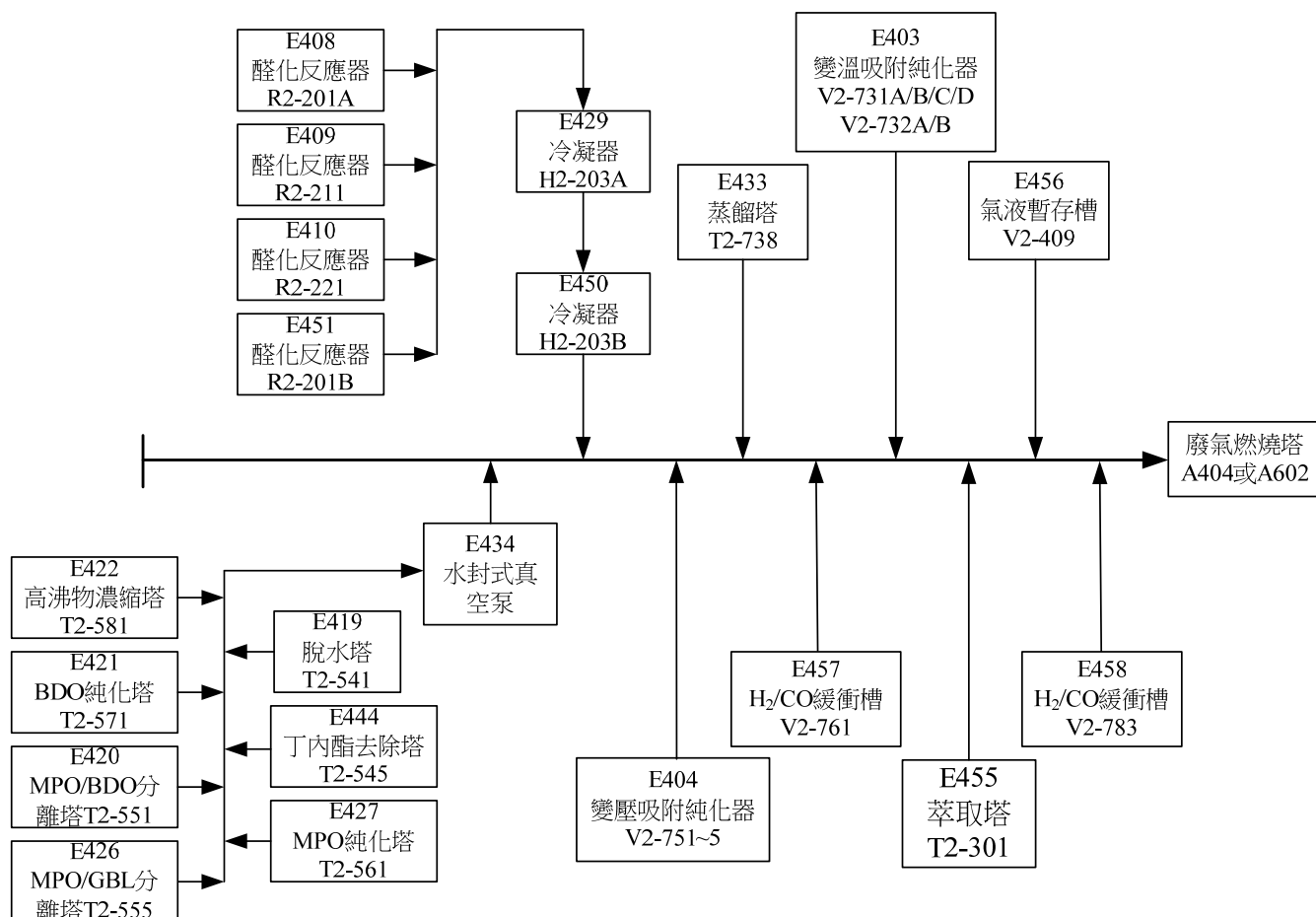
|     |    |     |    |
|-----|----|-----|----|
| 本頁次 | 23 | 總頁次 | 42 |
|-----|----|-----|----|

填表人： 沈 明 宗

|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A404 |
|------|---|---|---|---|---|---|---|---|------|------|

#### 四、廢氣燃燒塔上游管線與製程及附屬設施設計規格(二)

##### 緊急狀況



備註：M04 製程設備或高溫氧化器 E712 故障需停車檢修時或跳車時，M04 廢氣排往廢氣燃燒塔 A404 或 A602 處理。

說明：提供燃燒塔所屬上游管線與製程流程簡圖、燃燒塔 P&ID 總圖及其他主管機關指定之 P&ID 圖，可以 A4 尺寸或折疊成 A4 尺寸檢附於本文件內。

\*本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

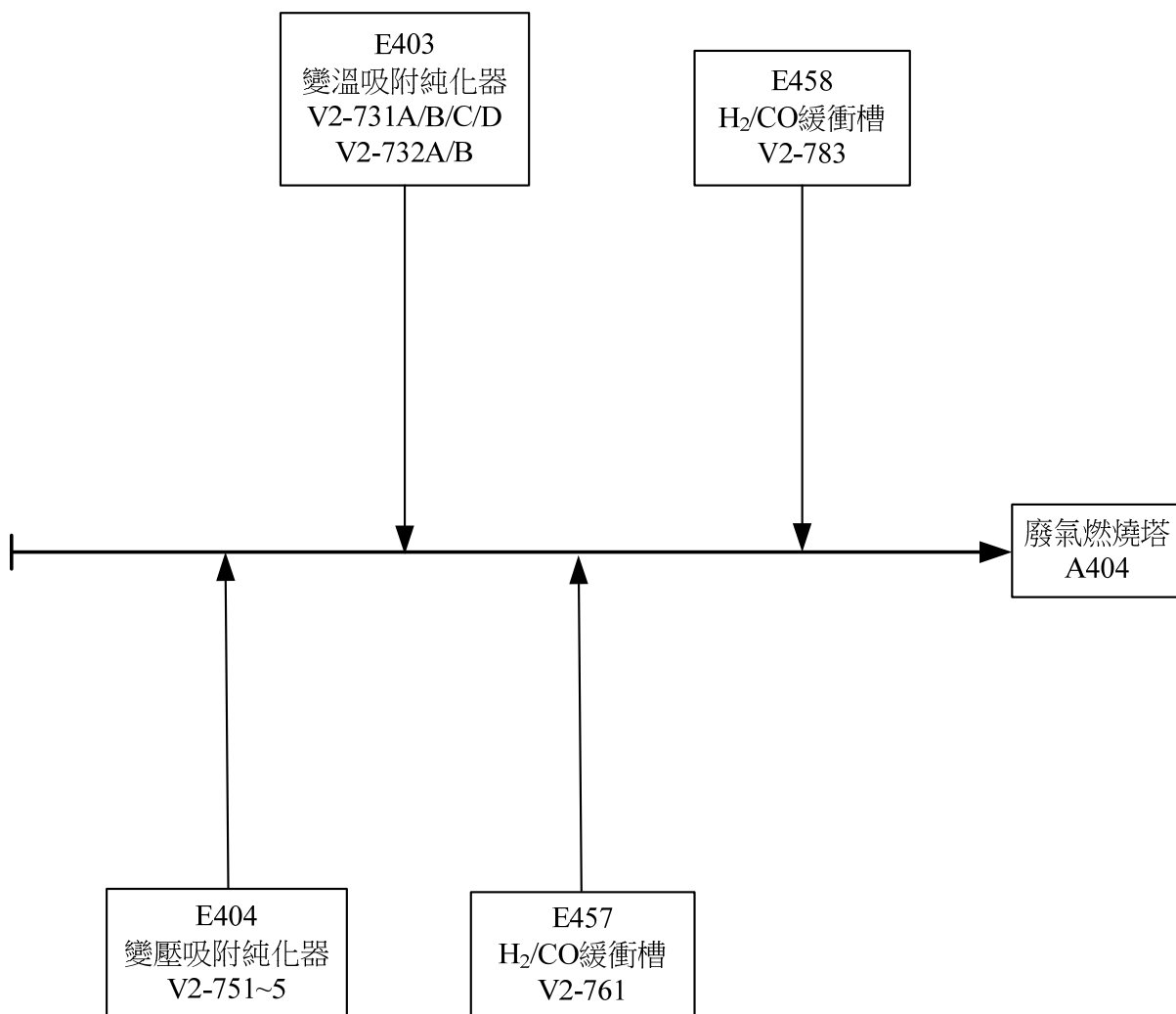
|     |    |     |    |
|-----|----|-----|----|
| 本頁次 | 24 | 總頁次 | 42 |
|-----|----|-----|----|

填表人：沈明宗

|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A404 |
|------|---|---|---|---|---|---|---|---|------|------|

#### 四、廢氣燃燒塔上游管線與製程及附屬設施設計規格(二)

開車( M04 製程開車)



說明：提供燃燒塔所屬上游管線與製程流程簡圖、燃燒塔 P&ID 總圖及其他主管機關指定之 P&ID 圖，  
可以 A4 尺寸或折疊成 A4 尺寸檢附於本文件內。

\*本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

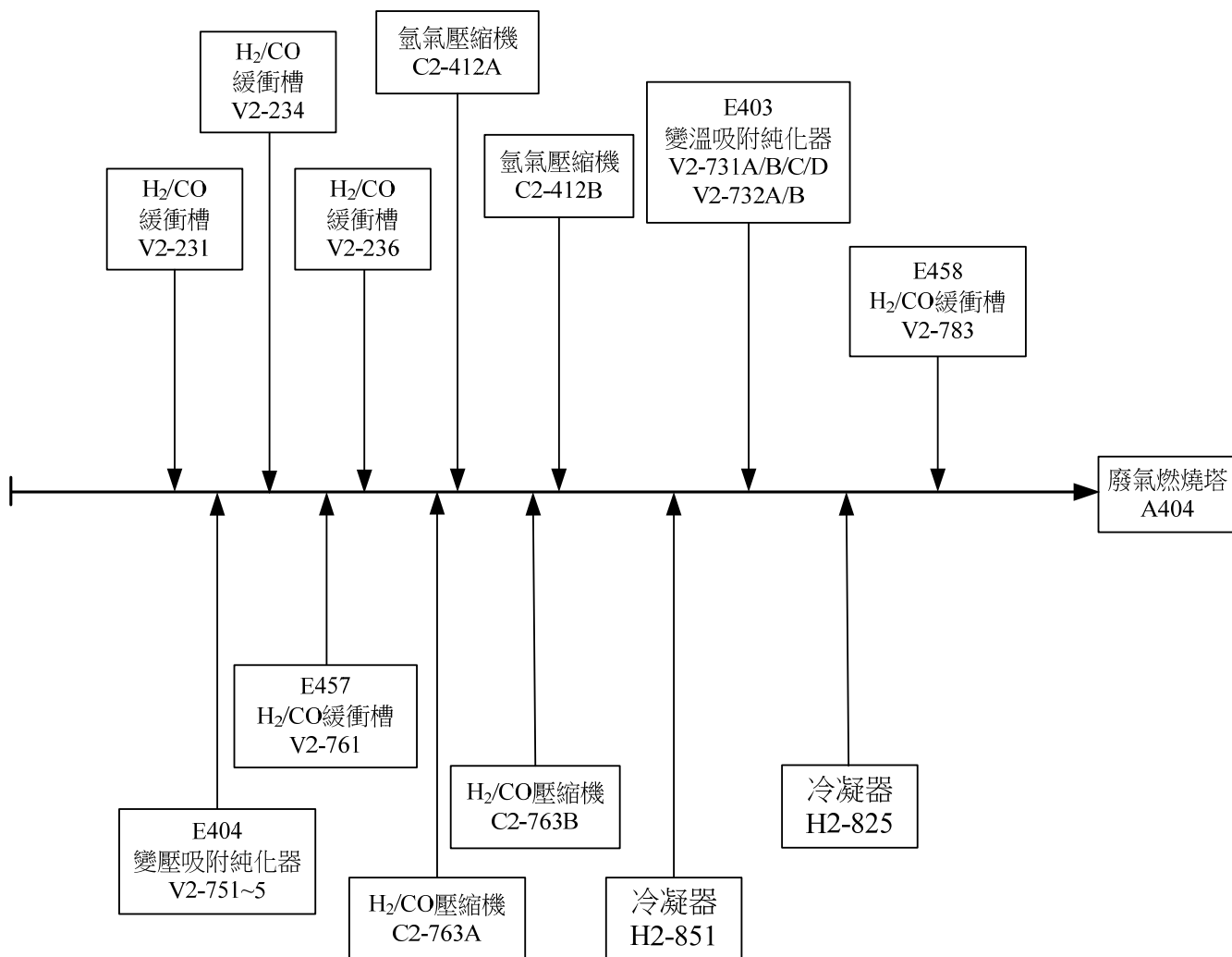
|     |    |     |    |
|-----|----|-----|----|
| 本頁次 | 25 | 總頁次 | 42 |
|-----|----|-----|----|

填表人： 沈明宗

|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A404 |
|------|---|---|---|---|---|---|---|---|------|------|

#### 四、廢氣燃燒塔上游管線與製程及附屬設施設計規格(二)

歲修一(M04 製程歲修或停修)



說明：提供燃燒塔所屬上游管線與製程流程簡圖、燃燒塔 P&ID 總圖及其他主管機關指定之 P&ID 圖，  
可以 A4 尺寸或折疊成 A4 尺寸檢附於本文件內。

\*本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

|     |    |     |    |
|-----|----|-----|----|
| 本頁次 | 26 | 總頁次 | 42 |
|-----|----|-----|----|

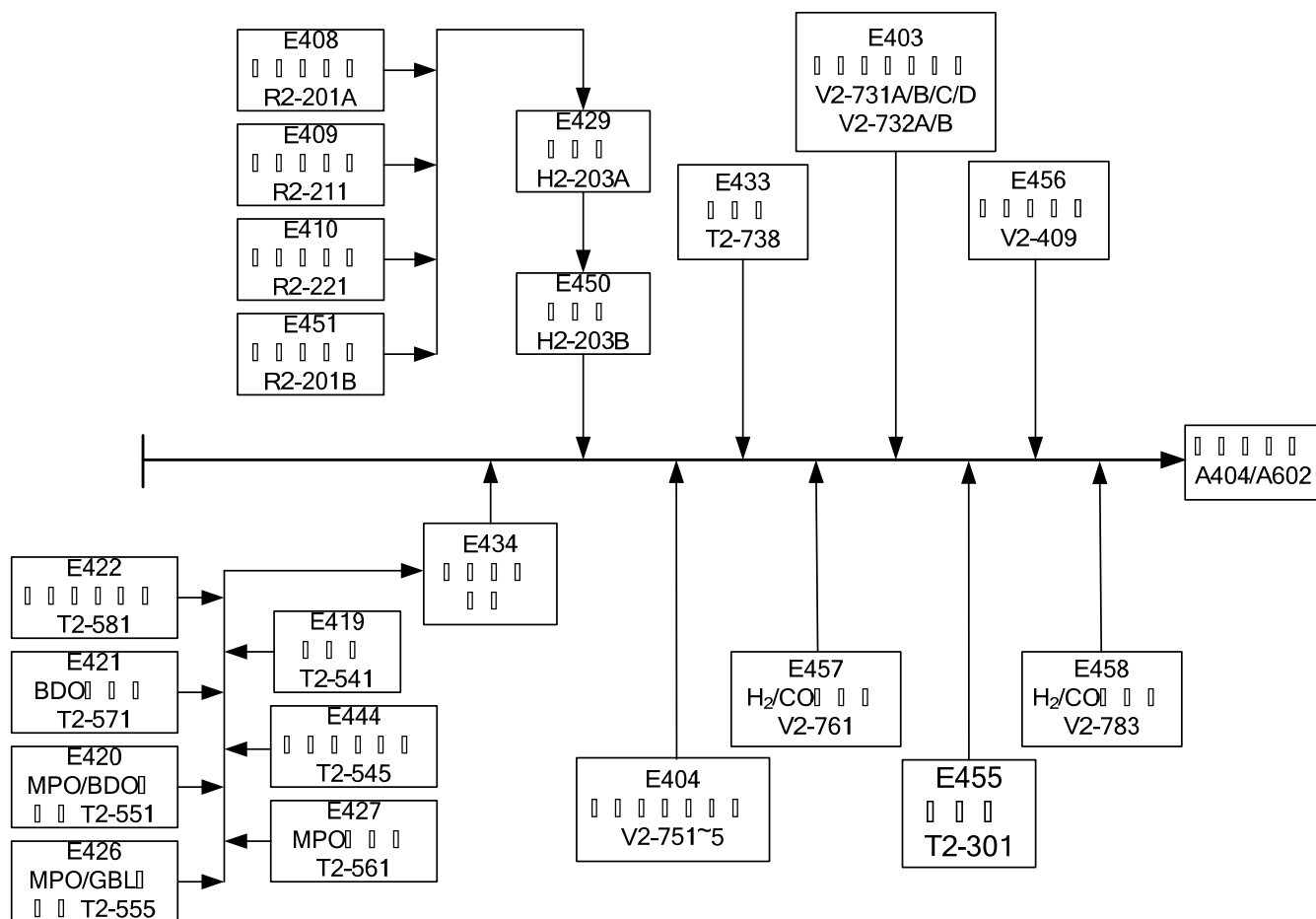
填表人： 沈明宗



|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A404 |
|------|---|---|---|---|---|---|---|---|------|------|

#### 四、廢氣燃燒塔上游管線與製程及附屬設施設計規格(二)

歲修二(E712 氧化爐清爐)



備註：高溫氧化器 E712 停爐清洗爐管時，M04 廢氣排往廢氣燃燒塔 A404 處理。

說明：提供燃燒塔所屬上游管線與製程流程簡圖、燃燒塔 P&ID 總圖及其他主管機關指定之 P&ID 圖，  
可以 A4 尺寸或折疊成 A4 尺寸檢附於本文件內。

\*本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

|     |    |     |    |
|-----|----|-----|----|
| 本頁次 | 27 | 總頁次 | 42 |
|-----|----|-----|----|

填表人：沈明宗

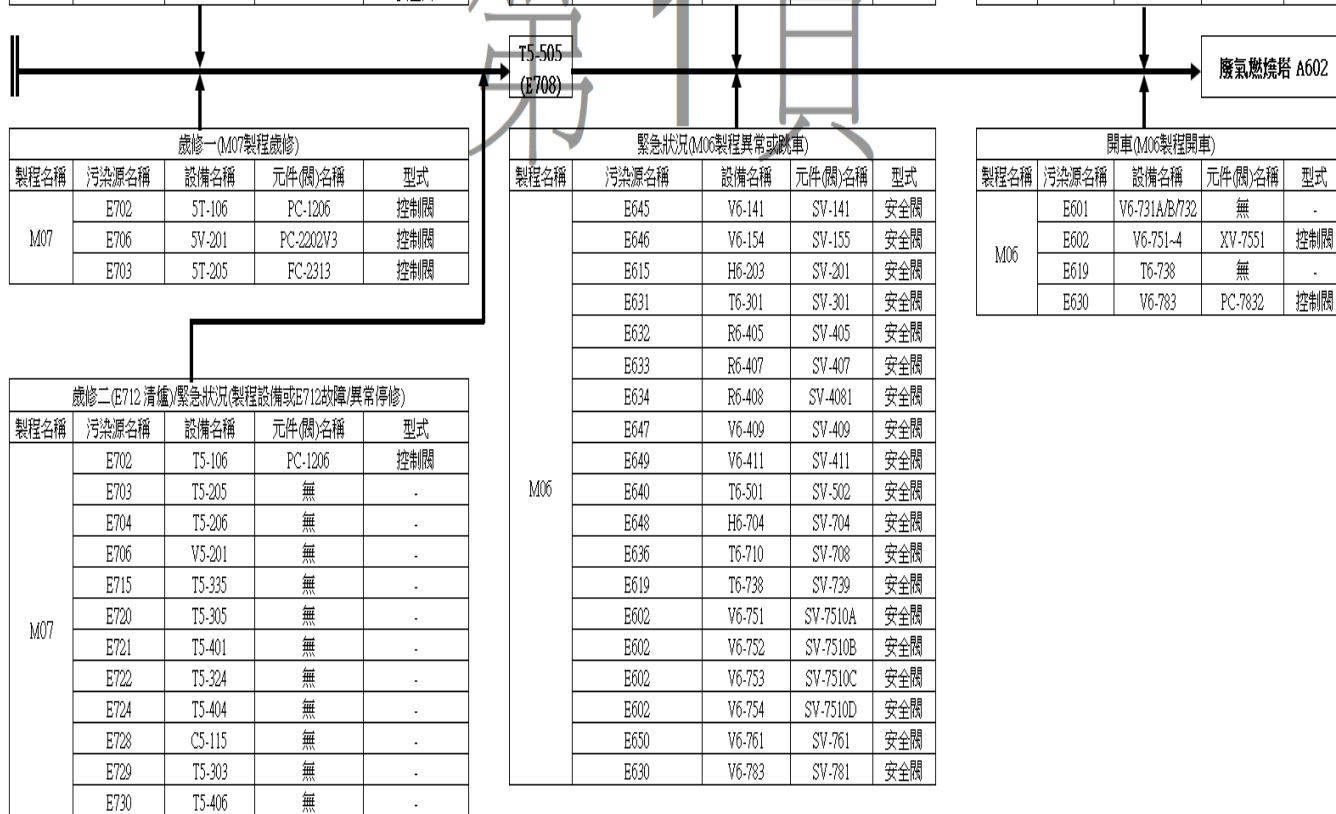
#### 四、廢氣燃燒塔上游管線與製程及附屬設施設計規格(一)

M06 及 M07 製程在緊急狀況、開車、歲修一及歲修二狀況下的廢氣會導入廢氣燃燒塔 A602 進行處理，而一般正常操作產生的製程廢氣將排往 M07 製程的 E712 處理，另外當 E712 故障、跳車或清洗爐管等不能使用的情形之下，M06 及 M07 製程常態廢氣則會排往廢氣燃燒塔 A602 處理。以下針對各使用狀況下，廢氣需排往 A602 之情形進行繪製說明：

| 緊急狀況(M07製程異常或跳車) |       |           |              |     |
|------------------|-------|-----------|--------------|-----|
| 製程名稱             | 污染源名稱 | 設備名稱      | 元件(個)名稱      | 型式  |
| M07              | E702  | T5-106    | PC-1206      | 控制閥 |
|                  | E703  | T5-205    | SV-0901      | 安全閥 |
|                  | E706  | V5-201    | SV-0701-2    | 安全閥 |
|                  | E715  | T5-335    | SV-5001      | 安全閥 |
|                  | E720  | T5-305    | SV-1501、1601 | 安全閥 |
|                  | E721  | T5-401    | 無            | -   |
|                  | E722  | T5-324    | SV-1401      | 安全閥 |
|                  | E724  | T5-404    | SV-1701      | 安全閥 |
|                  | E728  | C5-115    | 無            | -   |
|                  | E708  | T5-505    | 無            | -   |
|                  | -     | V5-804    | SV5-3901     | 安全閥 |
|                  | -     | V5-803    | SV5-3701     | 安全閥 |
|                  | -     | V5-803    | SV5-3702     | 安全閥 |
|                  | -     | H5-110A   | SV5-4601     | 安全閥 |
|                  | -     | V5-760A/B | SV5-4604     | 安全閥 |
|                  | -     | V5-760A/B | SV5-4605     | 安全閥 |
|                  | -     | V5-760A/B | SV5-760-3    | 安全閥 |
|                  | -     | V5-760A/B | SV5-760-4    | 安全閥 |
|                  | -     | V5-760A/B | SV5-4602     | 安全閥 |
|                  | -     | V5-760A/B | SV5-4603     | 安全閥 |

| 歲修二(E712 清爐)緊急狀況(製程設備或E712故障/異常停修) |        |               |         |     |
|------------------------------------|--------|---------------|---------|-----|
| 製程名稱                               | 污染源名稱  | 設備名稱          | 元件(閥)名稱 | 型式  |
| M06                                | E601   | V6-731A/B/732 | 無       | -   |
|                                    | E602   | V6-751~5      | XV-7551 | 控制閥 |
|                                    | E615   | H6-203        | FV-2331 | 控制閥 |
|                                    | E619   | T6-738        | 無       | -   |
|                                    | E630   | V6-783        | PC-7832 | 控制閥 |
|                                    | E631   | T6-301        | 無       | -   |
|                                    | E681   | T6-806        | 無       | -   |
|                                    | E609   | T6-541        | 無       | -   |
|                                    | E610   | T6-551        | 無       | -   |
|                                    | E611   | T6-571        | 無       | -   |
|                                    | E612   | T6-581        | 無       | -   |
|                                    | E613   | T6-555        | 無       | -   |
|                                    | E614   | T6-561        | 無       | -   |
|                                    | E624   | T6-545        | 無       | -   |
| E620                               | P6-596 | 無             | -       |     |
|                                    |        |               |         |     |
|                                    |        |               |         |     |
|                                    |        |               |         |     |
|                                    |        |               |         |     |
|                                    |        |               |         |     |

| 歲修一(M06製程歲修) |       |               |         |     |
|--------------|-------|---------------|---------|-----|
| 製程名稱         | 污染源名稱 | 設備名稱          | 元件(閥)名稱 | 型式  |
| M06          | E601  | V6-731A/B/732 | 無       | -   |
|              | E602  | V6-751-4      | XV-7551 | 控制閥 |
|              | E615  | H6-203        | FV-2331 | 控制閥 |
|              | E630  | V6-783        | PC-7832 | 控制閥 |
|              | E650  | V6-761        | PC-7611 | 控制閥 |
|              |       |               |         |     |
|              |       |               |         |     |
|              |       |               |         |     |
|              |       |               |         |     |
|              |       |               |         |     |

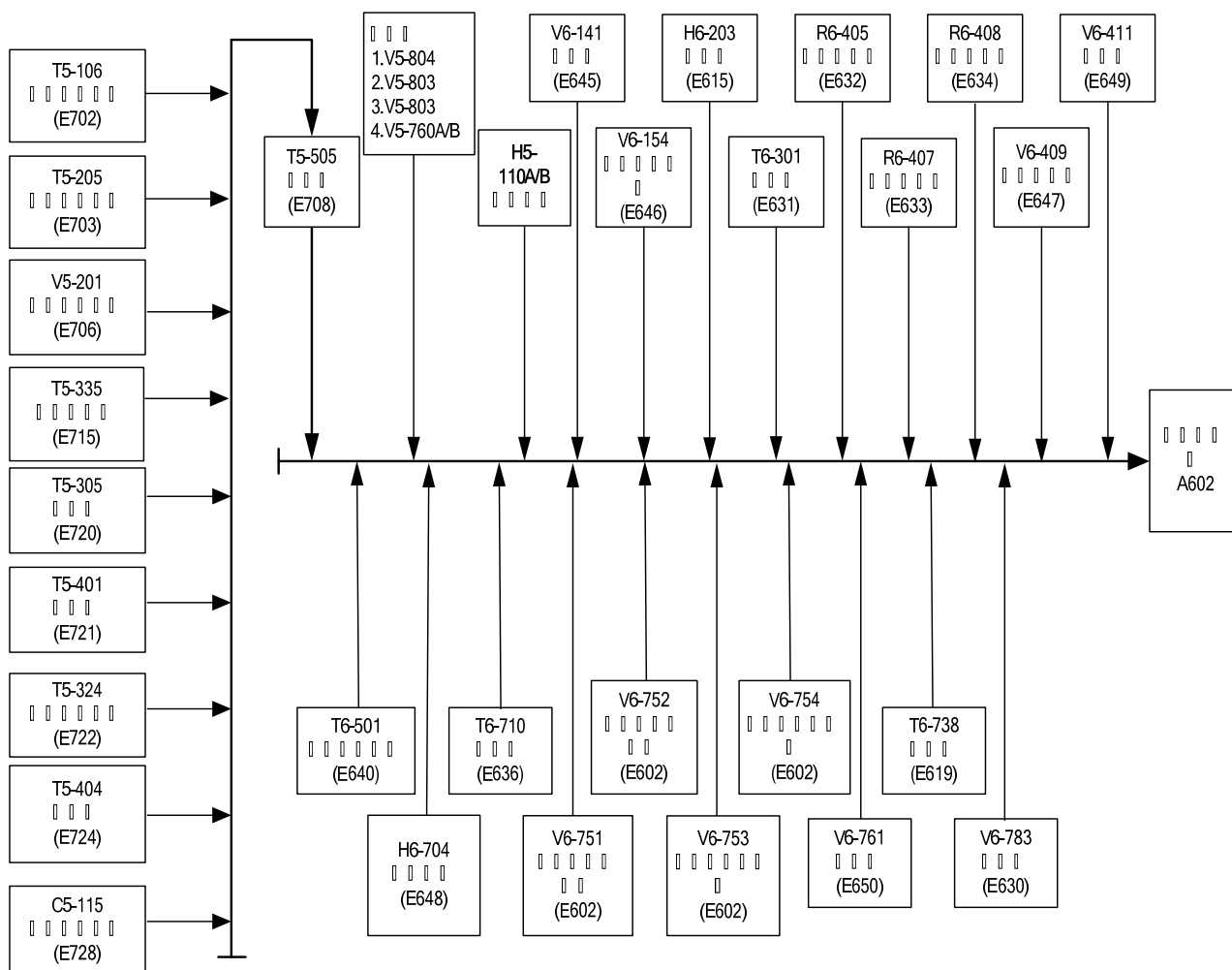


\* 本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A602 |
|------|---|---|---|---|---|---|---|---|------|------|

#### 四、廢氣燃燒塔上游管線與製程及附屬設施設計規格(二)

##### 緊急狀況



說明：提供燃燒塔所屬上游管線與製程流程簡圖、燃燒塔 P&ID 總圖及其他主管機關指定之 P&ID 圖，  
可以 A4 尺寸或折疊成 A4 尺寸檢附於本文件內。

\*本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

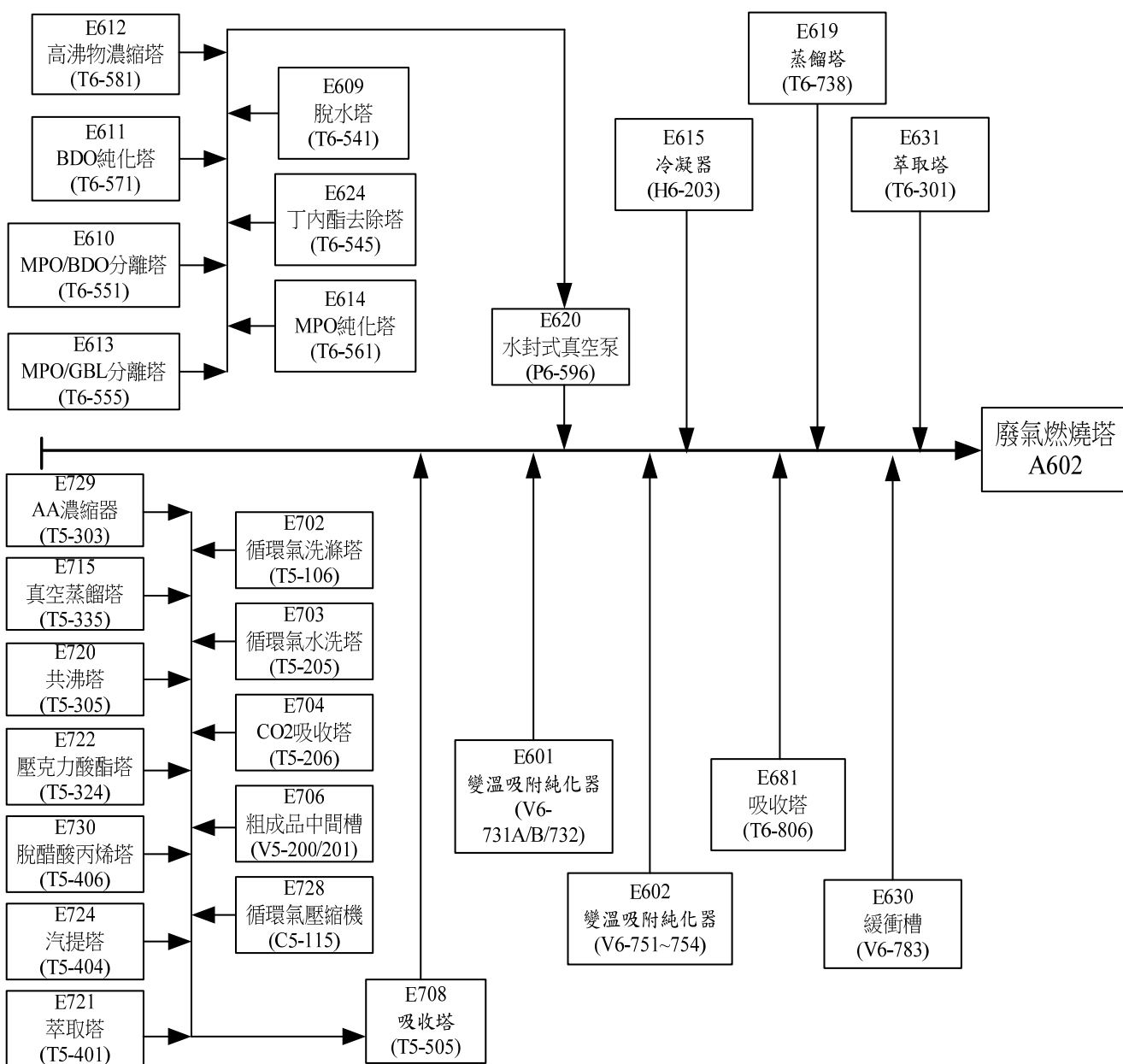
|     |    |     |    |
|-----|----|-----|----|
| 本頁次 | 29 | 總頁次 | 42 |
|-----|----|-----|----|

填表人：沈明宗

|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A602 |
|------|---|---|---|---|---|---|---|---|------|------|

#### 四、廢氣燃燒塔上游管線與製程及附屬設施設計規格(二)

##### 緊急狀況



說明：提供燃燒塔所屬上游管線與製程流程簡圖、燃燒塔 P&ID 總圖及其他主管機關指定之 P&ID 圖，  
可以 A4 尺寸或折疊成 A4 尺寸檢附於本文件內。

\*本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

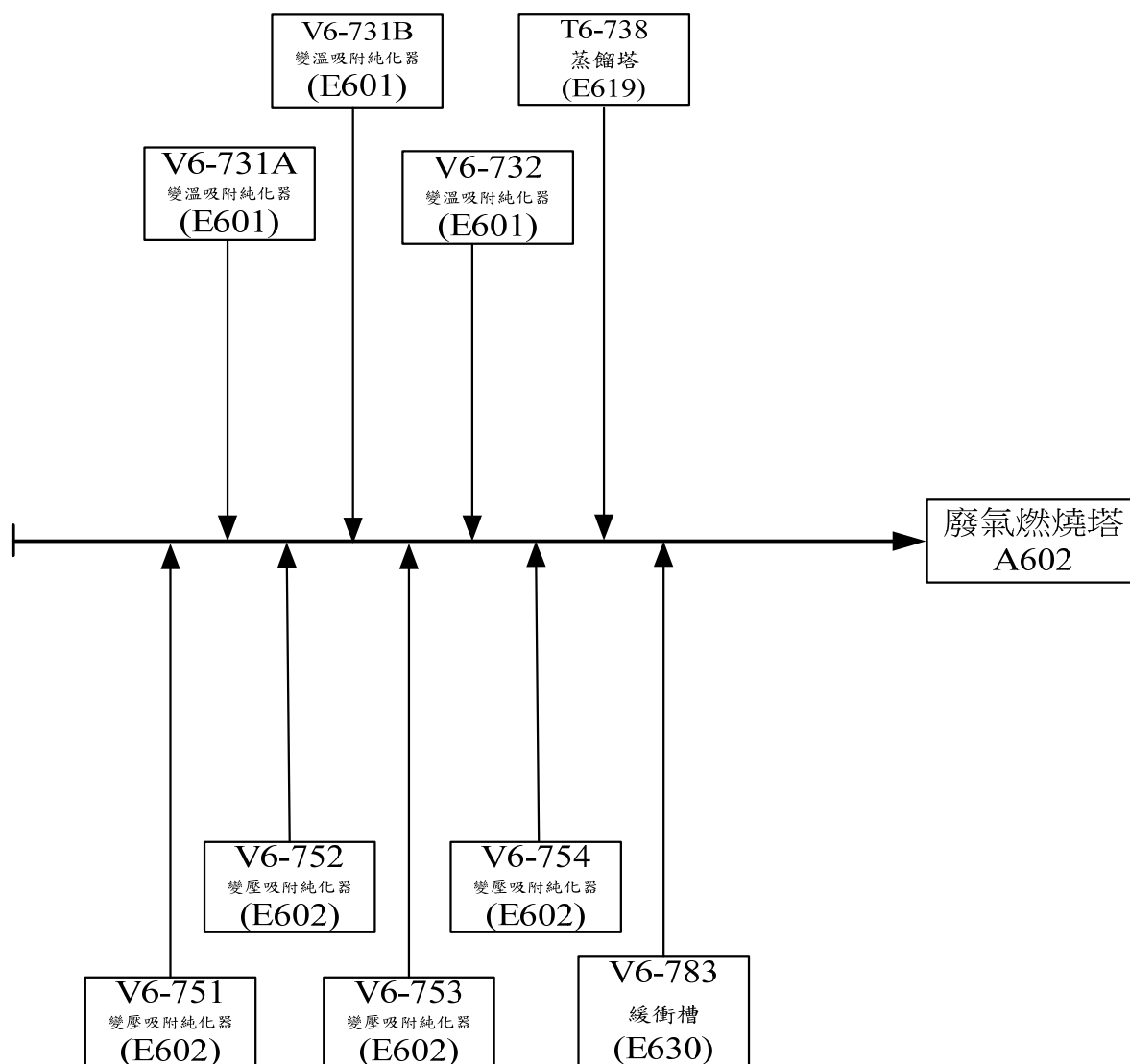
|     |    |     |    |
|-----|----|-----|----|
| 本頁次 | 30 | 總頁次 | 42 |
|-----|----|-----|----|

填表人：沈明宗

|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A602 |
|------|---|---|---|---|---|---|---|---|------|------|

#### 四、廢氣燃燒塔上游管線與製程及附屬設施設計規格(二)

開車(M06 製程開車)



說明：提供燃燒塔所屬上游管線與製程流程簡圖、燃燒塔 P&ID 總圖及其他主管機關指定之 P&ID 圖，可以 A4 尺寸或折疊成 A4 尺寸檢附於本文件內。

\*本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

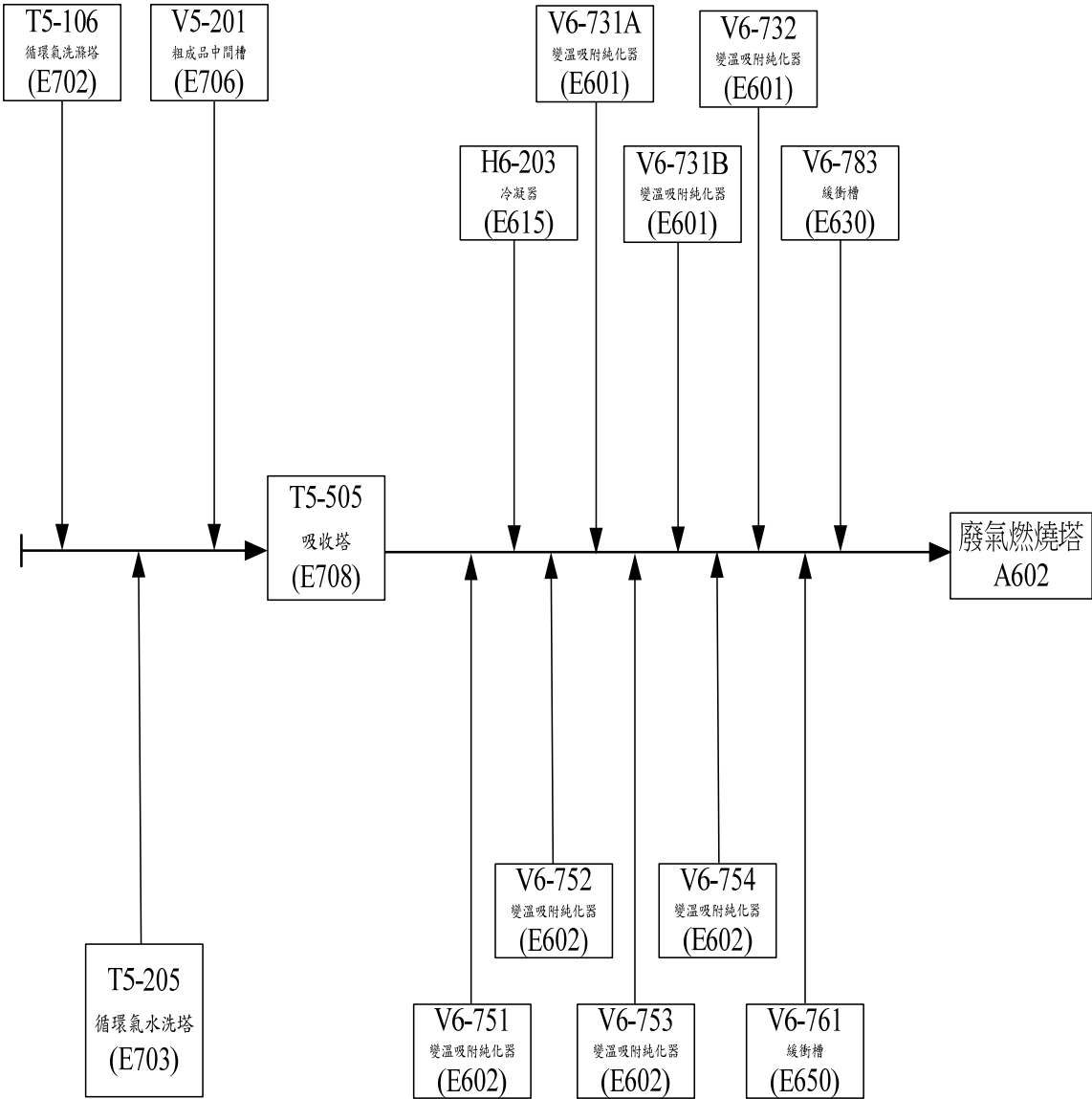
|     |    |     |    |
|-----|----|-----|----|
| 本頁次 | 31 | 總頁次 | 42 |
|-----|----|-----|----|

填表人： 沈明宗

|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A602 |
|------|---|---|---|---|---|---|---|---|------|------|

四、廢氣燃燒塔上游管線與製程及附屬設施設計規格(二)

歲修一(M06 或 M07 製程歲修)



說明：提供燃燒塔所屬上游管線與製程流程簡圖、燃燒塔 P&ID 總圖及其他主管機關指定之 P&ID 圖，  
可以 A4 尺寸或折疊成 A4 尺寸檢附於本文件內。

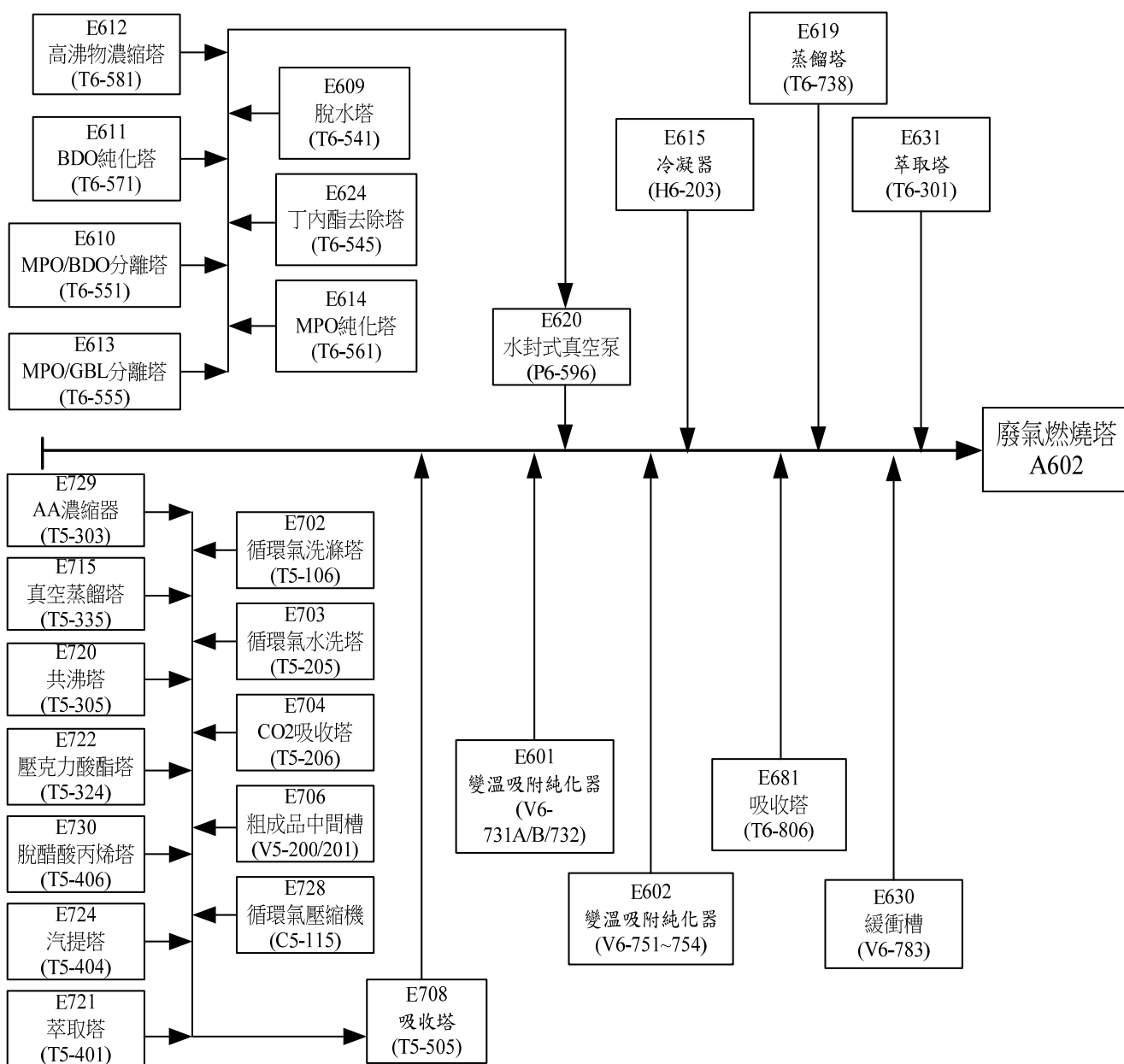
|                                                   |     |    |     |    |
|---------------------------------------------------|-----|----|-----|----|
| *本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。 | 本頁次 | 32 | 總頁次 | 42 |
|---------------------------------------------------|-----|----|-----|----|

填表人： 沈 明 宗

|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A602 |
|------|---|---|---|---|---|---|---|---|------|------|

#### 四、廢氣燃燒塔上游管線與製程及附屬設施設計規格(二)

##### 歲修二(E712 氧化爐清爐)



說明:提供燃燒塔所屬上游管線與製程流程簡圖、燃燒塔 P&ID 總圖及其他主管機關指定之 P&ID 圖, 可以 A4 尺寸或折疊成 A4 尺寸檢附於本文件內。

\*本表不敷填寫時,請自行影印空白表格使用,填妥後請在右上角填寫管制編號及設備編號,右下角填寫頁次。

|     |    |     |    |
|-----|----|-----|----|
| 本頁次 | 33 | 總頁次 | 42 |
|-----|----|-----|----|

填表人: 沈明宗

|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A404 |
|------|---|---|---|---|---|---|---|---|------|------|

### 五、廢氣燃燒塔使用情形分析

| 項次                                                 | 使用時機             | 廢氣量<br>(Nm <sup>3</sup> /hr) | 連續或<br>批次 | 每批次<br>時間          | 廢氣組成<br>(mole %)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  | 廢氣熱值<br>(MJ/Nm <sup>3</sup> ) | 說明<br>(含排放原因及估算方式) |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
|----------------------------------------------------|------------------|------------------------------|-----------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------|--------------------|----|--------|----|-------|----|--------|----|-------|------|--------|----|-------|----|-------|-----|-------|-----|-------|--------|-------|-----|-------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|-----|-------|----|-----|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| 1                                                  | 緊急狀況             | 8500                         | 批次        | 14<br>天/年          | <table><tr><th>物種</th><th>組成<br/>(%)</th></tr><tr><td>氫氣</td><td>29.900</td></tr><tr><td>氧氣</td><td>1.600</td></tr><tr><td>氮氣</td><td>11.990</td></tr><tr><td>甲烷</td><td>2.730</td></tr><tr><td>一氧化碳</td><td>52.250</td></tr><tr><td>乙烷</td><td>0.290</td></tr><tr><td>丙烷</td><td>0.810</td></tr><tr><td>異丁烷</td><td>0.185</td></tr><tr><td>正丁烷</td><td>0.011</td></tr><tr><td>環己烷</td><td>0.029</td></tr><tr><td>正丙醛</td><td>0.084</td></tr><tr><td>二甲基環己烷</td><td>0.037</td></tr><tr><td>四氫呋喃</td><td>0.015</td></tr><tr><td>正丙醇</td><td>0.064</td></tr><tr><td>合計</td><td>100</td></tr></table> |  | 物種                            | 組成<br>(%)          | 氫氣 | 29.900 | 氧氣 | 1.600 | 氮氣 | 11.990 | 甲烷 | 2.730 | 一氧化碳 | 52.250 | 乙烷 | 0.290 | 丙烷 | 0.810 | 異丁烷 | 0.185 | 正丁烷 | 0.011 | 環己烷    | 0.029 | 正丙醛 | 0.084 | 二甲基環己烷 | 0.037                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 四氫呋喃 | 0.015 | 正丙醇 | 0.064 | 合計 | 100 | 12.84 | (1)排放原因：<br>因 M04 製程或 E712 突發事故、無法預期且不可抗力之事件，導致公私場所產生安全危害之虞，需立即採取緊急處理行動，以回復正常安全操作之狀況<br>(2)使用頻率佐證資料詳如附件二十六。<br>(3)廢氣量估算方式：<br>廢氣量為製程常態排氣，依據附件九-排氣尾氣流量與組成分析資料，一般排氣 O <sub>2</sub> 、N <sub>2</sub> 、H <sub>2</sub> 、CO、CH <sub>4</sub> 佔廢氣成分 95%以上，依此值假設為常態下的廢氣質量流率)=7.49+179.87+101.27+604.73+67.48=960.84 kg/hr<br>排放流量=(960.84 kg/hr)/(19.44kg/kg-mole)×(22.4 Nm <sup>3</sup> /mole)=1107 Nm <sup>3</sup> /hr。<br>(4)廢氣組成和廢氣熱值估算依據附件八，108 年採樣分析結果填寫。 |  |  |
| 物種                                                 | 組成<br>(%)        |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 氫氣                                                 | 29.900           |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 氧氣                                                 | 1.600            |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 氮氣                                                 | 11.990           |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 甲烷                                                 | 2.730            |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 一氧化碳                                               | 52.250           |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 乙烷                                                 | 0.290            |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 丙烷                                                 | 0.810            |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 異丁烷                                                | 0.185            |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 正丁烷                                                | 0.011            |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 環己烷                                                | 0.029            |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 正丙醛                                                | 0.084            |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 二甲基環己烷                                             | 0.037            |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 四氫呋喃                                               | 0.015            |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 正丙醇                                                | 0.064            |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 合計                                                 | 100              |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 2                                                  | 開車<br>(M04 製程開車) | 4489                         | 批次        | 1 次/年<br><br>5 天/次 | <table><tr><th>物種</th><th>組成<br/>(%)</th></tr><tr><td>氫氣</td><td>57.012</td></tr><tr><td>氧氣</td><td>0.625</td></tr><tr><td>氮氣</td><td>19.234</td></tr><tr><td>甲烷</td><td>0.724</td></tr><tr><td>一氧化碳</td><td>21.116</td></tr><tr><td>乙烷</td><td>0.053</td></tr><tr><td>丙烷</td><td>1.077</td></tr><tr><td>丙烯</td><td>0.097</td></tr><tr><td>正丙醇</td><td>0.043</td></tr><tr><td>二甲基環己烷</td><td>0.011</td></tr><tr><td>合計</td><td>100</td></tr></table>                                                                                                                                               |  | 物種                            | 組成<br>(%)          | 氫氣 | 57.012 | 氧氣 | 0.625 | 氮氣 | 19.234 | 甲烷 | 0.724 | 一氧化碳 | 21.116 | 乙烷 | 0.053 | 丙烷 | 1.077 | 丙烯  | 0.097 | 正丙醇 | 0.043 | 二甲基環己烷 | 0.011 | 合計  | 100   | 10.28  | (1)排放原因：<br>製程排空停產超過 1 個月再重新開車時，因 M04 製程之製程氣來自甲醇裂解，製程氣成分主要為 H <sub>2</sub> 、CO、CO <sub>2</sub> 及 CH <sub>4</sub> 等非 VOCs 氣體，後續會經過 TSA(變溫吸附純化器)與 PSA(變壓吸附純化器)進行氣體純化與分離，初開車期間在各股氣體組成未達醛化反應與氫化反應需求標準前無法引入製程反應，故初開車期間產生排放之不合格製程氣將會排放至 flare 燃燒處理直至 TSA 與 PSA 產出符合反應要求的氣體組成。<br>(2)廢氣量及使用時間估算方式：廢氣量推估參考附件十三說明，使用時間以 104 及 105 年實際使用次數及時數估算，參考附件二十六說明。<br>(3)廢氣組成估算依據附件十三 105 年因 M04 開車之使用事件報告書平均填寫，廢氣熱值依據附件八，108 年採樣分析結果及附件十三 105 年因 M04 開車之使用事件報告書最小值及最大值填寫。 |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 物種                                                 | 組成<br>(%)        |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 氫氣                                                 | 57.012           |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 氧氣                                                 | 0.625            |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 氮氣                                                 | 19.234           |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 甲烷                                                 | 0.724            |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 一氧化碳                                               | 21.116           |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 乙烷                                                 | 0.053            |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 丙烷                                                 | 1.077            |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 丙烯                                                 | 0.097            |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 正丙醇                                                | 0.043            |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 二甲基環己烷                                             | 0.011            |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 合計                                                 | 100              |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| * 本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。 |                  |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                               | 本頁次                | 34 | 總頁次    | 42 |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |        |       |     |       |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |       |     |       |    |     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |

\*本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

|     |    |     |    |
|-----|----|-----|----|
| 本頁次 | 34 | 總頁次 | 42 |
|-----|----|-----|----|

填表人：沈明宗



|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A404 |
|------|---|---|---|---|---|---|---|---|------|------|

### 五、廢氣燃燒塔使用情形分析

| 項次         | 使用時機                     | 廢氣量<br>(Nm <sup>3</sup> /hr) | 連續或<br>批次 | 每批次<br>時間              | 廢氣組成<br>(mole %)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 廢氣熱值<br>(MJ/Nm <sup>3</sup> ) | 說明<br>(含排放原因及估算方式) |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
|------------|--------------------------|------------------------------|-----------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|--------------------|----|--------|----|-------|----|--------|----|-------|------|--------|----|-------|----|-------|-----|-------|-----|-------|-----|-------|-----|-------|------------|-------|------------|-------|------|-------|-----|-----|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3          | 歲修一<br>(M04 製程歲<br>修或停修) | 57~4489                      | 批次        | 1 次/年<br><br>28<br>天/次 | <table><tr><td>物種</td><td>組成<br/>(%)</td></tr><tr><td>氫氣</td><td>54.260</td></tr><tr><td>氧氣</td><td>1.385</td></tr><tr><td>氮氣</td><td>23.291</td></tr><tr><td>甲烷</td><td>0</td></tr><tr><td>一氧化碳</td><td>20.919</td></tr><tr><td>乙烷</td><td>0.011</td></tr><tr><td>丙烷</td><td>0.107</td></tr><tr><td>丙烯</td><td>0.007</td></tr><tr><td>異丁烷</td><td>0.002</td></tr><tr><td>正丁烷</td><td>0</td></tr><tr><td>環己烷</td><td>0</td></tr><tr><td>正丙醛</td><td>0.011</td></tr><tr><td>二甲基環<br/>己烷</td><td>0.003</td></tr><tr><td>四氫呋喃</td><td>0.005</td></tr><tr><td>正丙醇</td><td>0</td></tr><tr><td>合計</td><td>100</td></tr></table> | 物種                            | 組成<br>(%)          | 氫氣 | 54.260 | 氧氣 | 1.385 | 氮氣 | 23.291 | 甲烷 | 0     | 一氧化碳 | 20.919 | 乙烷 | 0.011 | 丙烷 | 0.107 | 丙烯  | 0.007 | 異丁烷 | 0.002 | 正丁烷 | 0     | 環己烷 | 0     | 正丙醛        | 0.011 | 二甲基環<br>己烷 | 0.003 | 四氫呋喃 | 0.005 | 正丙醇 | 0   | 合計    | 100                                                                                                                                                                                                                                                                                                                                                     | 8.64 | (1)排放原因：<br>(a)製程歲停修時，進行設備、管線清洗吹驅，因此廢氣成分大部分以氮氣為主，少部分為管線殘餘反應氣體。<br>(b)製程歲修末期初開車時。<br>(2)廢氣量估算方式：<br>為廠內氮氣吹驅的流量設定，請參照附件十三說明，及參考開車廢氣量。<br>(3)廢氣組成和廢氣熱值估算依據附件八，108 年採樣分析結果填寫。 |
| 物種         | 組成<br>(%)                |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 氫氣         | 54.260                   |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 氧氣         | 1.385                    |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 氮氣         | 23.291                   |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 甲烷         | 0                        |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 一氧化碳       | 20.919                   |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 乙烷         | 0.011                    |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 丙烷         | 0.107                    |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 丙烯         | 0.007                    |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 異丁烷        | 0.002                    |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 正丁烷        | 0                        |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 環己烷        | 0                        |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 正丙醛        | 0.011                    |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 二甲基環<br>己烷 | 0.003                    |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 四氫呋喃       | 0.005                    |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 正丙醇        | 0                        |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 合計         | 100                      |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 4          | 歲修二<br>(E712 氧化爐<br>清爐)  | 1107                         | 批次        | 4 次/年<br><br>2<br>天/次  | <table><tr><td>物種</td><td>組成<br/>(%)</td></tr><tr><td>氫氣</td><td>29.900</td></tr><tr><td>氧氣</td><td>1.600</td></tr><tr><td>氮氣</td><td>11.990</td></tr><tr><td>甲烷</td><td>2.730</td></tr><tr><td>一氧化碳</td><td>52.250</td></tr><tr><td>乙烷</td><td>0.290</td></tr><tr><td>丙烷</td><td>0.810</td></tr><tr><td>異丁烷</td><td>0.185</td></tr><tr><td>正丁烷</td><td>0.011</td></tr><tr><td>環己烷</td><td>0.029</td></tr><tr><td>正丙醛</td><td>0.084</td></tr><tr><td>二甲基環<br/>己烷</td><td>0.037</td></tr><tr><td>四氫呋喃</td><td>0.015</td></tr><tr><td>正丙醇</td><td>0.064</td></tr><tr><td>合計</td><td>100</td></tr></table>                   | 物種                            | 組成<br>(%)          | 氫氣 | 29.900 | 氧氣 | 1.600 | 氮氣 | 11.990 | 甲烷 | 2.730 | 一氧化碳 | 52.250 | 乙烷 | 0.290 | 丙烷 | 0.810 | 異丁烷 | 0.185 | 正丁烷 | 0.011 | 環己烷 | 0.029 | 正丙醛 | 0.084 | 二甲基環<br>己烷 | 0.037 | 四氫呋喃       | 0.015 | 正丙醇  | 0.064 | 合計  | 100 | 12.84 | (1)排放原因：<br>廢液燃料中原本含有高濃度鹽類，本廠增設除鹽系統(以樹脂將鹽類吸附去除)將廢液燃料中鹽類去除至<500ppm 後才投料至高溫氧化爐處理回收熱能，高溫氧化爐操作約 2~3 個月後因鹽類卡在爐管上之厚度增加，造成爐壓上升，基於操作安全上之考量，因而需停爐清洗爐管，於E712(高溫氧化爐)停爐清洗爐管至烘爐完成到開始處理廢氣期間，為確保M04 製程操作之安全，故須將M04 製程之廢氣導入A404 或 A602 處理。<br>(2)廢氣量及使用時間估算方式：廢氣量推估參考附件十三說明，使用時間以 105 年實際使用次數及時數估算。<br>(3) 其製程排氣成分與廢氣燃燒塔尚未管制使用前之排氣成分相同，總淨熱值依據附件八檢附之 108 年廢氣採樣分析結果平均值計算。 |      |                                                                                                                                                                           |
| 物種         | 組成<br>(%)                |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 氫氣         | 29.900                   |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 氧氣         | 1.600                    |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 氮氣         | 11.990                   |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 甲烷         | 2.730                    |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 一氧化碳       | 52.250                   |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 乙烷         | 0.290                    |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 丙烷         | 0.810                    |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 異丁烷        | 0.185                    |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 正丁烷        | 0.011                    |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 環己烷        | 0.029                    |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 正丙醛        | 0.084                    |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 二甲基環<br>己烷 | 0.037                    |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 四氫呋喃       | 0.015                    |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 正丙醇        | 0.064                    |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |
| 合計         | 100                      |                              |           |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                    |    |        |    |       |    |        |    |       |      |        |    |       |    |       |     |       |     |       |     |       |     |       |            |       |            |       |      |       |     |     |       |                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                                                                                                           |

\*本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

|     |    |     |    |
|-----|----|-----|----|
| 本頁次 | 35 | 總頁次 | 42 |
|-----|----|-----|----|

填表人：沈明宗

|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A602 |
|------|---|---|---|---|---|---|---|---|------|------|

### 五、廢氣燃燒塔使用情形分析

| 項次         | 使用時機                 | 廢氣量<br>(Nm <sup>3</sup> /hr) | 連續或<br>批次 | 每批次<br>時間          | 廢氣組成<br>(mole %)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |    | 廢氣熱值<br>(MJ/Nm <sup>3</sup> ) | 說明<br>(含排放原因及估算方式) |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
|------------|----------------------|------------------------------|-----------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-------------------------------|--------------------|--------|----|-------|----|--------|----|--------|------|--------|----|-------|------------|-------|----|-------|-----|-------|-----|-------|------------|-------|-----|-------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------|---------|-------|----|-----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1          | 緊急狀況                 | 140328                       | 批次        | 32<br>天/年          | <table><tr><td>物種</td><td>組成<br/>(%)</td></tr><tr><td>氫氣</td><td>32.820</td></tr><tr><td>氧氣</td><td>0.940</td></tr><tr><td>氮氣</td><td>35.201</td></tr><tr><td>甲烷</td><td>11.919</td></tr><tr><td>一氧化碳</td><td>15.333</td></tr><tr><td>乙烷</td><td>0.426</td></tr><tr><td>二甲基<br/>環己烷</td><td>0.001</td></tr><tr><td>丙烷</td><td>1.411</td></tr><tr><td>丙烯</td><td>0.703</td></tr><tr><td>異丁烷</td><td>0.338</td></tr><tr><td>正丁烷</td><td>0.023</td></tr><tr><td>環己烷</td><td>0.002</td></tr><tr><td>正丙醛</td><td>0.739</td></tr><tr><td>四氫<br/>呋喃</td><td>0.142</td></tr><tr><td>正丙<br/>醇</td><td>0.002</td></tr><tr><td>合計</td><td>100</td></tr></table> | 物種 | 組成<br>(%)                     | 氫氣                 | 32.820 | 氧氣 | 0.940 | 氮氣 | 35.201 | 甲烷 | 11.919 | 一氧化碳 | 15.333 | 乙烷 | 0.426 | 二甲基<br>環己烷 | 0.001 | 丙烷 | 1.411 | 丙烯  | 0.703 | 異丁烷 | 0.338 | 正丁烷        | 0.023 | 環己烷 | 0.002 | 正丙醛   | 0.739                                                                                                                                                                                                                                                                                                                                                                                                               | 四氫<br>呋喃 | 0.142 | 正丙<br>醇 | 0.002 | 合計 | 100 | 13.07 | (1)排放原因：<br>因 M06/M07 製程或 E712 突發事故、無法預期且不可抗力之事件，導致公私場所產生安全危害之虞，需立即採取緊急處理行動，以回復正常安全操作之狀況。<br>(2)使用頻率佐證資料詳如附件二十六。<br>(3)廢氣量估算方式：<br>廢氣量為製程常態排氣，依據附件十二-2-104 年 1 月 31 日廢氣燃燒塔使用報告書廢氣量估算=日累計量/24<br>=46007.19/24=1917 Nm3/hr。<br>(4)廢氣組成和廢氣熱值估算參照 P.15 填寫。 |
| 物種         | 組成<br>(%)            |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 氫氣         | 32.820               |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 氧氣         | 0.940                |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 氮氣         | 35.201               |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 甲烷         | 11.919               |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 一氧化碳       | 15.333               |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 乙烷         | 0.426                |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 二甲基<br>環己烷 | 0.001                |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 丙烷         | 1.411                |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 丙烯         | 0.703                |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 異丁烷        | 0.338                |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 正丁烷        | 0.023                |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 環己烷        | 0.002                |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 正丙醛        | 0.739                |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 四氫<br>呋喃   | 0.142                |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 正丙<br>醇    | 0.002                |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 合計         | 100                  |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 2          | 開車<br>(M06 製程<br>開車) | 7902                         | 批次        | 1 次/年<br><br>5 天/次 | <table><tr><td>物種</td><td>組成<br/>(%)</td></tr><tr><td>氫氣</td><td>51.043</td></tr><tr><td>氧氣</td><td>1.324</td></tr><tr><td>氮氣</td><td>15.000</td></tr><tr><td>甲烷</td><td>1.026</td></tr><tr><td>一氧化碳</td><td>30.230</td></tr><tr><td>乙烷</td><td>0.102</td></tr><tr><td>丙烷</td><td>0.146</td></tr><tr><td>丙烯</td><td>0.006</td></tr><tr><td>正丙醇</td><td>1.119</td></tr><tr><td>環己烷</td><td>0.005</td></tr><tr><td>二甲基<br/>環己烷</td><td>0.016</td></tr><tr><td>合計</td><td>100</td></tr></table>                                                                                                                                                         | 物種 | 組成<br>(%)                     | 氫氣                 | 51.043 | 氧氣 | 1.324 | 氮氣 | 15.000 | 甲烷 | 1.026  | 一氧化碳 | 30.230 | 乙烷 | 0.102 | 丙烷         | 0.146 | 丙烯 | 0.006 | 正丙醇 | 1.119 | 環己烷 | 0.005 | 二甲基<br>環己烷 | 0.016 | 合計  | 100   | 12.08 | (1)排放原因：<br>製程排空停產超過 1 個月再重新開車時，因 M06 製程之製程氣來自甲醇裂解，製程氣成分主要為 H2、CO、CO2 及 CH4 等非 VOCs 氣體，後續會經過 TSA(變溫吸附純化器)與 PSA(變壓吸附純化器)進行氣體純化與分離，初開車期間在各股氣體組成未達醛化反應與氫化反應需求標準前無法引入製程反應，故初開車期間產生排放之不合格製程氣將會排放至 flare 燃燒處理直至 TSA 與 PSA 產出符合反應要求的氣體組成。<br>(2)廢氣量及使用時間估算方式：廢氣量推估參考附件十三說明，使用時間以 104 及 105 年實際使用次數及時數估算，參考附件二十六說明。<br>(3)廢氣組成估算依據附件十三 105 年因 M06 開車之使用事件報告書平均填寫，廢氣熱值依據附件八、108 年採樣分析結果及附件十三 105 年因 M06 開車之使用事件報告書最小值及最大值填寫。 |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 物種         | 組成<br>(%)            |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 氫氣         | 51.043               |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 氧氣         | 1.324                |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 氮氣         | 15.000               |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 甲烷         | 1.026                |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 一氧化碳       | 30.230               |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 乙烷         | 0.102                |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 丙烷         | 0.146                |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 丙烯         | 0.006                |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 正丙醇        | 1.119                |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 環己烷        | 0.005                |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 二甲基<br>環己烷 | 0.016                |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |
| 合計         | 100                  |                              |           |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                               |                    |        |    |       |    |        |    |        |      |        |    |       |            |       |    |       |     |       |     |       |            |       |     |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |         |       |    |     |       |                                                                                                                                                                                                                                                        |

\*本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

|     |    |     |    |
|-----|----|-----|----|
| 本頁次 | 36 | 總頁次 | 42 |
|-----|----|-----|----|

填表人：沈明宗

|      |   |   |   |   |   |   |   |   |      |      |
|------|---|---|---|---|---|---|---|---|------|------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A602 |
|------|---|---|---|---|---|---|---|---|------|------|

### 五、廢氣燃燒塔使用情形分析

| 項次  | 使用時機                | 廢氣量<br>(Nm <sup>3</sup> /hr) | 連續或<br>批次 | 每批次<br>時間           | 廢氣組成<br>(mole %) |        | 廢氣熱值<br>(MJ/Nm <sup>3</sup> ) | 說明<br>(含排放原因及估算方式)                                                                                                                                                                                                                                                                                                                                                   |
|-----|---------------------|------------------------------|-----------|---------------------|------------------|--------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3   | 歲修一(M06 或 M07 製程歲修) | 6446                         | 批次        | 1 次/年<br><br>36 天/次 | 物種               | 組成 (%) | 12.28                         | (1)排放原因：<br>(a)製程歲停修時，進行設備、管線清洗吹驅，因此廢氣成分大部分以氮氣、CO 為主，少部分為管線殘餘反應氣體。<br>(b)製程歲修末期初開車時。<br>(2)廢氣量估算方式：<br>廢氣量估算方式請參考附件十二說明。<br>(3)廢氣組成及廢氣熱值估算參考附件十二因 M06 歲修之使用事件報告書平均填寫。                                                                                                                                                                                                |
|     |                     |                              |           |                     | 氫氣               | 31.239 |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 氧氣               | 1.170  |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 氮氣               | 46.828 |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 甲烷               | 4.335  |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 一氧化碳             | 7.909  |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 乙烷               | 0      |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 二甲基環己烷           | 0.011  |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 丙烷               | 6.403  |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 丙烯               | 1.849  |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 異丁烷              | 0.212  |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 正丁烷              | 0.001  |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 環己烷              | 0      |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 正丙醛              | 0.005  |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 四氫呋喃             | 0.020  |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 正丙醇              | 0.010  |                               |                                                                                                                                                                                                                                                                                                                                                                      |
| 合計  | 100                 |                              |           |                     |                  |        |                               |                                                                                                                                                                                                                                                                                                                                                                      |
| 4   | 歲修二<br>(E712 氧化爐清爐) | 956                          | 批次        | 4 次/年<br><br>2 天/次  | 物種               | 組成 (%) | 13.07                         | (1)排放原因：<br>廢液燃料中原本含有高濃度鹽類，本廠增設除鹽系統(以樹脂將鹽類吸附去除)將廢液燃料中鹽類去除至<500ppm 後才投料至高溫氧化爐處理回收熱能，高溫氧化爐操作約 2~3 個月後因鹽類卡在爐管上之厚度增加，造成爐壓上升，基於操作安全上之考量，因而需停爐清洗爐管，於 E712(高溫氧化爐) 停爐清洗爐管至烘爐完成到開始處理廢氣期間，因確保 M06 及 M07 製程操作之安全，故須將 M06 及 M07 製程之廢氣導入 A602 處理。<br>(2)廢氣量估算方式：<br>廢氣量為製程常態排氣，依據附件十二-1-107 年 12 月 28 日廢氣燃燒塔使用報告書廢氣量估算=日累計量/24=19702/24=956 Nm3/hr。<br>(3) 廢氣組成和廢氣熱值估算參照 P.14 填寫。 |
|     |                     |                              |           |                     | 氫氣               | 18.600 |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 氧氣               | 1.530  |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 氮氣               | 28.600 |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 甲烷               | 2.000  |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 一氧化碳             | 24.200 |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 二氧化碳             | 5.700  |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 乙烷               | 0.530  |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 乙烯               | 0.040  |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 丙烷               | 6.120  |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 丙烯               | 12.500 |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 異丁烷              | 0.080  |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 正丁烷              | 0.006  |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 環己烷              | 0.007  |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 正丙醛              | 0.077  |                               |                                                                                                                                                                                                                                                                                                                                                                      |
|     |                     |                              |           |                     | 四氫呋喃             | 0.004  |                               |                                                                                                                                                                                                                                                                                                                                                                      |
| 正丙醇 | 0.003               |                              |           |                     |                  |        |                               |                                                                                                                                                                                                                                                                                                                                                                      |
| 合計  | 100                 |                              |           |                     |                  |        |                               |                                                                                                                                                                                                                                                                                                                                                                      |

\* 本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

|     |    |     |    |
|-----|----|-----|----|
| 本頁次 | 37 | 總頁次 | 42 |
|-----|----|-----|----|

填表人： 沈明宗

|      |   |   |   |   |   |   |   |   |      |           |
|------|---|---|---|---|---|---|---|---|------|-----------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A404/A602 |
|------|---|---|---|---|---|---|---|---|------|-----------|

## 六、燃燒塔廢氣減量措施(一)已裝設

| 項次 | 使用時機                         | 廢氣量<br>(Nm <sup>3</sup> /hr) | 回收量<br>(Nm <sup>3</sup> /hr) | 回收比例<br>(%) | 改善完成<br>日期(年/<br>月) | 改善方式說明(例如增設廢氣回收系統、增<br>加製程維護頻率等)                                                                              |
|----|------------------------------|------------------------------|------------------------------|-------------|---------------------|---------------------------------------------------------------------------------------------------------------|
| 1  | M04 正常操作<br>下之製程氣            | 1107                         | 1107                         | 100         | 103/6/30            | 配置管路、氣體緩衝灌及穩壓風車將製程正<br>常操作時排放之廢氣導引至丙烯醇化學製<br>造程序(M07 製程)中之 E712 高溫氧化爐處<br>理。                                  |
| 2  | M06 及 M07 正<br>常操作下之<br>製程氣  | 1917                         | 1917                         | 100         | 103/6/30            |                                                                                                               |
| 3  | A404/A602 之<br>緊急狀況二         | 3024                         | 79                           | 2.6         | 104/7/31            | 增設製程重沸物除鹽系統，將製程重沸物中<br>鹽類去除後再導入高溫氧化器(E712)處理<br>以避免因重沸物中含鹽類過高，導致爐體阻<br>塞及耐火泥崩落，造成高溫氧化器(E712)需<br>緊急停爐維修之情形發生。 |
| 4  | A404/A602 之<br>緊急狀況二         | 3024                         | 57                           | 1.9         | 104/11/30           | E712 高溫氧化爐內部耐火鉤釘材質更換，<br>耐火泥崩落處全部打除重新依照原廠設計<br>鋪設以防止 E712 高溫氧化爐爐體熱受損造<br>成停車，廢氣排至燃燒塔處理。                       |
| 5  | A404/A602 之<br>緊急狀況二         | 3024                         | 10                           | 0.3         | 105/11/30           | E712 高溫氧化爐更換廢氣燃燒機組以減少<br>E712 高溫氧化爐異常或故障次數。                                                                   |
| 6  | A404/A602 之<br>歲修二及緊<br>急狀況二 | 3024                         | 1512                         | 50          | 106/3/31            | M04/M06 製程優化改善減少製程尾氣排放                                                                                        |
| 7  | A404/A602 之<br>歲修二           | 2063                         | 80                           | 3.9         | 106/6/30            | E712 廢液廢氣焚化爐燃料除鹽系統優化改<br>善                                                                                    |
| 8  | A404/A602 之<br>歲修二           | 2063                         | 100                          | 4.8         | 107/11/30           | 當 E712 廢液廢氣焚化爐防制設備 A703 故<br>障、異常或壓力過高時，E712 改以投入輕<br>沸物(不含鹽類)拌燃製程尾氣持續處理，製<br>程尾氣不導到廢氣燃燒塔。                    |
|    |                              |                              |                              |             |                     |                                                                                                               |
|    |                              |                              |                              |             |                     |                                                                                                               |
|    |                              |                              |                              |             |                     |                                                                                                               |

註：請依廢氣燃燒塔設備編號逐項填寫。請填寫近五年內資料。

\*本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制  
編號及設備編號，右下角填寫頁次。

|     |    |     |    |
|-----|----|-----|----|
| 本頁次 | 38 | 總頁次 | 42 |
|-----|----|-----|----|

填表人：沈明宗

|      |   |   |   |   |   |   |   |   |      |           |
|------|---|---|---|---|---|---|---|---|------|-----------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A404/A602 |
|------|---|---|---|---|---|---|---|---|------|-----------|

## 六、燃燒塔廢氣減量措施(二)預計增設

| 項次 | 使用時機          | 廢氣量<br>(Nm <sup>3</sup> /hr) | 回收量<br>(Nm <sup>3</sup> /hr) | 回收比例<br>(%) | 改善完成日期<br>(年/月) | 改善方式說明(例如增設廢氣回收系統、增加製程維護頻率等)                              |
|----|---------------|------------------------------|------------------------------|-------------|-----------------|-----------------------------------------------------------|
| 1  | A602 之<br>歲修一 | 4489                         | 2245                         | 50          | 110/12/31       | 評估與規劃 M06 製程歲修週期由 1 年延長至 2 年之可行性(考量設備維修保養週期、觸媒壽命與可能的品質影響) |
| 2  | A404 之<br>歲修一 | 6446                         | 3223                         | 50          | 111/12/31       | 評估與規劃 M04 製程歲修週期由 1 年延長至 2 年之可行性(考量設備維修保養週期、觸媒壽命與可能的品質影響) |
|    |               |                              |                              |             |                 |                                                           |
|    |               |                              |                              |             |                 |                                                           |
|    |               |                              |                              |             |                 |                                                           |
|    |               |                              |                              |             |                 |                                                           |
|    |               |                              |                              |             |                 |                                                           |
|    |               |                              |                              |             |                 |                                                           |
|    |               |                              |                              |             |                 |                                                           |
|    |               |                              |                              |             |                 |                                                           |
|    |               |                              |                              |             |                 |                                                           |
|    |               |                              |                              |             |                 |                                                           |
|    |               |                              |                              |             |                 |                                                           |
|    |               |                              |                              |             |                 |                                                           |
|    |               |                              |                              |             |                 |                                                           |
|    |               |                              |                              |             |                 |                                                           |
|    |               |                              |                              |             |                 |                                                           |
|    |               |                              |                              |             |                 |                                                           |
|    |               |                              |                              |             |                 |                                                           |

註：請依廢氣燃燒塔設備編號逐項填寫。

\* 本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

|     |    |     |    |
|-----|----|-----|----|
| 本頁次 | 39 | 總頁次 | 42 |
|-----|----|-----|----|

填表人： 沈明宗

|      |   |   |   |   |   |   |   |   |      |           |
|------|---|---|---|---|---|---|---|---|------|-----------|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 | 設備編號 | A404/A602 |
|------|---|---|---|---|---|---|---|---|------|-----------|

## 七、監測設施失效之替代方式

| 監測設施失效之替代方式 |         |                                                                                                                                          |
|-------------|---------|------------------------------------------------------------------------------------------------------------------------------------------|
| 項次          | 監測設施名稱  | 失效替代方式                                                                                                                                   |
| 1           | 母火溫度計   | (1)A404<br>母火溫度計有二支，其中一支失效或故障，可由另一支溫度計或二支母火監視器替代，且本廠有母火溫度計備品可立即更換。<br>(2)A602<br>母火溫度計有十二支，其中一支失效或故障，可由其他溫度計或二支母火監視器替代，且本廠有母火溫度計備品可立即更換。 |
| 2           | 母火監視器   | A404 及 A602 母火監視器皆有二台，其中一台失效或故障，可由另一台母火監視器或母火溫度計替代。                                                                                      |
| 3           | 廢氣流量計   | 若 A404 及 A602 廢氣流量計失效或故障，原廠備有備品可於 24 小時內完成修復，失效或故障期間，本廠人員每 1 小時將使用手提式風速計量測廢氣流速並記錄量測值，該手提式風速計本廠每年皆有執行校正以確保其準確性。                           |
| 4           | 母火燃料流量計 | A404 及 A602 現場有電子式累計式流量計可記錄母火燃料累計值，若失效或故障本廠有備品可更換，失效或故障期間可使用欣雄瓦斯計量總表再扣除其他使用端用量作為計量依據，另也可以利用母火溫度計及監視器替代。                                  |
| 5           | 水封槽液位計  | 若 A404 及 A602 水封槽液位計失效或故障，本廠將排定每班人員(每 8 小時)至現場目測液位視窗並記錄液位高度，並立即更換備品。                                                                     |

\* 本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號及設備編號，右下角填寫頁次。

|     |    |     |    |
|-----|----|-----|----|
| 本頁次 | 40 | 總頁次 | 42 |
|-----|----|-----|----|

填表人： 沈明宗

|      |   |   |   |   |   |   |   |   |
|------|---|---|---|---|---|---|---|---|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 |
|------|---|---|---|---|---|---|---|---|

## 八、其他主管機關指定之項目

一、廢氣流量計如何能涵蓋全廠正常操作下與緊急情況之進廢氣，說明如下：

依據 P.4~P.13 各項廢氣燃燒塔使用條件所計算之排放速度介於 0.302~38.98 m/s 間，本廠選用之廢氣流量計廠牌為 KURZ，型號為 454FTB，參照附件十六原廠說明書之流量計量測範圍為 0~112 m/s，故本廠選用之廢氣流量計可涵蓋量測全廠正常操作下與緊急情況之進廢氣流速及流量。

二、108 年 9 月 1 日後，本廠廢氣燃燒塔 A404 及 A602 使用時機及使用條件說明如下：

1. 廢氣燃燒塔 A404 使用時機可分為緊急狀況、開車、歲修一及歲修二等四種狀況，各項使用時機說明如下：

- (1) 緊急狀況：因 M04 製程或 E712 突發事故、無法預期且不可抗力之事件，導致公私場所產生安全危害之虞，需立即採取緊急處理行動，以回復正常安全操作之狀況。
- (2) 開車：製程排空停產超過 1 個月再重新開車時，因 M04 製程之製程氣來自甲醇裂解，製程氣成分主要為  $H_2$ 、 $CO$ 、 $CO_2$  及  $CH_4$  等非 VOCs 氣體，後續會經過 TSA(變溫吸附純化器)與 PSA(變壓吸附純化器)進行氣體純化與分離，初開車期間在各股氣體組成未達醛化反應與氫化反應需求標準前無法引入製程反應，故初開車期間產生排放之不合格製程氣將會排放至 flare 燃燒處理直至 TSA 與 PSA 產出符合反應要求的氣體組成。
- (3) 歲修一：M04 製程歲停修初期至開車產品合格產出期間，進行設備、管線清洗吹驅，因此廢氣成分大部分以氮氣為主，少部分為管線殘餘反應氣體。
- (4) 歲修二：廢液燃料中原本含有高濃度鹽類，本廠已增設除鹽系統(以樹脂將鹽類吸附去除)將廢液燃料中鹽類去除至<500ppm 後才投料至高溫氧化爐處理回收熱能，高溫氧化爐操作約 2~3 個月後因鹽類卡在爐管上之厚度增加，造成爐壓上升，基於操作安全上之考量，因而需停爐清洗爐管，於 E712(高溫氧化爐) 停爐清洗爐管至烘爐完成到開始處理廢氣期間，為確保 M04 製程操作之安全，故須將 M04 製程之廢氣導入 A404 或 A602 處理。

2. 廢氣燃燒塔 A602 使用時機可分為緊急狀況、開車、歲修一及歲修二等四種狀況，各項使用時機說明如下：

- (1) 緊急狀況：因 M06/M07 製程或 E712 突發事故、無法預期且不可抗力之事件，導致公私場所產生安全危害之虞，需立即採取緊急處理行動，以回復正常安全操作之狀況。
- (2) 開車：製程排空停產超過 1 個月再重新開車時，因 M06 製程之製程氣來自甲醇裂解，製程氣成分主要為  $H_2$ 、 $CO$ 、 $CO_2$  及  $CH_4$  等非 VOCs 氣體，後續會經過 TSA(變溫吸附純化器)與 PSA(變壓吸附純化器)進行氣體純化與分離，初開車期間在各股氣體組成未達醛化反應與氫化反應需求標準前無法引入製程反應，故初開車期間產生排放之不合格製程氣將會排放至 flare 燃燒處理直至 TSA 與 PSA 產出符合反應要求的氣體組成。
- (3) 歲修一：M06 或 M07 製程歲停修初期至開車產品合格產出期間，進行設備、管線清洗吹驅，因此廢氣成分大部分以氮氣為主，少部分為管線殘餘反應氣體。
- (4) 歲修二：廢液燃料中原本含有高濃度鹽類，本廠增設除鹽系統(以樹脂將鹽類吸附去除)將廢液燃料中鹽類去除至<500ppm 後才投料至高溫氧化爐處理回收熱能，高溫氧化爐操作約 2~3 個月後因鹽類卡在爐管上之厚度增加，造成爐壓上升，基於操作安全上之考量，因而需停爐清洗爐管，於 E712(高溫氧化爐) 停爐清洗爐管至烘爐完成到開始處理廢氣期間，因確保 M06 及 M07 製程操作之安全，故須將 M06 及 M07 製程之廢氣導入 A602 處理。

\* 本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號，右下角填寫頁次。

|     |    |     |    |
|-----|----|-----|----|
| 本頁次 | 41 | 總頁次 | 42 |
|-----|----|-----|----|

填表人：沈明宗

|      |   |   |   |   |   |   |   |   |
|------|---|---|---|---|---|---|---|---|
| 管制編號 | S | 2 | 0 | 0 | 5 | 6 | 5 | 2 |
|------|---|---|---|---|---|---|---|---|

### 八、其他主管機關指定之項目(續)

3. 使用條件：依據「揮發性有機物空氣污染管制及排放標準」第六條第六項規定，自行每六天採樣檢測進廢氣成分及濃度乙次，另依據「揮發性有機物空氣污染管制及排放標準」第六條規定，廢氣燃燒塔除母火監視器及導入廢氣管線之流量計外，應設置之監測設施，本廠設有母火燃料監視器。

三、100 年~108 年各年度廢氣燃燒塔進廢氣量：

| 年度    | A404<br>(Nm <sup>3</sup> ) | A602<br>(Nm <sup>3</sup> ) | 整廠總量<br>(Nm <sup>3</sup> ) |
|-------|----------------------------|----------------------------|----------------------------|
| 100 年 | 3,633,130                  | 尚未設置                       | 3,633,130                  |
| 101 年 | 3,837,150                  | 尚未設置                       | 3,837,150                  |
| 102 年 | 4,122,793                  | 尚未設置                       | 4,122,793                  |
| 103 年 | 1,449,640                  | 1,184,490                  | 2,634,130                  |
| 104 年 | 670,689                    | 3,335,876                  | 4,006,565                  |
| 105 年 | 391,934                    | 1,491,433                  | 1,883,367                  |
| 106 年 | 734,706                    | 2,152,298                  | 2,887,004                  |
| 107 年 | 116,698                    | 1,473,110                  | 1,589,808                  |
| 108 年 | 591,083                    | 990,092                    | 1,581,175                  |

\*本表不敷填寫時，請自行影印空白表格使用，填妥後請在右上角填寫管制編號，右下角填寫頁次。

|     |    |     |    |
|-----|----|-----|----|
| 本頁次 | 42 | 總頁次 | 42 |
|-----|----|-----|----|

填表人： 沈明宗



附件一 導入廢氣燃燒塔之釋壓閥使用情形

| 燃燒塔編號 | 製程編號 | 釋壓閥編號     | 設定壓力 | 設定溫度 |
|-------|------|-----------|------|------|
| A404  | M04  | SV2-141   | 1.8  | 134  |
| A404  | M04  | SV2-155   | 1.8  | 44   |
| A404  | M04  | SV2-201   | 6.7  | 80   |
| A404  | M04  | SV2-231   | 5.7  | 36   |
| A404  | M04  | SV2-2351A | 8.2  | 80   |
| A404  | M04  | SV2-2351B | 8.1  | 80   |
| A404  | M04  | SV2-301   | 1.8  | 45   |
| A404  | M04  | SV2-405   | 38.2 | 170  |
| A404  | M04  | SV2-405B  | 38.2 | 170  |
| A404  | M04  | SV2-407   | 38.4 | 170  |
| A404  | M04  | SV2-4081  | 38.2 | 170  |
| A404  | M04  | SV2-409   | 1.8  | 132  |
| A404  | M04  | SV2-411   | 9    | 35   |
| A404  | M04  | SV2-412A  | 20   | 120  |
| A404  | M04  | SV2-412B  | 20   | 120  |
| A404  | M04  | SV2-414A  | 39.6 | 120  |
| A404  | M04  | SV2-414B  | 39.6 | 120  |
| A404  | M04  | SV2-502   | 1.8  | 52   |
| A404  | M04  | SV2-611   | 1.8  | 113  |
| A404  | M04  | SV2-655   | 1.8  | 40   |
| A404  | M04  | SV2-704   | 12   | 290  |
| A404  | M04  | SV2-708   | 9.9  | 27   |
| A404  | M04  | SV2-739   | 1.8  | 36   |
| A404  | M04  | SV2-7510A | 9.46 | 35   |
| A404  | M04  | SV2-7510B | 9.46 | 35   |
| A404  | M04  | SV2-7510C | 9.46 | 35   |
| A404  | M04  | SV2-7510D | 9.46 | 35   |
| A404  | M04  | SV2-7510E | 9.46 | 35   |
| A404  | M04  | SV2-761   | 1.8  | 37   |
| A404  | M04  | SV2-764A  | 3.7  | 170  |
| A404  | M04  | SV2-764B  | 3.7  | 170  |
| A404  | M04  | SV2-766A  | 9.7  | 175  |
| A404  | M04  | SV2-766B  | 9.7  | 175  |
| A404  | M04  | SV2-781   | 9.4  | 40   |
| A404  | M04  | SV2-508   | 1.9  | 130  |
| A404  | M04  | SV2-751   | 9.6  | 35   |
| A404  | M04  | SV2-752   | 9.6  | 35   |
| A404  | M04  | SV2-753   | 9.6  | 35   |
| A404  | M04  | SV2-754   | 9.6  | 35   |
| A404  | GBL2 | SV6-5381  | 2    | 210  |
| A404  | GBL2 | SV6-5481  | 2    | 185  |
| A404  | GBL2 | SV6-5581  | 2    | 185  |
| A404  | GBL2 | SV6-5681  | 2    | 200  |
| A404  | GBL2 | SV6-5771  | 2    | 220  |
| A404  | GBL2 | SV6-5881  | 2    | 180  |
| A404  | BDOH | SV6-583B1 | 1.9  | 210  |
| A404  | BDOH | SV6-584D1 | 1.9  | 230  |
| A404  | BDOH | SV6-5861  | 1.9  | 110  |
| A404  | BDOH | SV6-589B1 | 1.9  | 110  |
| A404  | BDOH | SV6-594B1 | 1.9  | 10   |
| A404  | BDOH | SV6-5981  | 1.9  | 80   |
| A404  | BDOH | SV6-5991  | 1.9  | 90   |
| A404  | GBLE | SV6-5181  | 2    | 100  |
| A404  | GBLE | SV6-5191  | 2    | 100  |
| A404  | GBLE | SV6-8081  | 2    | 100  |

| 燃燒塔編號 | 製程編號 | 釋壓閥編號     | 設定壓力 | 設定溫度 |
|-------|------|-----------|------|------|
| A602  | M06  | SV6-141   | 1.8  | 134  |
| A602  | M06  | SV6-155   | 1.8  | 44   |
| A602  | M06  | SV6-201   | 6.7  | 80   |
| A602  | M06  | SV6-231   | 5.7  | 36   |
| A602  | M06  | SV6-2351A | 8.2  | 80   |
| A602  | M06  | SV6-2351B | 8.1  | 80   |
| A602  | M06  | SV6-301   | 1.8  | 45   |
| A602  | M06  | SV6-405   | 38.2 | 170  |
| A602  | M06  | SV6-405B  | 38.2 | 170  |
| A602  | M06  | SV6-407   | 38.4 | 170  |
| A602  | M06  | SV6-4081  | 38.2 | 170  |
| A602  | M06  | SV6-409   | 1.8  | 132  |
| A602  | M06  | SV6-411   | 9    | 35   |
| A602  | M06  | SV6-412A  | 20   | 120  |
| A602  | M06  | SV6-412B  | 20   | 120  |
| A602  | M06  | SV6-414A  | 39.6 | 120  |
| A602  | M06  | SV6-414B  | 39.6 | 120  |
| A602  | M06  | SV6-502   | 1.8  | 52   |
| A602  | M06  | SV6-611   | 1.8  | 113  |
| A602  | M06  | SV6-655   | 1.8  | 40   |
| A602  | M06  | SV6-704   | 12   | 290  |
| A602  | M06  | SV6-708   | 9.9  | 27   |
| A602  | M06  | SV6-739   | 1.8  | 36   |
| A602  | M06  | SV6-7510A | 9.46 | 35   |
| A602  | M06  | SV6-7510B | 9.46 | 35   |
| A602  | M06  | SV6-7510C | 9.46 | 35   |
| A602  | M06  | SV6-7510D | 9.46 | 35   |
| A602  | M06  | SV6-7510E | 9.46 | 35   |
| A602  | M06  | SV6-761   | 1.8  | 37   |
| A602  | M06  | SV6-764A  | 3.7  | 170  |
| A602  | M06  | SV6-764B  | 3.7  | 170  |
| A602  | M06  | SV6-766A  | 9.7  | 175  |
| A602  | M06  | SV6-766B  | 9.7  | 175  |
| A602  | M06  | SV6-781   | 9.5  | 40   |

| 燃燒塔編號 | 製程編號 | 釋壓閥編號     | 設定壓力 | 設定溫度 |
|-------|------|-----------|------|------|
| A602  | M07  | SV5-0301  | 21.6 | 100  |
| A602  | M07  | SV5-0701  | 1.9  | 88   |
| A602  | M07  | SV5-0702  | 1.9  | 88   |
| A602  | M07  | SV5-0901  | 12   | 70   |
| A602  | M07  | SV5-1001  | 12   | 130  |
| A602  | M07  | SV5-1201  | 3    | 170  |
| A602  | M07  | SV5-1202  | 3    | 170  |
| A602  | M07  | SV5-1401  | 1.9  | 150  |
| A602  | M07  | SV5-1501  | 3    | 155  |
| A602  | M07  | SV5-1601  | 1.9  | 130  |
| A602  | M07  | SV5-1701  | 1.9  | 130  |
| A602  | M07  | SV5-2001  | 1.9  | 90   |
| A602  | M07  | SV5-2101  | 1.9  | 95   |
| A602  | M07  | SV-52201  | 1.9  | 100  |
| A602  | M07  | SV5-2202  | 1.9  | 60   |
| A602  | M07  | SV5-2701  | 12   | 80   |
| A602  | M07  | SV5-2702  | 14   | 80   |
| A602  | M07  | SV5-5001  | 1.9  | 130  |
| A602  | M07  | SV5-4610  | 20   | 65   |
| A602  | M07  | SV5-760-1 | 16   | 80   |
| A602  | M07  | SV5-760-2 | 16   | 80   |
| A602  | M07  | SV5-3901  | 1.9  | 70   |
| A602  | M07  | SV5-3701  | 1.9  | 70   |
| A602  | M07  | SV5-3702  | 1.9  | 70   |
| A602  | M07  | SV5-4601  | 30   | 80   |
| A602  | M07  | SV5-4604  | 20.2 | 80   |
| A602  | M07  | SV5-4605  | 20.2 | 80   |
| A602  | M07  | SV5-760-3 | 16   | 80   |
| A602  | M07  | SV5-760-4 | 16   | 80   |
| A602  | M07  | SV5-4602  | 19.8 | 80   |
| A602  | M07  | SV5-4603  | 27.5 | 80   |

註：設定壓力單位為 mmH<sub>2</sub>O、溫度為℃

附件二、各母火實際量測溫度、母火燃料流量、水封槽水位及未納入廢氣流量之吹驅氣體流量實測說明

一、A404 及 A602 母火實際量測溫度

1. 以下附圖為 2019 年 8 月 A404 控制室 DCS 母火實際量測溫度趨勢圖平均溫度約 530℃，因受風雨影響，最低溫度會低至約 250℃。



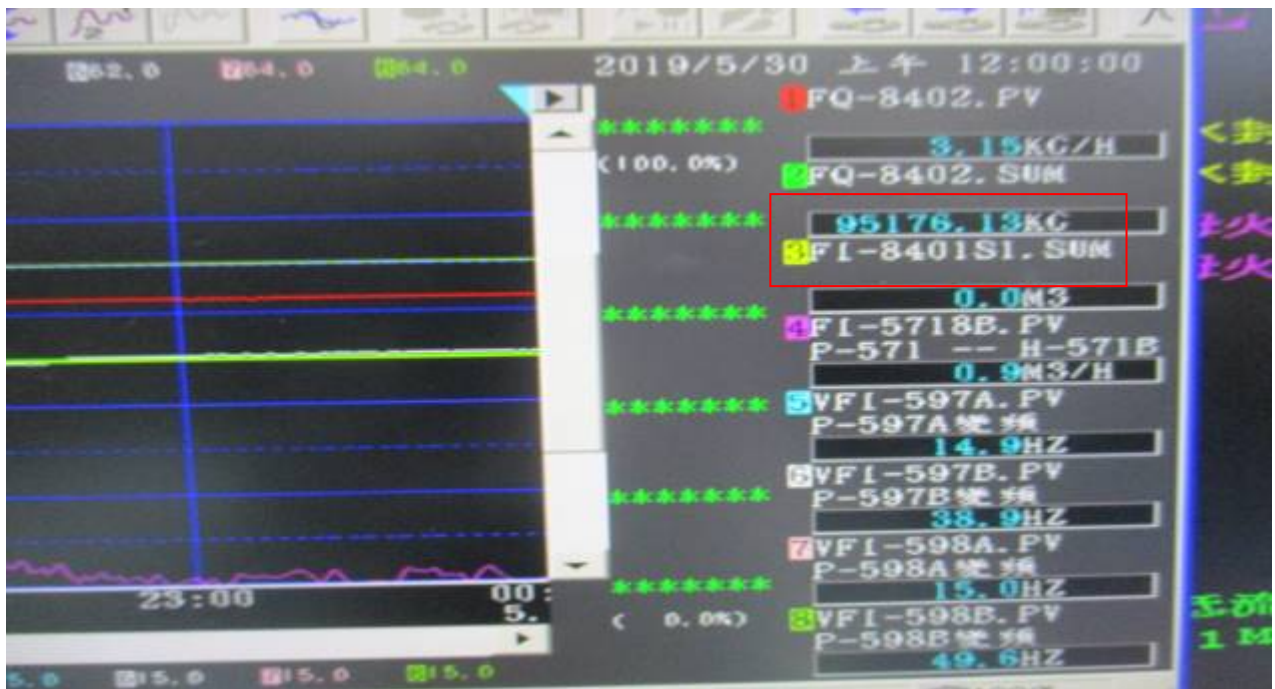
2. 以下附圖為 2019 年 8 月 A602 控制室 DCS 母火實際量測溫度趨勢圖平均溫度約 500℃，因受雨勢影響，最低溫度會低至約 350℃ 左右。





## 二-1、A404 及 A602 母火燃料使用量實測說明

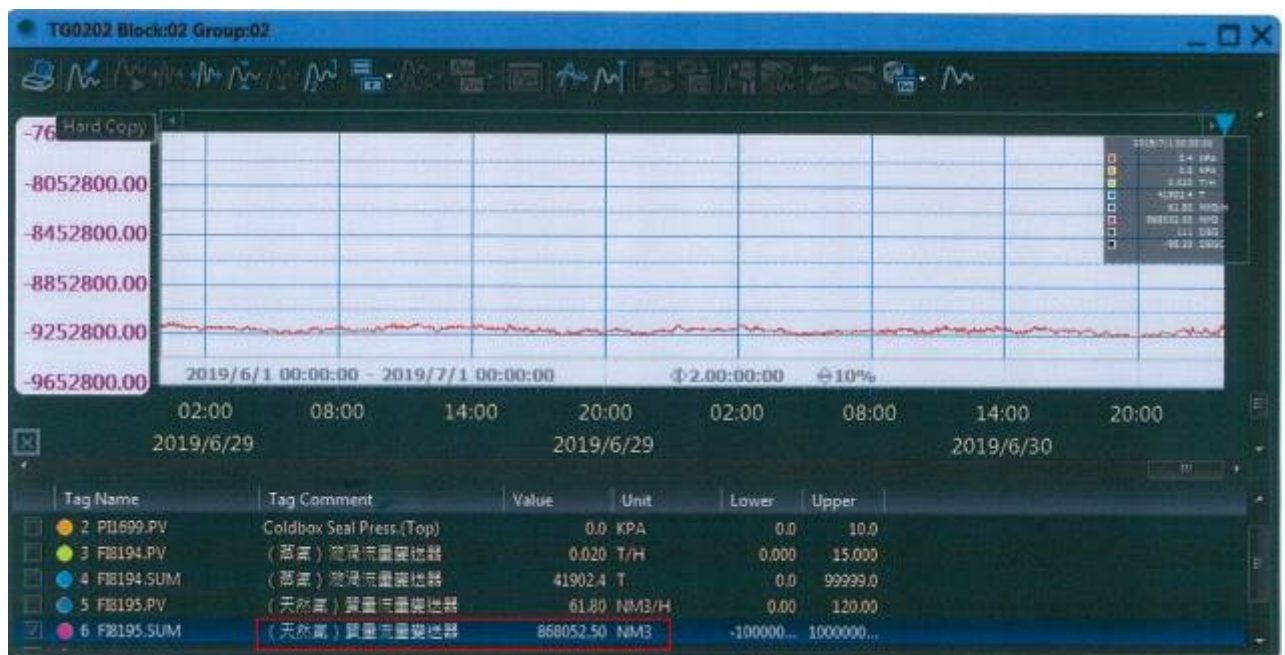
1.以下附圖為控制室 DCS A404 母火燃料使用量監測畫面



2.說明：A404 母火燃料 108 年 5/30~8/22 日總使用量 $= (101617 - 95176) = 6441 \text{ kg}$ ，  
天然氣比重轉換為  $0.7908 \text{ Nm}^3/\text{kg}$ ，故換算 108 年 5/30~8/22 日母火燃料(天然氣)每小時平均流量 $= 6441 / (85 \times 24) \times 0.7908 = 2.5 \text{ Nm}^3/\text{hr}$

## 二-2、A602 母火燃料使用量實測說明

1.以下附圖為控制室 DCS A602 母火燃料使用量監測畫面



2.說明：A602 母火燃料 108 年 1~6 月使用量 $= (868052.5 - 592233.13) = 275819.4$   
 $\text{Nm}^3$ ，換算每小時平均用量 $= 275819.4 / (181 \times 24) = 64.5 \text{ Nm}^3/\text{hr}$ 。

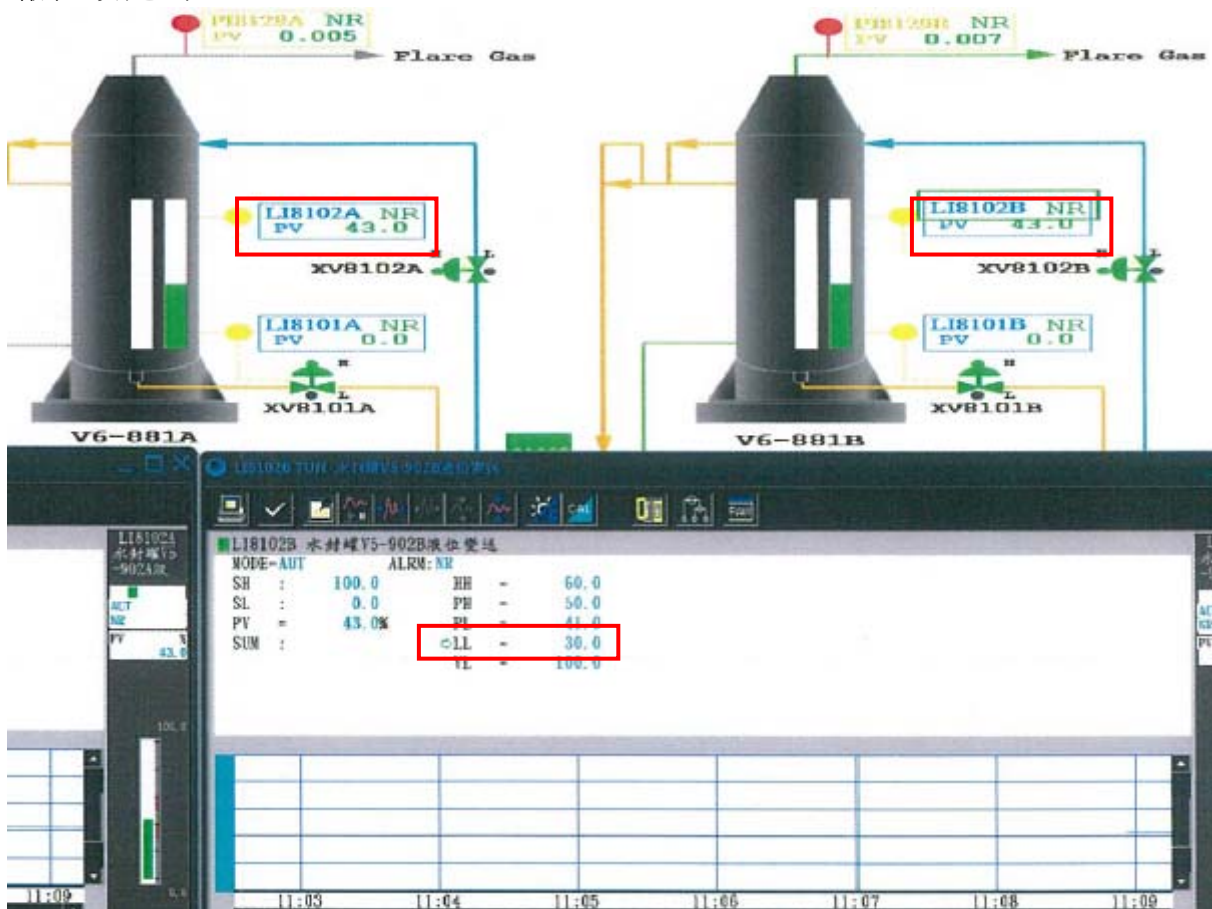


### 三、A404 及 A602 水封槽水位 LL 警報設定值及實測說明

1.以下附圖為 A404 控制室 DCS 監測畫面，108 年 10 月 17 日 11:00 時為水封槽液位為 46.2%，水封槽液位會晃動，基於製程安全保護將水封槽液位 LL 警報值設定為 30.0%。

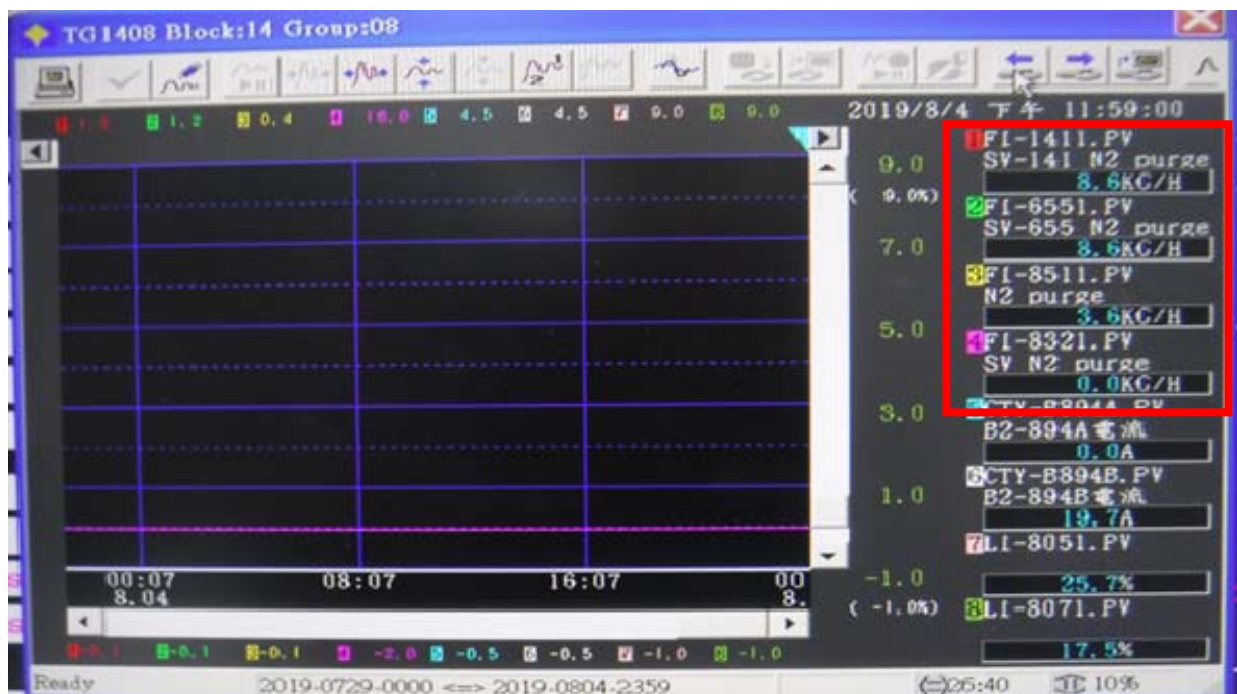
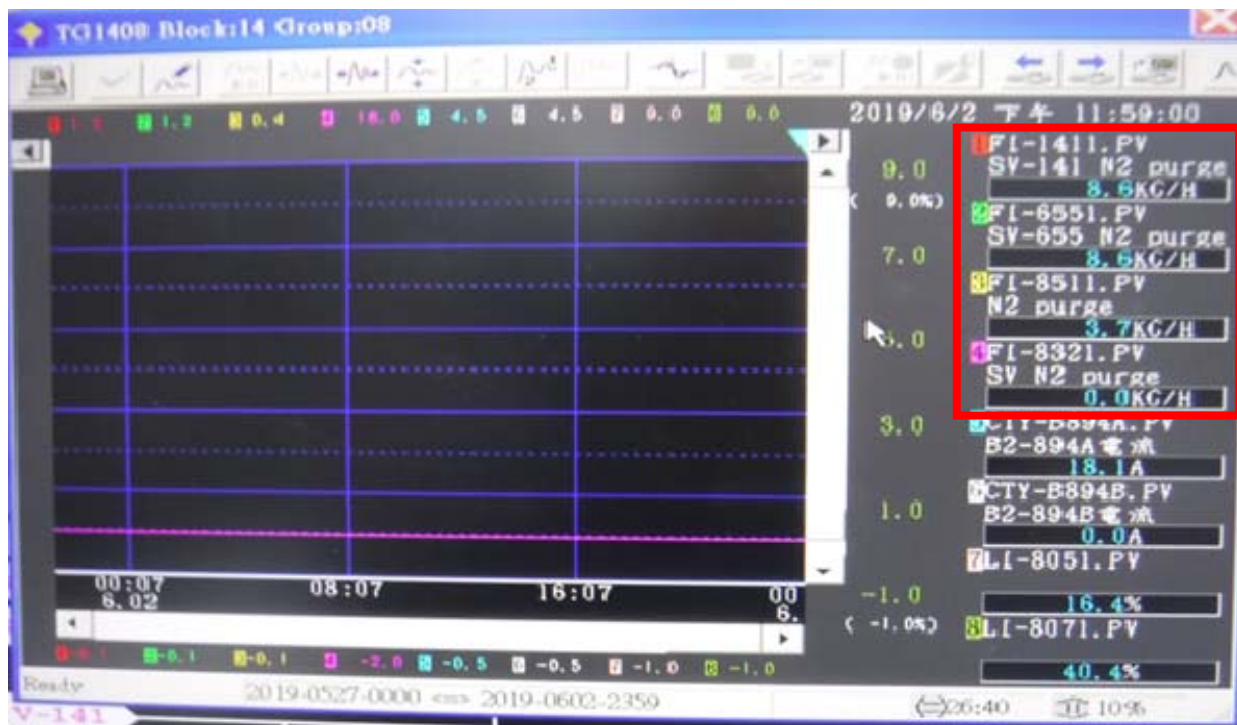


2.以下附圖為 A602 控制室 DCS 監測畫面，108 年 10 月 17 日 10:30 時為水封槽液位為 43.2%，水封槽液位會晃動，基於製程安全保護將水封槽液位 LL 警報值設定為 30.0%。



#### 四、A404 及 A602 未納入廢氣流量之吹驅氣體流量實測說明

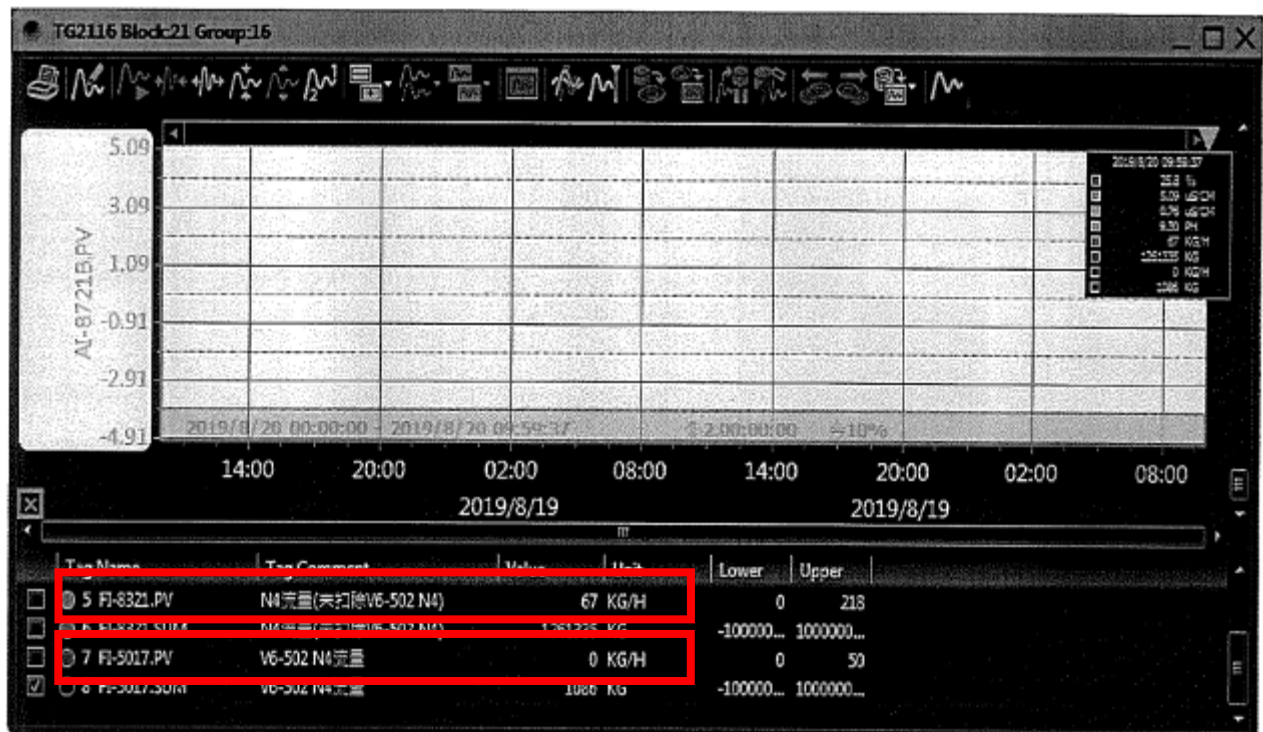
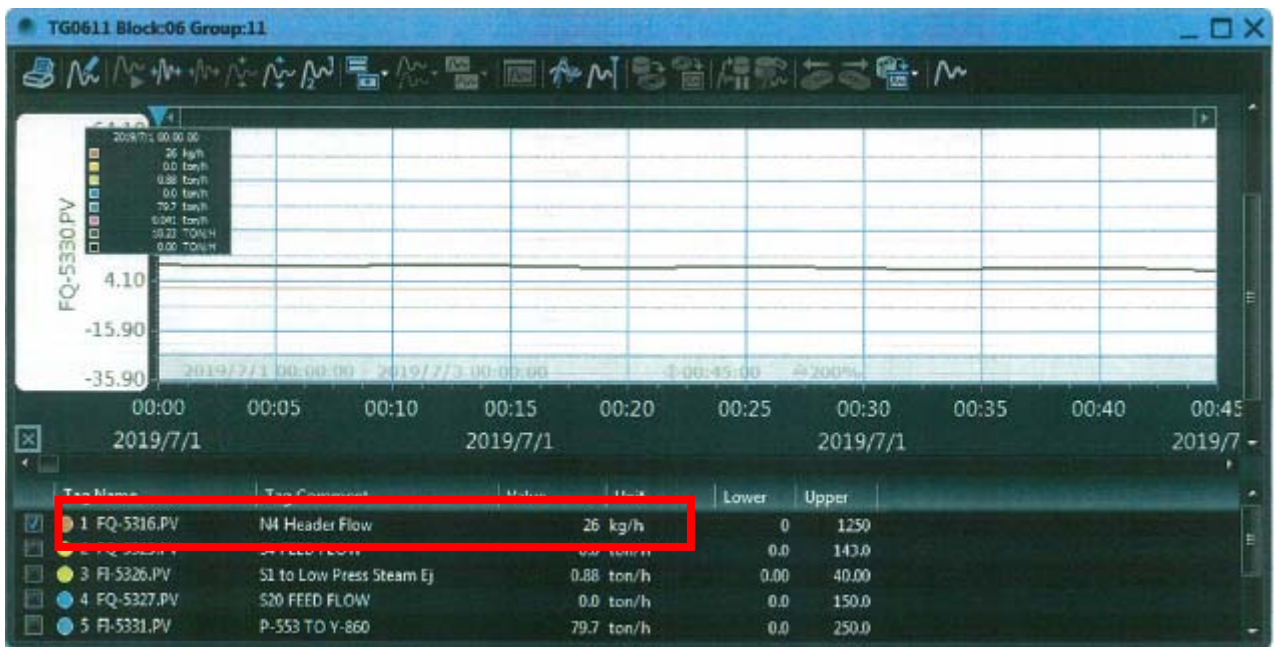
1. A404 未納入廢氣流量之計算參照附件二十三、吹驅氮氣流量計設置位置示意圖，為 FI2-1411、FI2-6551、FI2-8511 及 FI2-8321 四個流量計總和，近二季 DCS 監控畫面流量如下，因為固定開度，吹驅氮氣流量變化不大，故 A404 未納入廢氣流量之氮氣吹驅流量 $= (8.6+8.6+3.7+0)=20.9\text{kg/hr}=16.7\text{ Nm}^3/\text{hr}$ 。





1. A602 未納入廢氣流量之計算參照附件二十三、吹驅氮氣流量計設置位置示意圖，為 FI6-8321 及 FQ-5316 二個流量計總和扣除 FI6-5017，近二季 DCS 監控畫面流量如下，因為固定開度，吹驅氮氣流量變化不大，故 A404 未納入廢氣流量之氮氣吹驅流量=(40.4+67.8-0)=108.2kg/hr=86.5 Nm<sup>3</sup>/hr。

|           | FQ-5316              | FI6-8321             | FI6-5017             | A602                 | A602                               |           | FQ-5316              | FI6-8321             | FI6-5017             | A602                 | A602                               |
|-----------|----------------------|----------------------|----------------------|----------------------|------------------------------------|-----------|----------------------|----------------------|----------------------|----------------------|------------------------------------|
| 日期        | 當日小時平均<br>最大值(kg/hr) | 當日小時平均<br>最大值(kg/hr) | 當日小時平均<br>最大值(kg/hr) | 當日小時平均<br>最大值(kg/hr) | 當日小時平均<br>最大值(Nm <sup>3</sup> /hr) | 日期        | 當日小時平均<br>最大值(kg/hr) | 當日小時平均<br>最大值(kg/hr) | 當日小時平均<br>最大值(kg/hr) | 當日小時平均<br>最大值(kg/hr) | 當日小時平均<br>最大值(Nm <sup>3</sup> /hr) |
| 2019/4/1  | 22.0                 | 67.4                 | 0.0                  | 89.4                 | 71.5                               | 2019/5/17 | 23.4                 | 68.2                 | 0.0                  | 91.6                 | 73.2                               |
| 2019/4/2  | 22.0                 | 68.0                 | 0.0                  | 90.0                 | 72.0                               | 2019/5/18 | 24.8                 | 68.0                 | 0.0                  | 92.8                 | 74.2                               |
| 2019/4/3  | 124.3                | 67.4                 | 0.0                  | 191.7                | 153.3                              | 2019/5/19 | 25.0                 | 67.9                 | 0.0                  | 92.9                 | 74.3                               |
| 2019/4/4  | 22.0                 | 67.6                 | 0.0                  | 89.6                 | 71.6                               | 2019/5/20 | 25.3                 | 67.5                 | 0.0                  | 92.8                 | 74.2                               |
| 2019/4/5  | 22.0                 | 67.5                 | 0.0                  | 89.6                 | 71.6                               | 2019/5/21 | 25.3                 | 68.6                 | 0.0                  | 94.0                 | 75.1                               |
| 2019/4/6  | 22.0                 | 67.5                 | 0.0                  | 89.6                 | 71.6                               | 2019/5/22 | 129.7                | 67.4                 | 0.0                  | 197.1                | 157.6                              |
| 2019/4/7  | 126.0                | 67.5                 | 0.0                  | 193.6                | 154.8                              | 2019/5/23 | 22.9                 | 68.6                 | 0.0                  | 91.5                 | 73.1                               |
| 2019/4/8  | 22.0                 | 68.1                 | 0.0                  | 90.2                 | 72.1                               | 2019/5/24 | 21.8                 | 67.6                 | 0.0                  | 89.4                 | 71.5                               |
| 2019/4/9  | 112.1                | 68.0                 | 0.0                  | 180.1                | 144.0                              | 2019/5/25 | 22.4                 | 67.7                 | 0.0                  | 90.1                 | 72.0                               |
| 2019/4/10 | 22.3                 | 67.4                 | 0.0                  | 89.7                 | 71.7                               | 2019/5/26 | 22.2                 | 67.4                 | 0.0                  | 89.5                 | 71.6                               |
| 2019/4/11 | 22.9                 | 67.7                 | 0.0                  | 90.6                 | 72.4                               | 2019/5/27 | 23.7                 | 67.5                 | 0.0                  | 91.2                 | 72.9                               |
| 2019/4/12 | 23.4                 | 67.9                 | 0.0                  | 91.3                 | 73.0                               | 2019/5/28 | 112.8                | 67.6                 | 0.0                  | 180.4                | 144.3                              |
| 2019/4/13 | 23.0                 | 68.1                 | 0.0                  | 91.1                 | 72.9                               | 2019/5/29 | 23.1                 | 67.7                 | 0.0                  | 90.8                 | 72.6                               |
| 2019/4/14 | 22.6                 | 67.6                 | 0.0                  | 90.1                 | 72.0                               | 2019/5/30 | 20.5                 | 67.5                 | 0.0                  | 88.0                 | 70.4                               |
| 2019/4/15 | 22.2                 | 67.6                 | 0.0                  | 89.8                 | 71.8                               | 2019/5/31 | 22.8                 | 67.8                 | 0.0                  | 90.5                 | 72.4                               |
| 2019/4/16 | 22.0                 | 67.6                 | 0.0                  | 89.7                 | 71.7                               | 2019/6/1  | 21.4                 | 68.6                 | 0.0                  | 90.0                 | 71.9                               |
| 2019/4/17 | 22.0                 | 67.0                 | 0.0                  | 89.1                 | 71.2                               | 2019/6/2  | 23.8                 | 67.9                 | 0.0                  | 91.7                 | 73.3                               |
| 2019/4/18 | 22.1                 | 67.6                 | 0.0                  | 89.7                 | 71.7                               | 2019/6/3  | 25.0                 | 67.9                 | 0.0                  | 92.9                 | 74.3                               |
| 2019/4/19 | 22.6                 | 67.8                 | 0.0                  | 90.3                 | 72.2                               | 2019/6/4  | 26.1                 | 67.9                 | 0.0                  | 93.9                 | 75.1                               |
| 2019/4/20 | 22.7                 | 67.8                 | 0.0                  | 90.5                 | 72.3                               | 2019/6/5  | 26.2                 | 66.8                 | 0.0                  | 93.0                 | 74.4                               |
| 2019/4/21 | 22.8                 | 67.6                 | 0.0                  | 90.4                 | 72.3                               | 2019/6/6  | 102.7                | 68.0                 | 0.0                  | 170.7                | 136.4                              |
| 2019/4/22 | 84.5                 | 67.5                 | 0.0                  | 152.0                | 121.5                              | 2019/6/7  | 26.2                 | 68.6                 | 0.0                  | 94.8                 | 75.8                               |
| 2019/4/23 | 23.3                 | 67.5                 | 0.0                  | 90.8                 | 72.6                               | 2019/6/8  | 26.9                 | 68.0                 | 0.0                  | 94.9                 | 75.9                               |
| 2019/4/24 | 23.9                 | 67.9                 | 0.0                  | 91.8                 | 73.4                               | 2019/6/9  | 28.4                 | 68.1                 | 0.0                  | 96.5                 | 77.2                               |
| 2019/4/25 | 23.5                 | 67.8                 | 0.0                  | 91.4                 | 73.0                               | 2019/6/10 | 28.5                 | 67.5                 | 0.0                  | 96.0                 | 76.7                               |
| 2019/4/26 | 23.0                 | 68.1                 | 0.0                  | 91.1                 | 72.9                               | 2019/6/11 | 27.0                 | 68.2                 | 0.0                  | 95.2                 | 76.1                               |
| 2019/4/27 | 22.8                 | 68.1                 | 0.0                  | 90.9                 | 72.7                               | 2019/6/12 | 25.8                 | 67.1                 | 0.0                  | 92.8                 | 74.2                               |
| 2019/4/28 | 20.8                 | 68.0                 | 0.0                  | 88.9                 | 71.0                               | 2019/6/13 | 23.7                 | 67.7                 | 0.0                  | 91.3                 | 73.0                               |
| 2019/4/29 | 19.4                 | 67.9                 | 0.0                  | 87.4                 | 69.9                               | 2019/6/14 | 25.4                 | 68.4                 | 0.0                  | 93.7                 | 74.9                               |
| 2019/4/30 | 21.3                 | 68.1                 | 0.0                  | 89.4                 | 71.4                               | 2019/6/15 | 113.5                | 67.5                 | 0.0                  | 181.0                | 144.7                              |
| 2019/5/1  | 23.2                 | 68.3                 | 0.0                  | 91.6                 | 73.2                               | 2019/6/16 | 23.3                 | 68.0                 | 0.0                  | 91.3                 | 73.0                               |
| 2019/5/2  | 23.1                 | 67.3                 | 0.0                  | 90.4                 | 72.3                               | 2019/6/17 | 23.5                 | 67.9                 | 0.0                  | 91.4                 | 73.1                               |
| 2019/5/3  | 22.0                 | 68.1                 | 0.0                  | 90.1                 | 72.0                               | 2019/6/18 | 110.0                | 67.9                 | 0.0                  | 177.9                | 142.2                              |
| 2019/5/4  | 23.5                 | 67.3                 | 0.0                  | 90.8                 | 72.6                               | 2019/6/19 | 27.0                 | 68.1                 | 0.0                  | 95.1                 | 76.0                               |
| 2019/5/5  | 20.4                 | 68.0                 | 0.0                  | 88.4                 | 70.6                               | 2019/6/20 | 28.3                 | 68.1                 | 0.0                  | 96.5                 | 77.1                               |
| 2019/5/6  | 22.0                 | 67.9                 | 0.0                  | 89.9                 | 71.9                               | 2019/6/21 | 98.8                 | 67.7                 | 0.0                  | 166.5                | 133.1                              |
| 2019/5/7  | 22.0                 | 66.7                 | 0.0                  | 88.8                 | 71.0                               | 2019/6/22 | 29.1                 | 68.4                 | 0.0                  | 97.5                 | 77.9                               |
| 2019/5/8  | 22.0                 | 67.3                 | 0.0                  | 89.3                 | 71.4                               | 2019/6/23 | 28.8                 | 67.7                 | 0.0                  | 96.5                 | 77.1                               |
| 2019/5/9  | 22.0                 | 67.3                 | 0.0                  | 89.4                 | 71.4                               | 2019/6/24 | 122.1                | 68.4                 | 0.0                  | 190.5                | 152.3                              |
| 2019/5/10 | 22.6                 | 67.8                 | 0.0                  | 90.4                 | 72.2                               | 2019/6/25 | 110.5                | 67.7                 | 0.0                  | 178.2                | 142.5                              |
| 2019/5/11 | 20.8                 | 67.3                 | 0.0                  | 88.1                 | 70.4                               | 2019/6/26 | 143.3                | 67.3                 | 0.0                  | 210.6                | 168.4                              |
| 2019/5/12 | 18.8                 | 67.6                 | 0.0                  | 86.4                 | 69.0                               | 2019/6/27 | 139.6                | 67.5                 | 0.0                  | 207.1                | 165.5                              |
| 2019/5/13 | 19.6                 | 67.7                 | 0.0                  | 87.3                 | 69.8                               | 2019/6/28 | 152.1                | 67.4                 | 0.0                  | 219.5                | 175.5                              |
| 2019/5/14 | 19.7                 | 67.5                 | 0.0                  | 87.2                 | 69.7                               | 2019/6/29 | 24.4                 | 68.0                 | 0.0                  | 92.4                 | 73.8                               |
| 2019/5/15 | 23.2                 | 68.0                 | 0.0                  | 91.3                 | 73.0                               | 2019/6/30 | 142.7                | 67.7                 | 0.0                  | 210.4                | 168.2                              |
| 2019/5/16 | 24.0                 | 67.3                 | 0.0                  | 91.3                 | 73.0                               | 第二季平均     | 40.4                 | 67.8                 | 0.0                  | 108.2                | 86.5                               |



### 附件三、蒸氣量廢氣量重量比之推估說明

#### 1.以下附表為原廠設計資料



Technical Proposal  
P.27237/12 Rev.0

### 3. TECHNICAL DATA

#### 3.1. TECHNICAL DATA ENCLOSED GROUND FLARE

|     |                         |                      |                  |          |
|-----|-------------------------|----------------------|------------------|----------|
| 1.  | <b>Site Data</b>        |                      |                  |          |
| 2.  | Ambient Pressure        | 1.016 bara           | Solar Radiation  | Excluded |
| 3.  | Ambient temperature     | -20 / +35°C          | Wind Speed for   | N/A      |
| 4.  | Ambient Rel. Humidity   | 18 / 90%             | Rad. Calculation |          |
| 5.  | Design Wind Speed for   | 30 m/s               | Seismicity       | N/A      |
| 6.  | structure               |                      |                  |          |
| 7.  | <b>Process data</b>     |                      |                  |          |
| 8.  | Fluid                   |                      | BDO6             | AAL5     |
| 9.  | Case                    |                      | 1                | 2        |
| 10. | Frequency               |                      | Emerg.           | Future   |
| 11. | Flow rate               | kg/h                 | 22,950           | 97,356   |
| 12. | Gas Temperature         | °C                   | 40               | 38.92    |
| 13. | Molecular Weight        |                      | 10.99            | 2.80     |
| 14. | L.H.V.                  | kcal/kg              | 5,903            | 6,668    |
| 15. | Cp / Cv Ratio           |                      | 1.40             | 289      |
| 16. | Sonic Velocity          | m/s                  | 575              | 1,107    |
| 17. | Flare header diameter   | inch                 | TBA              | TBA      |
| 18. | Mach No. in the header  |                      |                  |          |
| 19. | Gas Velocity in header  | m/s                  |                  |          |
| 20. | Pressure Drop           | mmWC                 | < 1,000          | 700      |
| 21. | Gas Pressure            | mmWC                 | 1,000            | 1,000    |
| 22. | Comb. chamber height    | m                    | 30               |          |
| 23. | Comb. chamber dia.      | m                    | 12               |          |
| 24. | Number of stages        |                      | 2                | 4        |
| 25. | Q.ty of burners 0.4 t/h |                      |                  | 15       |
| 26. | Q.ty of burners 1 t/h   |                      | 23               | 92       |
| 27. | Flame Lib. 0.4 t/h      | MW                   |                  | 3        |
| 28. | Flame Length (max.)     | m                    |                  | 4        |
| 29. | Flame Liberation 1 t/h  | MW                   |                  | 8        |
| 30. | Flame Length (max.)     | m                    |                  | 6        |
| 31. | Pilot quantity          |                      | 4                | 8        |
| 32. | Burner Design Temp.     | °C                   | 850              | 850      |
| 33. | Burner Design           | kg/cm <sup>2</sup> g | 3.5              | 3.5      |
| 34. | Smokeless Operation     |                      | Yes 100%         | Yes 100% |
| 35. | Smokeless Flowrate      | kg/h                 | 22,950           | 97,356   |
| 36. | Steam for smokeless     | kg/h                 | 2,295            | 29,750   |
| 37. |                         |                      |                  |          |
| 38. |                         |                      |                  |          |
| 39. |                         |                      |                  |          |
| 40. |                         |                      |                  |          |
| 41. |                         |                      |                  |          |

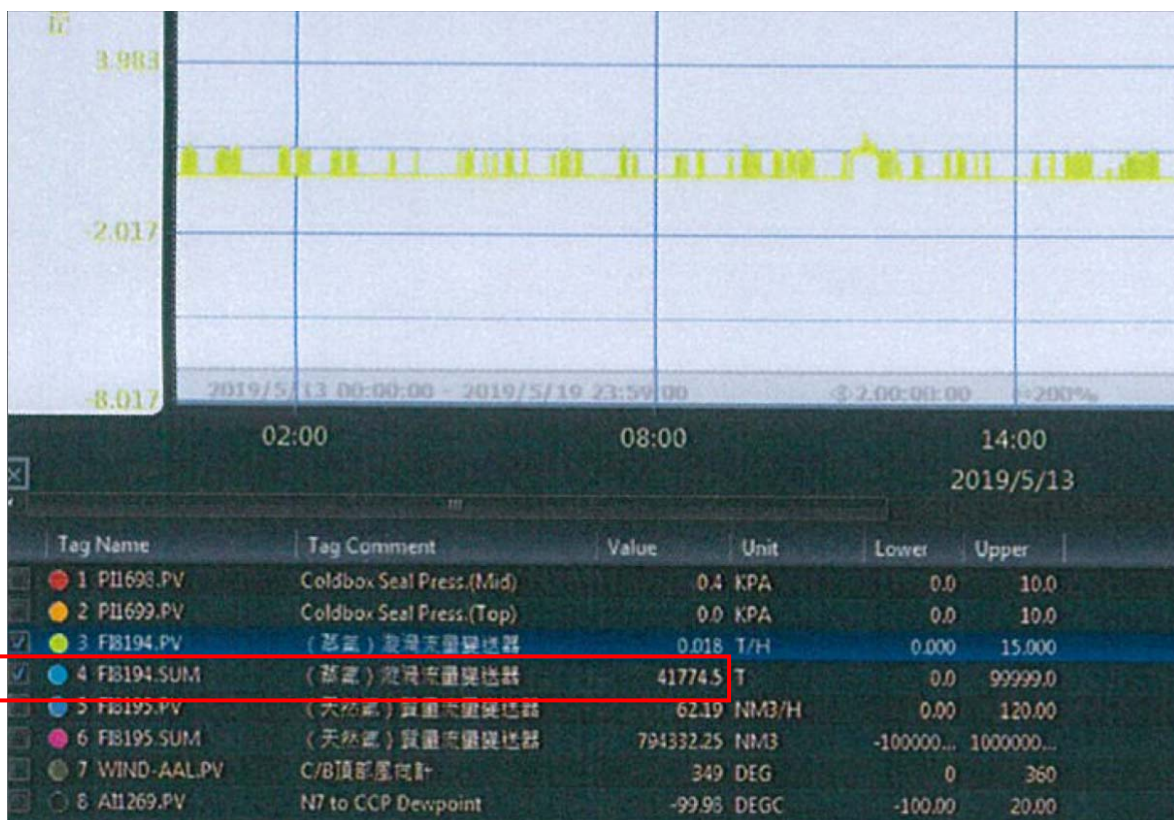
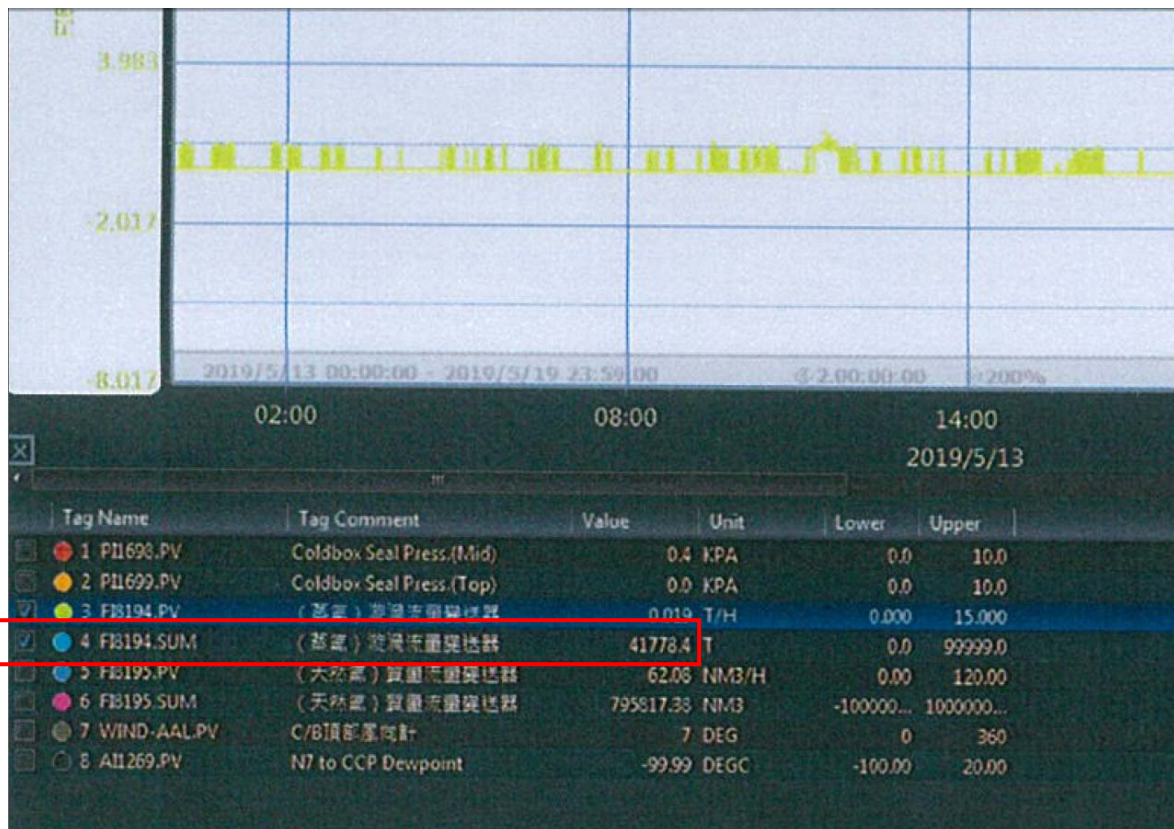
For equipment data see attachment

2.說明：本廠新設置廢氣燃燒塔 A602 處理 M06(BDO6)及 M07(AAL5)製程之異常緊急排氣最大量為 $(22950+97356)=120306$  kg/h(參照上表第 35 列)，輔助蒸汽量為 $(2295+29750)=32045$  kg/h(參照上表第 36 列)，故蒸氣量廢氣量重量比=26.6%。



#### 附件四、A602 蒸氣實際使用量及蒸氣量廢氣量重量比計算說明

1.以下附圖為控制室 DCS 監測畫面



2.說明：A602 108 年 5 月 13 日因 E712 高溫氧化爐進行清爐作業(歲修二)造成使用事件日，以該期間之蒸氣用量= $(41778.4-41774.5) = 3.9$  噸=3,900 kg，換算每小時平均用量= $3,900/24=162.5$  kg/hr，當日廢氣量為 17,661kg。廢氣平均密度為 1.495kg/m<sup>3</sup>，蒸氣量廢氣量重量比(%)= $3,900/(17,661/1.495)=33.01\%$

## 附件五、A404及A602未納入廢氣流量之吹驅氣體流量估算

### 1.A404未納入廢氣流量之吹驅氣體流量估算

| 設備名稱                 | 限流板編號    | 流量規格(Nm <sup>3</sup> /hr) |
|----------------------|----------|---------------------------|
| V2-141               | RO2-1411 | 10                        |
| 100區 VG Header       | RO2-1559 | 10                        |
| V2-155               | RO2-1572 | 10                        |
| R2-201               | RO2-2011 | 100                       |
| T2-301               | RO2-3012 | 10                        |
| R2-405A/B            | RO2-4051 | 10                        |
| R2-407               | RO2-4071 | 10                        |
| R2-408               | RO2-4081 | 10                        |
| 600區 VG Header       | RO2-6539 | 10                        |
| V2-655               | RO2-6572 | 10                        |
| V2-851               | RO2-8512 | 10                        |
| A404未納入廢氣流量之吹驅氣體流量合計 |          | 200                       |

### 2.A602未納入廢氣流量之吹驅氣體流量估算

| 設備名稱                 | 限流板編號    | 流量規格(Nm <sup>3</sup> /hr) |
|----------------------|----------|---------------------------|
| V6-141               | RO6-1411 | 10                        |
| 100區 VG Header       | RO6-1559 | 10                        |
| V6-155               | RO6-1572 | 10                        |
| R6-201               | RO6-2011 | 100                       |
| T6-301               | RO6-3012 | 10                        |
| R6-405A/B            | RO6-4051 | 10                        |
| R6-407               | RO6-4071 | 10                        |
| R6-408               | RO6-4081 | 10                        |
| 600區 VG Header       | RO6-6539 | 10                        |
| V6-655               | RO6-6572 | 10                        |
| V6-851               | RO6-8512 | 10                        |
| N4 Header集管          | RO-5355  | 20                        |
| N4 Header集管          | RO-5356  | 20                        |
| N4 Header集管          | RO-5357  | 20                        |
| N4 Header集管          | RO-5357A | 20                        |
| N4 Header集管          | RO-5358  | 20                        |
| A602未納入廢氣流量之吹驅氣體流量合計 |          | 300                       |

# 附件六、104年上半年A602廢氣累計值

| M06製程104年1月1日~6月30日每日廢氣量 |   |    |                        |
|--------------------------|---|----|------------------------|
| 年                        | 月 | 日  | 廢氣累計值(m <sup>3</sup> ) |
| 2015                     | 1 | 1  | 5694.76                |
| 2015                     | 1 | 2  | 5989.27                |
| 2015                     | 1 | 3  | 6690.88                |
| 2015                     | 1 | 4  | 6038.03                |
| 2015                     | 1 | 5  | 16357.66               |
| 2015                     | 1 | 6  | 9397.09                |
| 2015                     | 1 | 7  | 8077.21                |
| 2015                     | 1 | 8  | 8899.4                 |
| 2015                     | 1 | 9  | 7291.21                |
| 2015                     | 1 | 10 | 7031.46                |
| 2015                     | 1 | 11 | 7924.54                |
| 2015                     | 1 | 12 | 7515.85                |
| 2015                     | 1 | 13 | 7710.98                |
| 2015                     | 1 | 14 | 8137.59                |
| 2015                     | 1 | 15 | 7316.38                |
| 2015                     | 1 | 16 | 7344.79                |
| 2015                     | 1 | 17 | 7422.26                |
| 2015                     | 1 | 18 | 7242.18                |
| 2015                     | 1 | 19 | 7192.18                |
| 2015                     | 1 | 20 | 7347.7                 |
| 2015                     | 1 | 21 | 7312.29                |
| 2015                     | 1 | 22 | 7344.68                |
| 2015                     | 1 | 23 | 14889.91               |
| 2015                     | 1 | 24 | 25388.5                |
| 2015                     | 1 | 25 | 27133.98               |
| 2015                     | 1 | 26 | 29055.71               |
| 2015                     | 1 | 27 | 25535.75               |
| 2015                     | 1 | 28 | 31910.33               |
| 2015                     | 1 | 29 | 31766.71               |
| 2015                     | 1 | 30 | 31984.34               |
| 2015                     | 1 | 31 | 37356.78               |
| 2015                     | 2 | 1  | 22276.77               |
| 2015                     | 2 | 2  | 6833.6                 |
| 2015                     | 2 | 3  | 5205.42                |
| 2015                     | 2 | 4  | 5013.17                |
| 2015                     | 2 | 5  | 4269.34                |
| 2015                     | 2 | 6  | 3343.67                |
| 2015                     | 2 | 7  | 3381.51                |
| 2015                     | 2 | 8  | 3280.87                |
| 2015                     | 2 | 9  | 3201.57                |
| 2015                     | 2 | 10 | 3288.22                |
| 2015                     | 2 | 11 | 3580.9                 |
| 2015                     | 2 | 12 | 3673.21                |
| 2015                     | 2 | 13 | 3312.78                |
| 2015                     | 2 | 14 | 19586.85               |
| 2015                     | 2 | 15 | 3489.53                |
| 2015                     | 2 | 16 | 4080.08                |
| 2015                     | 2 | 17 | 6311.12                |
| 2015                     | 2 | 18 | 3108.58                |
| 2015                     | 2 | 19 | 20288.82               |
| 2015                     | 2 | 20 | 5702.42                |
| 2015                     | 2 | 21 | 2652.86                |
| 2015                     | 2 | 22 | 2676.55                |
| 2015                     | 2 | 23 | 2783.95                |
| 2015                     | 2 | 24 | 2655.1                 |
| 2015                     | 2 | 25 | 2590.08                |
| 2015                     | 2 | 26 | 2994.49                |
| 2015                     | 2 | 27 | 2593.03                |
| 2015                     | 2 | 28 | 2556.75                |

| M07製程104年1月1日~6月30日每日廢氣量 |   |    |                        |
|--------------------------|---|----|------------------------|
| 年                        | 月 | 日  | 廢氣累計值(m <sup>3</sup> ) |
| 2015                     | 1 | 1  | 2765.09                |
| 2015                     | 1 | 2  | 2593.18                |
| 2015                     | 1 | 3  | 3076.68                |
| 2015                     | 1 | 4  | 2675.47                |
| 2015                     | 1 | 5  | 6115.71                |
| 2015                     | 1 | 6  | 3416.54                |
| 2015                     | 1 | 7  | 2977.87                |
| 2015                     | 1 | 8  | 4000.29                |
| 2015                     | 1 | 9  | 3132.8                 |
| 2015                     | 1 | 10 | 2873.04                |
| 2015                     | 1 | 11 | 3627.24                |
| 2015                     | 1 | 12 | 3926.17                |
| 2015                     | 1 | 13 | 2716.49                |
| 2015                     | 1 | 14 | 3029.92                |
| 2015                     | 1 | 15 | 2960.39                |
| 2015                     | 1 | 16 | 2684.02                |
| 2015                     | 1 | 17 | 3396.35                |
| 2015                     | 1 | 18 | 2756.35                |
| 2015                     | 1 | 19 | 2008.8                 |
| 2015                     | 1 | 20 | 2185.59                |
| 2015                     | 1 | 21 | 3100.27                |
| 2015                     | 1 | 22 | 3210.8                 |
| 2015                     | 1 | 23 | 5937.2                 |
| 2015                     | 1 | 24 | 9807.35                |
| 2015                     | 1 | 25 | 8874.61                |
| 2015                     | 1 | 26 | 7899.77                |
| 2015                     | 1 | 27 | 7937.44                |
| 2015                     | 1 | 28 | 7551                   |
| 2015                     | 1 | 29 | 8217.43                |
| 2015                     | 1 | 30 | 8639.14                |
| 2015                     | 1 | 31 | 8650.41                |
| 2015                     | 2 | 1  | 7281.17                |
| 2015                     | 2 | 2  | 3408.33                |
| 2015                     | 2 | 3  | 3052.97                |
| 2015                     | 2 | 4  | 2685.74                |
| 2015                     | 2 | 5  | 2208.1                 |
| 2015                     | 2 | 6  | 1314.04                |
| 2015                     | 2 | 7  | 1503.3                 |
| 2015                     | 2 | 8  | 1425.78                |
| 2015                     | 2 | 9  | 1285.91                |
| 2015                     | 2 | 10 | 1701.9                 |
| 2015                     | 2 | 11 | 2093.69                |
| 2015                     | 2 | 12 | 2022.04                |
| 2015                     | 2 | 13 | 1924.16                |
| 2015                     | 2 | 14 | 5830.37                |
| 2015                     | 2 | 15 | 1837.08                |
| 2015                     | 2 | 16 | 2327.96                |
| 2015                     | 2 | 17 | 1744.04                |
| 2015                     | 2 | 18 | 2337.47                |
| 2015                     | 2 | 19 | 9519.77                |
| 2015                     | 2 | 20 | 4281                   |
| 2015                     | 2 | 21 | 942.86                 |
| 2015                     | 2 | 22 | 1868.65                |
| 2015                     | 2 | 23 | 2079.19                |
| 2015                     | 2 | 24 | 1862.38                |
| 2015                     | 2 | 25 | 1447.13                |
| 2015                     | 2 | 26 | 2214.48                |
| 2015                     | 2 | 27 | 1624.53                |
| 2015                     | 2 | 28 | 1436.39                |

|      |   |    |         |
|------|---|----|---------|
| 2015 | 3 | 1  | 2846.48 |
| 2015 | 3 | 2  | 2987.28 |
| 2015 | 3 | 3  | 3084.99 |
| 2015 | 3 | 4  | 3319.4  |
| 2015 | 3 | 5  | 3359.69 |
| 2015 | 3 | 6  | 3343.81 |
| 2015 | 3 | 7  | 3353.09 |
| 2015 | 3 | 8  | 3758.08 |
| 2015 | 3 | 9  | 3392.12 |
| 2015 | 3 | 10 | 3267.26 |
| 2015 | 3 | 11 | 3445.41 |
| 2015 | 3 | 12 | 3291.75 |
| 2015 | 3 | 13 | 3270.4  |
| 2015 | 3 | 14 | 3148.14 |
| 2015 | 3 | 15 | 3181.83 |
| 2015 | 3 | 16 | 3047.07 |
| 2015 | 3 | 17 | 3178.22 |
| 2015 | 3 | 18 | 3191.37 |
| 2015 | 3 | 19 | 3305.13 |
| 2015 | 3 | 20 | 3198.32 |
| 2015 | 3 | 21 | 3254.08 |
| 2015 | 3 | 22 | 3148.18 |
| 2015 | 3 | 23 | 6502.31 |
| 2015 | 3 | 24 | 8140.12 |
| 2015 | 3 | 25 | 7817.37 |
| 2015 | 3 | 26 | 7615.79 |
| 2015 | 3 | 27 | 7696.24 |
| 2015 | 3 | 28 | 7870.6  |
| 2015 | 3 | 29 | 7390.05 |
| 2015 | 3 | 30 | 7667.21 |
| 2015 | 3 | 31 | 7357.77 |
| 2015 | 4 | 1  | 6955.12 |
| 2015 | 4 | 2  | 7665.83 |
| 2015 | 4 | 3  | 7262.78 |
| 2015 | 4 | 4  | 7272.2  |
| 2015 | 4 | 5  | 7216.84 |
| 2015 | 4 | 6  | 7072.15 |
| 2015 | 4 | 7  | 7508.94 |
| 2015 | 4 | 8  | 7499.48 |
| 2015 | 4 | 9  | 7464.94 |
| 2015 | 4 | 10 | 7516.04 |
| 2015 | 4 | 11 | 4522.3  |
| 2015 | 4 | 12 | 1169.08 |
| 2015 | 4 | 13 | 805.32  |
| 2015 | 4 | 14 | 1523.7  |
| 2015 | 4 | 15 | 2671.73 |
| 2015 | 4 | 16 | 7481.99 |
| 2015 | 4 | 17 | 5026.87 |
| 2015 | 4 | 18 | 1945.46 |
| 2015 | 4 | 19 | 2018.32 |
| 2015 | 4 | 20 | 1760.14 |
| 2015 | 4 | 21 | 1988.82 |
| 2015 | 4 | 22 | 2314.49 |
| 2015 | 4 | 23 | 2093.57 |
| 2015 | 4 | 24 | 2128.06 |
| 2015 | 4 | 25 | 2098.04 |
| 2015 | 4 | 26 | 2265.7  |
| 2015 | 4 | 27 | 1988.33 |
| 2015 | 4 | 28 | 1925.36 |
| 2015 | 4 | 29 | 2011.31 |
| 2015 | 4 | 30 | 1873.89 |
| 2015 | 5 | 1  | 1960.92 |

|      |   |    |         |
|------|---|----|---------|
| 2015 | 3 | 1  | 1892.63 |
| 2015 | 3 | 2  | 1132.77 |
| 2015 | 3 | 3  | 1757.22 |
| 2015 | 3 | 4  | 1295.39 |
| 2015 | 3 | 5  | 1969.63 |
| 2015 | 3 | 6  | 1600.32 |
| 2015 | 3 | 7  | 1914.72 |
| 2015 | 3 | 8  | 2561.44 |
| 2015 | 3 | 9  | 2835.12 |
| 2015 | 3 | 10 | 2256.55 |
| 2015 | 3 | 11 | 2227.66 |
| 2015 | 3 | 12 | 2352.73 |
| 2015 | 3 | 13 | 2779.75 |
| 2015 | 3 | 14 | 2416.86 |
| 2015 | 3 | 15 | 2379.32 |
| 2015 | 3 | 16 | 2069.66 |
| 2015 | 3 | 17 | 2274.03 |
| 2015 | 3 | 18 | 2510.04 |
| 2015 | 3 | 19 | 2736.63 |
| 2015 | 3 | 20 | 2144.08 |
| 2015 | 3 | 21 | 2199.41 |
| 2015 | 3 | 22 | 1941.92 |
| 2015 | 3 | 23 | 2360.53 |
| 2015 | 3 | 24 | 1790.34 |
| 2015 | 3 | 25 | 1852.33 |
| 2015 | 3 | 26 | 1997.16 |
| 2015 | 3 | 27 | 1839.03 |
| 2015 | 3 | 28 | 1837.3  |
| 2015 | 3 | 29 | 1852.78 |
| 2015 | 3 | 30 | 1799.09 |
| 2015 | 3 | 31 | 1931.81 |
| 2015 | 4 | 1  | 1898.18 |
| 2015 | 4 | 2  | 1962.09 |
| 2015 | 4 | 3  | 1947.47 |
| 2015 | 4 | 4  | 1845.64 |
| 2015 | 4 | 5  | 2047.52 |
| 2015 | 4 | 6  | 1942.38 |
| 2015 | 4 | 7  | 2093.52 |
| 2015 | 4 | 8  | 1993.34 |
| 2015 | 4 | 9  | 2314.15 |
| 2015 | 4 | 10 | 2232.96 |
| 2015 | 4 | 11 | 1351.4  |
| 2015 | 4 | 12 | 418.34  |
| 2015 | 4 | 13 | 460.78  |
| 2015 | 4 | 14 | 1534.58 |
| 2015 | 4 | 15 | 2278.94 |
| 2015 | 4 | 16 | 2013.96 |
| 2015 | 4 | 17 | 2231.63 |
| 2015 | 4 | 18 | 2837.46 |
| 2015 | 4 | 19 | 2927.18 |
| 2015 | 4 | 20 | 3104.46 |
| 2015 | 4 | 21 | 2170.84 |
| 2015 | 4 | 22 | 2902.01 |
| 2015 | 4 | 23 | 2753.18 |
| 2015 | 4 | 24 | 3124.13 |
| 2015 | 4 | 25 | 2723.38 |
| 2015 | 4 | 26 | 2988.65 |
| 2015 | 4 | 27 | 2945.03 |
| 2015 | 4 | 28 | 2973.58 |
| 2015 | 4 | 29 | 3410.38 |
| 2015 | 4 | 30 | 3715.64 |
| 2015 | 5 | 1  | 2603.9  |

|      |   |    |            |
|------|---|----|------------|
| 2015 | 5 | 2  | 1925.06    |
| 2015 | 5 | 3  | 1907.56    |
| 2015 | 5 | 4  | 2459.2     |
| 2015 | 5 | 5  | 3103.46    |
| 2015 | 5 | 6  | 3179.55    |
| 2015 | 5 | 7  | 3112.74    |
| 2015 | 5 | 8  | 3164.45    |
| 2015 | 5 | 9  | 3283.34    |
| 2015 | 5 | 10 | 3076.4     |
| 2015 | 5 | 11 | 3140.02    |
| 2015 | 5 | 12 | 3140.72    |
| 2015 | 5 | 13 | 3335.59    |
| 2015 | 5 | 14 | 3505.01    |
| 2015 | 5 | 15 | 3414.44    |
| 2015 | 5 | 16 | 3458.98    |
| 2015 | 5 | 17 | 3704.34    |
| 2015 | 5 | 18 | 3302.17    |
| 2015 | 5 | 19 | 3392.53    |
| 2015 | 5 | 20 | 3167.17    |
| 2015 | 5 | 21 | 3182.67    |
| 2015 | 5 | 22 | 3249.24    |
| 2015 | 5 | 23 | 3177.01    |
| 2015 | 5 | 24 | 3178.49    |
| 2015 | 5 | 25 | 3195.74    |
| 2015 | 5 | 26 | 3143.03    |
| 2015 | 5 | 27 | 3934.61    |
| 2015 | 5 | 28 | 4415.81    |
| 2015 | 5 | 29 | 4228.17    |
| 2015 | 5 | 30 | 4955.39    |
| 2015 | 5 | 31 | 4336.91    |
| 2015 | 6 | 1  | 3055.98    |
| 2015 | 6 | 2  | 2289.34    |
| 2015 | 6 | 3  | 3274.66    |
| 2015 | 6 | 4  | 1984.04    |
| 2015 | 6 | 5  | 2693.51    |
| 2015 | 6 | 6  | 1418.68    |
| 2015 | 6 | 7  | 3124.52    |
| 2015 | 6 | 8  | 2576.97    |
| 2015 | 6 | 9  | 3332.39    |
| 2015 | 6 | 10 | 2334.73    |
| 2015 | 6 | 11 | 2230.56    |
| 2015 | 6 | 12 | 2028.57    |
| 2015 | 6 | 13 | 2113.98    |
| 2015 | 6 | 14 | 1964.75    |
| 2015 | 6 | 15 | 6122.16    |
| 2015 | 6 | 16 | 2130.32    |
| 2015 | 6 | 17 | 2232.54    |
| 2015 | 6 | 18 | 2132.39    |
| 2015 | 6 | 19 | 2394.29    |
| 2015 | 6 | 20 | 2279.89    |
| 2015 | 6 | 21 | 2594.33    |
| 2015 | 6 | 22 | 1756.59    |
| 2015 | 6 | 23 | 3183.9     |
| 2015 | 6 | 24 | 3866.64    |
| 2015 | 6 | 25 | 2069.39    |
| 2015 | 6 | 26 | 2286.64    |
| 2015 | 6 | 27 | 2490.01    |
| 2015 | 6 | 28 | 2025.21    |
| 2015 | 6 | 29 | 2171.35    |
| 2015 | 6 | 30 | 1943.63    |
|      |   |    | 1021340.68 |

|      |   |    |           |
|------|---|----|-----------|
| 2015 | 5 | 2  | 2353.6    |
| 2015 | 5 | 3  | 2926.77   |
| 2015 | 5 | 4  | 2681.29   |
| 2015 | 5 | 5  | 2441.83   |
| 2015 | 5 | 6  | 2299.54   |
| 2015 | 5 | 7  | 2485.99   |
| 2015 | 5 | 8  | 2523.16   |
| 2015 | 5 | 9  | 2748.71   |
| 2015 | 5 | 10 | 2756.7    |
| 2015 | 5 | 11 | 3577.09   |
| 2015 | 5 | 12 | 3268.64   |
| 2015 | 5 | 13 | 1829.69   |
| 2015 | 5 | 14 | 2260.29   |
| 2015 | 5 | 15 | 2346.88   |
| 2015 | 5 | 16 | 2628.63   |
| 2015 | 5 | 17 | 2885.98   |
| 2015 | 5 | 18 | 3414.58   |
| 2015 | 5 | 19 | 3439.06   |
| 2015 | 5 | 20 | 2443.25   |
| 2015 | 5 | 21 | 2191.59   |
| 2015 | 5 | 22 | 2810.56   |
| 2015 | 5 | 23 | 2096.3    |
| 2015 | 5 | 24 | 1953.8    |
| 2015 | 5 | 25 | 1763.71   |
| 2015 | 5 | 26 | 1753.67   |
| 2015 | 5 | 27 | 5839.73   |
| 2015 | 5 | 28 | 4187.27   |
| 2015 | 5 | 29 | 5194.7    |
| 2015 | 5 | 30 | 4954.78   |
| 2015 | 5 | 31 | 4263.22   |
| 2015 | 6 | 1  | 4265.67   |
| 2015 | 6 | 2  | 4953.47   |
| 2015 | 6 | 3  | 6005.16   |
| 2015 | 6 | 4  | 5041.86   |
| 2015 | 6 | 5  | 5265.48   |
| 2015 | 6 | 6  | 4298.04   |
| 2015 | 6 | 7  | 5003.3    |
| 2015 | 6 | 8  | 5621.54   |
| 2015 | 6 | 9  | 5558.95   |
| 2015 | 6 | 10 | 5251.01   |
| 2015 | 6 | 11 | 5489.12   |
| 2015 | 6 | 12 | 5391.52   |
| 2015 | 6 | 13 | 5503.43   |
| 2015 | 6 | 14 | 5101.53   |
| 2015 | 6 | 15 | 5782.94   |
| 2015 | 6 | 16 | 5107.12   |
| 2015 | 6 | 17 | 4804.17   |
| 2015 | 6 | 18 | 5143.01   |
| 2015 | 6 | 19 | 4759.26   |
| 2015 | 6 | 20 | 4556.33   |
| 2015 | 6 | 21 | 4549.23   |
| 2015 | 6 | 22 | 4639.12   |
| 2015 | 6 | 23 | 3883.95   |
| 2015 | 6 | 24 | 4866.52   |
| 2015 | 6 | 25 | 4319.11   |
| 2015 | 6 | 26 | 4646.74   |
| 2015 | 6 | 27 | 4690.11   |
| 2015 | 6 | 28 | 4681      |
| 2015 | 6 | 29 | 4319.33   |
| 2015 | 6 | 30 | 5129.15   |
|      |   |    | 589206.97 |

A602廢氣燃燒塔104年1月1日~6月30日廢氣量=1021341+589207=1610548m<sup>3</sup>



## 二、檢測結果摘要

|                                                     |                                                        |    |                 |                |            |                |                      |        |              |              |             |    |    |    |   |
|-----------------------------------------------------|--------------------------------------------------------|----|-----------------|----------------|------------|----------------|----------------------|--------|--------------|--------------|-------------|----|----|----|---|
| 基本資料                                                | 1. 公私場所：大連化學工業股份有限公司大發廠                                |    |                 |                |            |                | 5. 管制編號：S2005654     |        |              |              |             |    |    |    |   |
|                                                     | 2. 地址：高雄市大發工業區華西路8-1號                                  |    |                 |                |            |                | 6. 受測污染源(編號)：*       |        |              |              |             |    |    |    |   |
|                                                     | 3. 檢測用途：公私場所自行進行與法令規範無關之檢測                             |    |                 |                |            |                | 7. 採樣日期：100年08月15日   |        |              |              |             |    |    |    |   |
|                                                     | 4. 檢測機構名稱：台宇環境科技股份有限公司                                 |    |                 |                |            |                | 8. 採樣位置：廢氣燃燒塔進流廢氣取樣點 |        |              |              |             |    |    |    |   |
| 採樣時污染源操作狀況                                          | 進料量(註明單位)                                              |    |                 | 產量(註明單位)       |            |                | 燃料(註明單位)             |        |              |              |             |    |    |    |   |
|                                                     | 名稱                                                     | 當日 | 平日最大量或許可用量      | 名稱             | 當日         | 平日最大量或許可用量     | 名稱                   | 當日     | 平日最大量或許可用量   |              |             |    |    |    |   |
|                                                     | —                                                      | —  | —               | —              | —          | —              | —                    | —      | —            |              |             |    |    |    |   |
|                                                     | —                                                      | —  | —               | —              | —          | —              | —                    | —      | —            |              |             |    |    |    |   |
|                                                     | —                                                      | —  | —               | —              | —          | —              | —                    | —      | —            |              |             |    |    |    |   |
|                                                     | —                                                      | —  | —               | —              | —          | —              | —                    | —      | —            |              |             |    |    |    |   |
| A. 燃料名稱：* (含硫量：*%)，B. 燃料名稱：* (含硫量：*%)<br>混燒比例 * : * |                                                        |    |                 |                |            |                |                      |        |              |              |             |    |    |    |   |
| 採樣時污染防制設施操作狀況                                       | 空氣污染防制設施名稱                                             |    | 主要操作參數(註明單位)    |                |            | 處理量(註明單位)      |                      |        |              |              |             |    |    |    |   |
|                                                     |                                                        |    | 名稱              | 當日             | 平日最大量或許可用量 | 當日             | 平日最大量或許可用量           |        |              |              |             |    |    |    |   |
|                                                     | —                                                      |    | —               | —              | —          | —              | —                    |        |              |              |             |    |    |    |   |
|                                                     | —                                                      |    | —               | —              | —          | —              | —                    |        |              |              |             |    |    |    |   |
|                                                     | —                                                      |    | —               | —              | —          | —              | —                    |        |              |              |             |    |    |    |   |
|                                                     | —                                                      |    | —               | —              | —          | —              | —                    |        |              |              |             |    |    |    |   |
| 廢氣性質                                                | (1)濕度：排氣濕度(%)：—                                        |    |                 |                |            |                | 平均排氣濕度(%)：—          |        |              |              |             |    |    |    |   |
|                                                     | (2)溫度：排氣溫度(°C)：—                                       |    |                 |                |            |                | 平均排氣溫度(°C)：—         |        |              |              |             |    |    |    |   |
| 檢測結果                                                | (3)速度：排氣速度(m/s)：—                                      |    |                 |                |            |                | 平均排氣速度(m/s)：—        |        |              |              |             |    |    |    |   |
|                                                     | (4)排氣量：濕基實測值(Nm³/min)：—                                |    |                 |                |            |                | 平均濕基實測值(Nm³/min)：—   |        |              |              |             |    |    |    |   |
|                                                     | 乾基實測值(Nm³/min)：—                                       |    |                 |                |            |                | 平均乾基實測值(Nm³/min)：—   |        |              |              |             |    |    |    |   |
|                                                     |                                                        |    |                 |                |            |                |                      |        |              |              |             |    |    |    |   |
| 檢測結果                                                | 空氣污染物                                                  |    | 排氣組成(%)         |                |            | O <sub>2</sub> | 空氣污染                 | 空氣污染   | 乾基           | 乾基           | 空氣污染        | 削減 | 排放 | 合格 |   |
|                                                     | 檢測方法編號                                                 |    | CO <sub>2</sub> | O <sub>2</sub> | CO         | 參考基準(%)        | 物實測值                 | 物實測校正值 | 排氣量(Nm³/min) | 校正值(Nm³/min) | 物排放量(kg/hr) | 率% | 標準 | 是  | 否 |
|                                                     | 硫化氫                                                    |    | —               | —              | —          | —              | ND<0.16 ppm          | —      | —            | —            | —           | —  | —  |    |   |
|                                                     | NIEA A406.71A                                          |    | —               | —              | —          | —              | —                    | —      | —            | —            | —           | —  | —  |    |   |
|                                                     |                                                        |    |                 |                |            |                |                      |        |              |              |             |    |    |    |   |
|                                                     |                                                        |    |                 |                |            |                |                      |        |              |              |             |    |    |    |   |
| 備註                                                  | 一、報告編號：R1000911A11                                     |    |                 |                |            |                |                      |        |              |              |             |    |    |    |   |
|                                                     | 二、本報告僅對該批次所採樣品負責，未經本檢驗室同意，不得隨意複製及作為宣傳廣告之用。             |    |                 |                |            |                |                      |        |              |              |             |    |    |    |   |
|                                                     | 三、本報告頁次詳如目錄所示，分離使用無效。                                  |    |                 |                |            |                |                      |        |              |              |             |    |    |    |   |
|                                                     | 四、本報告已由報告簽署人審核無誤，並簽署於內部文件，簽署人：賴建能(GC-A-04)、邱炳華(GC-02)。 |    |                 |                |            |                |                      |        |              |              |             |    |    |    |   |
| 上述資料經本人做最終審查，確認無誤。實驗室主任簽章                           |                                                        |    |                 |                |            |                |                      |        |              |              |             |    |    |    |   |

- 一、若不敷使用，請自行影印置於後頁辦理。  
二、檢測結果是否合格，由環保主管機關填寫。

頁次

3

## 附件八、2019年FLARE採樣分析紀錄

M04緊急狀況( 2019/5/1~5/2 M04製程發生異常跳車)

| SAMPDATE | H2      | O2     | N2       | CH4    | CO      | ETHANE | PROPANE | PROPYLENE | ISO_BUTANE | N_BUTANE | CHN      | PROPANAL | DMC       | THF     | NPA     |
|----------|---------|--------|----------|--------|---------|--------|---------|-----------|------------|----------|----------|----------|-----------|---------|---------|
| 2019/5/1 | 58.86   | 0.6144 | 11.01221 | 5.3245 | 23.1179 | 0.2297 | 0.5382  | 0.03798   | 0.09083    | 0.00958  | 2.07E-05 | 0.1125   | 0.0062898 | 0.03348 | 0.01241 |
| 2019/5/2 | 47.3158 | 1.2027 | 4.8735   | 0      | 46.475  | 0.0034 | 0.0225  | 0.1071    | 0          | 0        | 0        | 0        | 0         | 0       | 0       |
| 平均       | 53.088  | 0.909  | 7.943    | 2.662  | 34.796  | 0.117  | 0.280   | 0.073     | 0.045      | 0.005    | 0.000    | 0.056    | 0.003     | 0.017   | 0.006   |

M04歲修二( 2019/2/27及2019/5/13 E712氧化爐停爐清爐)

| SAMPDATE  | H2      | O2     | N2       | CH4    | CO     | ETHANE | PROPANE | PROPYLENE | ISO_BUTANE | N_BUTANE | CHN      | PROPANAL | DMC     | THF     | NPA     |
|-----------|---------|--------|----------|--------|--------|--------|---------|-----------|------------|----------|----------|----------|---------|---------|---------|
| 2019/2/27 | 72.8064 | 4.2748 | 13.81161 | 6.2307 | 0.0216 | 0.4625 | 1.5196  | 0.3283    | 0.3467     | 0.02388  | 2.13E-03 | 0.02641  | 0.02253 | 0.09172 | 0.03112 |
| 2019/5/13 | 25.6    | 1.5    | 48.0674  | 12.577 | 7.72   | 0.463  | 1.8374  | 1.782     | 0.28       | 0.025    | 0.0001   | 0.0206   | 0.0141  | 0.0927  | 0.0207  |
| 平均        | 49.203  | 2.887  | 30.940   | 9.404  | 3.871  | 0.463  | 1.679   | 1.055     | 0.313      | 0.024    | 0.001    | 0.024    | 0.018   | 0.092   | 0.026   |

M04歲修一( 2019/4/20~4/21 M04製程歲修)

| SAMPDATE  | H2      | O2     | N2       | CH4   | CO     | ETHANE | PROPANE | PROPYLENE | ISO_BUTANE | N_BUTANE | CHN      | PROPANAL  | DMC      | THF       | NPA   |
|-----------|---------|--------|----------|-------|--------|--------|---------|-----------|------------|----------|----------|-----------|----------|-----------|-------|
| 2019/4/20 | 51.7474 | 0.7465 | 35.28583 | 0     | 11.994 | 0.0163 | 0.2013  | 0.0037    | 0.001164   | 0        | 2.31E-05 | 0.0007979 | 0.002387 | 0.0005946 | 0     |
| 2019/4/21 | 56.772  | 2.023  | 11.2959  | 0     | 29.844 | 0.0051 | 0.0122  | 0.0108    | 0.00289    | 0        | 0.00006  | 0.0206    | 0.00405  | 0.0094    | 0     |
| 平均        | 54.260  | 1.385  | 23.291   | 0.000 | 20.919 | 0.011  | 0.107   | 0.007     | 0.002      | 0.000    | 0.000    | 0.011     | 0.003    | 0.005     | 0.000 |

附件九、排氣尾氣流量與組成分析資料

| Stream No.                  |                 |                 |      | 11                 |           |           |          | 12                 |           |           |          | 13 ( 8 + 11 )          |           |           |          | 14 ( 8 + 12 )          |           |           |          | 15     |          |          |        |       |
|-----------------------------|-----------------|-----------------|------|--------------------|-----------|-----------|----------|--------------------|-----------|-----------|----------|------------------------|-----------|-----------|----------|------------------------|-----------|-----------|----------|--------|----------|----------|--------|-------|
| Source                      |                 |                 |      | BDO6 PC Vent (不含氧) |           |           |          | BDO2 PC Vent (不含氧) |           |           |          | BDO6 (含氧) + BDO6 (不含氧) |           |           |          | BDO2 (含氧) + BDO2 (不含氧) |           |           |          | PTG1   |          |          |        |       |
| Motoring & Interlock System |                 |                 |      | No                 |           |           |          | No                 |           |           |          | No                     |           |           |          | No                     |           |           |          | No     |          |          |        |       |
| Flow Rate                   |                 |                 |      | kg/h               | g-mole/h  | mole%     |          | kg/h               | g-mole/h  | mole%     |          | kg/h                   | g-mole/h  | mole%     |          | kg/h                   | g-mole/h  | mole%     |          | kg/h   | g-mole/h | mole%    |        |       |
|                             |                 |                 |      |                    |           | Original  | Inerting |                    |           | Original  | Inerting |                        |           | Original  | Inerting |                        |           | Original  | Inerting |        |          |          |        |       |
| 1.)                         | O2              | M.W.            | 32.0 |                    |           |           |          |                    |           |           |          | 7.49                   | 234.06    | 0.27      | 0.27     | 7.49                   | 234.06    | 0.27      | 0.27     | 4.76   | 148.80   | 6.97     | 2.98   |       |
| 2-1.)                       | N2              | , Original      | M.W. | 28.0               | 80.29     | 2,867.46  | 3.65     | 3.65               | 80.29     | 2,867.50  | 3.65     | 3.65                   | 179.87    | 6,423.89  | 7.43     | 7.43                   | 179.87    | 6,423.93  | 7.43     | 7.43   | 55.59    | 1,985.30 | 93.02  | 39.77 |
| 2-2.)                       | N2              | , Inerting      | M.W. | 28.0               | 0.00      | 0.00      |          | 0.00               | 0.00      | 0.00      |          | 0.00                   | 0.00      |           | 0.00     | 0.00                   |           | 0.00      |          | 80.00  | 2,857.14 |          | 57.24  |       |
| 3.)                         | CO2             |                 | M.W. | 44.0               | 17.06     | 387.77    | 0.49     | 0.49               | 17.06     | 387.73    | 0.49     | 0.49                   | 17.06     | 387.77    | 0.45     | 0.45                   | 17.06     | 387.73    | 0.45     | 0.45   |          |          |        |       |
| 4.)                         | H2              |                 | M.W. | 2.0                | 93.99     | 46,994.00 | 59.81    | 59.81              | 93.99     | 46,995.00 | 59.81    | 59.81                  | 101.27    | 50,634.00 | 58.56    | 58.56                  | 101.27    | 50,635.00 | 58.56    | 58.56  |          | 0.00     | 0.00   | 0.00  |
| 5.)                         | CO              |                 | M.W. | 28.0               | 604.73    | 21,597.46 | 27.49    | 27.49              | 604.73    | 21,597.50 | 27.49    | 27.49                  | 604.73    | 21,597.46 | 24.98    | 24.98                  | 604.73    | 21,597.50 | 24.98    | 24.98  |          |          |        |       |
| 6.)                         | CH4             |                 | M.W. | 16.0               | 67.48     | 4,217.36  | 5.37     | 5.37               | 67.48     | 4,217.50  | 5.37     | 5.37                   | 67.48     | 4,217.36  | 4.88     | 4.88                   | 67.48     | 4,217.50  | 4.88     | 4.88   |          |          |        |       |
| 7.)                         | CH4O            | Methanol        | M.W. | 32.0               | 27.86     | 870.62    | 1.11     | 1.11               | 27.86     | 870.63    | 1.11     | 1.11                   | 40.71     | 1,272.18  | 1.47     | 1.47                   | 40.71     | 1,272.19  | 1.47     | 1.47   |          | 0.00     | 0.00   | 0.00  |
| 8.)                         | C2H4            |                 | M.W. | 28.0               |           |           |          |                    |           |           |          |                        |           |           |          |                        |           |           |          |        |          |          |        |       |
| 9.)                         | C2H4O2          | Methyl Formate  | M.W. | 60.0               | 6.70      | 111.67    | 0.14     | 0.14               | 6.70      | 111.75    | 0.14     | 0.14                   | 6.70      | 111.67    | 0.13     | 0.13                   | 6.70      | 111.75    | 0.13     | 0.13   |          |          |        |       |
| 10.)                        | C2H6            |                 | M.W. | 30.0               |           |           |          |                    |           |           |          |                        |           |           |          |                        |           |           |          |        |          |          |        |       |
| 11.)                        | C2H6O           | Dimethyl Ether  | M.W. | 46.0               | 70.25     | 1,527.15  | 1.94     | 1.94               | 70.25     | 1,527.15  | 1.94     | 1.94                   | 70.25     | 1,527.15  | 1.77     | 1.77                   | 70.25     | 1,527.15  | 1.77     | 1.77   |          |          |        |       |
| 12.)                        | C3H6            | Propylene       | M.W. | 42.0               |           |           |          |                    |           |           |          |                        |           |           |          |                        |           |           |          |        |          |          |        |       |
| 13.)                        | C3H8            |                 | M.W. | 44.0               |           |           |          |                    |           |           |          |                        |           |           |          | 0.00                   | 0.00      | 0.00      | 0.00     |        |          |          |        |       |
| 14.)                        | C4H6            | 1,2-Butadiene   | M.W. | 54.0               |           |           |          |                    |           |           |          |                        |           |           |          | 0.00                   | 0.00      | 0.00      | 0.00     |        |          |          |        |       |
| 15.)                        | C4H8O           | Tetrahydrofuran | M.W. | 72.0               |           |           |          |                    |           |           |          | 4.40                   | 61.11     | 0.07      | 0.07     | 4.40                   | 61.11     | 0.07      | 0.07     | 0.01   | 0.14     | 0.01     | 0.00   |       |
| 16.)                        |                 | M.W.            |      |                    |           |           |          |                    |           |           |          |                        |           |           |          |                        |           |           |          |        |          |          |        |       |
| 17.)                        |                 | M.W.            |      |                    |           |           |          |                    |           |           |          |                        |           |           |          |                        |           |           |          |        |          |          |        |       |
| 18.)                        |                 | M.W.            |      |                    |           |           |          |                    |           |           |          |                        |           |           |          |                        |           |           |          |        |          |          |        |       |
| 19.)                        |                 | M.W.            |      |                    |           |           |          |                    |           |           |          |                        |           |           |          |                        |           |           |          |        |          |          |        |       |
| 20.)                        |                 | M.W.            |      |                    |           |           |          |                    |           |           |          |                        |           |           |          |                        |           |           |          |        |          |          |        |       |
| Total                       |                 |                 |      | 968.35             | 78,573.49 | 100.00    | 100.00   | 968.36             | 78,574.76 | 100.00    | 100.00   | 1,099.95               | 86,466.65 | 100.00    | 100.00   | 1,099.96               | 86,467.92 | 100.00    | 100.00   | 140.36 | 4,991.38 | 100.00   | 100.00 |       |
| LEL                         |                 |                 |      | mole%              |           |           |          |                    |           |           |          | 4.8                    |           |           |          | 4.8                    |           |           |          | 2.0    |          |          |        |       |
| UEL                         |                 |                 |      | mole%              |           |           |          |                    |           |           |          | 53.2                   |           |           |          | 52.9                   |           |           |          | 11.8   |          |          |        |       |
| LOC                         |                 |                 |      | mole%              |           |           |          | 5.0                |           |           |          | 5.0                    |           |           |          | 5.0                    |           |           |          | 10.0   |          |          |        |       |
| Original (Note 1)           |                 |                 |      | 設計基準               | 計算值       | 判定        |          | 設計基準               | 計算值       | 判定        |          | 設計基準                   | 計算值       | 判定        |          | 設計基準                   | 計算值       | 判定        |          | 設計基準   | 計算值      | 判定       |        |       |
| Fuel                        | [ 4.) ~ 20.) ]  | mole%           | 0.0  | 95.9               | OK        |           | 0.0      | 95.9               | OK        |           | 1.2      | 91.9                   | OK        |           | 1.2      | 91.9                   | OK        |           | 0.5      | 0.01   | OK       |          |        |       |
| Oxygen                      |                 | mole%           | 3.0  | 0.0                | OK        |           | 3.0      | 0.0                | OK        |           | 3.0      | 0.3                    | OK        |           | 3.0      | 0.3                    | OK        |           | 6.5      | 6.97   | x        |          |        |       |
| Inert                       | [ 2-1.) + 3.) ] | mole%           |      | 4.1                |           |           |          | 4.1                |           |           |          | 7.9                    |           |           |          | 7.9                    |           |           |          | 93.0   |          |          |        |       |
| Inerting (Note 1)           |                 |                 |      |                    |           |           |          |                    |           |           |          |                        |           |           |          |                        |           |           |          |        |          |          |        |       |
| Fuel                        | [ 4.) ~ 20.) ]  | mole%           |      |                    |           |           |          |                    |           |           |          |                        |           |           |          |                        |           |           |          |        |          |          |        |       |
| Oxygen                      |                 | mole%           |      |                    |           |           |          |                    |           |           |          |                        |           |           |          |                        |           |           |          |        |          |          |        |       |
| Inert                       | [ 2-1.) ~ 3.) ] | mole%           |      |                    |           |           |          |                    |           |           |          |                        |           |           |          |                        |           |           |          |        |          |          |        |       |
| 判定                          |                 |                 |      | OK                 |           |           |          | OK                 |           |           |          | OK                     |           |           |          | OK                     |           |           |          | OK     |          |          |        |       |
| Remark                      |                 |                 |      |                    |           |           |          |                    |           |           |          |                        |           |           |          |                        |           |           |          |        |          |          |        |       |

尾氣排放之可燃性物質濃度或氧氣濃度標準

尾氣排放之可燃性物質濃度或氧氣濃度標準

1.) Oxygen Concentration之限制

A.) LOC < 5% , Oxygen Concentration ≤ 40% LOC

B.) LOC ≥ 5% , Oxygen Concentration ≤ 60% LOC

or 2.) Fuel Concentration之限制

Fuel ≤ 25% LEL

|                                                                                                             |                             |          |                       |
|-------------------------------------------------------------------------------------------------------------|-----------------------------|----------|-----------------------|
| <br>JOHN ZINK Asia-Pacific | SUBJECT                     | PAGE     | 1 / 21                |
|                                                                                                             | FLARE SYSTEM SPECIFICATION  | JOB NO.  | 97FS-2303             |
|                                                                                                             | TITLE                       | CUSTOMER | Yaw Li Co., Ltd.      |
|                                                                                                             | DAIREN CHEMICAL CORPORATION | END USER | Dairen Chemical Corp. |
|                                                                                                             | ELEVATED FLARE SYSTEM       | LOCATION | Taiwan                |

OPERATION & MAINTENANCE MANUAL



|     |          |                          |    |      |       |              |              |
|-----|----------|--------------------------|----|------|-------|--------------|--------------|
| 4   |          |                          |    |      |       | DATE         | 07. 02, 2002 |
| 3   |          |                          |    |      |       | PREPARED     | K.K.         |
| 2   |          |                          |    |      |       | CHECKED      | K.S.         |
| 1   |          |                          |    |      |       | APPROVED     | K.S.         |
| 0   | 07/02/02 | For customer information | JT | KS   | KS    | DOCUMENT NO. | REV.         |
| NO. | DATE     | REVISIONS                | BY | CHKD | APPR. | 012303-M-001 | 0            |



---

# OPERATION AND MAINTENANCE MANUAL FOR EEF-U-18 Flare with Airrestor and EEP-210 Pilots

---

LOCATION: TAIWAN

|                |
|----------------|
| <b>WARNING</b> |
|----------------|

- |                                                                                                                                                                                                                                                                                                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>◆ Do not attempt to operate or maintain the equipment covered in these instructions without first familiarizing yourself with these operating instructions! Improper operation of the equipment may result in injury to persons or damage to equipment.</li></ul> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

*Prepared for:*

Purchasing Co. : Yaw Li Co., Ltd.  
End User Co. : Dairen Chemical Co., Ltd.  
Purchase Order No. : TF105034

*Prepared by:*

John Zink Asia-Pacific  
7<sup>th</sup> Floor, KSS Gotanda Bldg.  
21-8, Nishigotanda, Shinagawaku  
Tokyo, Japan  
Shop Order No. :  
01-FS2303 (Tulsa 943364)

---

For assistance contact John Zink Asia-Pacific, Japan as follows:

|                       |                   |     |                   |
|-----------------------|-------------------|-----|-------------------|
| Service & Spare Parts | : +81-3-5435-8551 | Fax | : +81-3-3491-3584 |
|-----------------------|-------------------|-----|-------------------|

---

Request field service and spare parts during our normal office hours from 9:30 a.m. to 6:00 p.m. (Japan).

## SAFETY SUMMARY

The following are general safety precautions for the operation and maintenance of the flare. Instructions contained in this Operating and Maintenance Manual are an addition to and do not replace the operating company's and owner's existing operating procedures and policies with regards to standard safety precautions for flare operation and maintenance.

### WARNING

- ◆ High voltages capable of causing death are used with this equipment. Use extreme caution when servicing the control rack. Any circuit on which work is being performed should be de-energized and the switch should be locked open. Ground the control rack with an adequate grounding rod or field prior to turning on the power.
- ◆ Flares are capable of producing extremely high thermal radiation levels in close proximity to the flame. Personnel exposed to such radiation levels may suffer severe burns. Equipment located near the flame must be designed for high temperatures. Contact John Zink Company before placing either personnel or equipment in an area where potential radiation levels are unknown or where radiation levels may exceed safety limits.
- ◆ Flare systems may contain or produce toxic gases. Appropriate safety precautions must be taken whenever personnel may be exposed to flare gases. In particular, exposure may occur during close inspection of the flare tip or pilots and during removal or maintenance of equipment attached to the flare header.

## TABLE OF CONTENTS

|                                                                           |    |
|---------------------------------------------------------------------------|----|
| SAFETY SUMMARY .....                                                      | 3  |
| TABLE OF CONTENTS .....                                                   | 4  |
| I. GENERAL INFORMATION & EQUIPMENT DESCRIPTION .....                      | 5  |
| GENERAL INFORMATION .....                                                 | 5  |
| DESIGN PROCESS DATA .....                                                 | 5  |
| EEF-U-18 UTILITY FLARE .....                                              | 6  |
| AR-18 AIRRESTOR .....                                                     | 6  |
| EEP-210 ENERGY EFFICIENT PILOT .....                                      | 6  |
| COMBINATION DRUM .....                                                    | 7  |
| AUTO-MANUAL FLAME FRONT GENERATOR .....                                   | 7  |
| II. SAFETY IN FLARE OPERATION AND PURGING .....                           | 8  |
| GENERAL COMMENTS .....                                                    | 8  |
| SUITABLE PURGE GASES .....                                                | 8  |
| ADMISSION POINT FOR THE PURGE GAS .....                                   | 9  |
| ALARM FOR PURGE FAILURE .....                                             | 9  |
| MINIMUM PURGE GAS RATE .....                                              | 9  |
| III. PRE-STARTUP CHECK LIST .....                                         | 10 |
| KNOCK-OUT DRUM CHECKLIST .....                                            | 10 |
| LIQUID SEAL DRUM CHECKLIST .....                                          | 11 |
| IV. OPERATING INSTRUCTIONS .....                                          | 12 |
| UTILITY FLARE .....                                                       | 12 |
| START-UP AND OPERATION: .....                                             | 12 |
| SHUTDOWN: .....                                                           | 12 |
| AIRRESTOR .....                                                           | 12 |
| KNOCK-OUT DRUM .....                                                      | 13 |
| LIQUID SEAL DRUM .....                                                    | 13 |
| V. PILOT LIGHTING PROCEDURE .....                                         | 14 |
| PILOT IGNITION USING <u>AUTO-MANUAL</u> FLAME FRONT GENERATOR (FFG) ..... | 14 |
| VISUAL PILOT VERIFICATION .....                                           | 17 |
| VI. MAINTENANCE RECOMMENDATIONS .....                                     | 18 |
| PURGE SYSTEM .....                                                        | 18 |
| Shutdown Items: .....                                                     | 18 |
| Periodic On-Line Items: .....                                             | 18 |
| PILOTS .....                                                              | 18 |
| Shutdown Items: .....                                                     | 18 |
| Periodic On-Line Items: .....                                             | 19 |
| UTILITY FLARE .....                                                       | 19 |
| Shutdown Items: .....                                                     | 19 |
| Periodic On-Line Items: .....                                             | 20 |
| AIRRESTOR .....                                                           | 20 |
| Shutdown Items: .....                                                     | 20 |
| LIQUID SEAL DRUM & KNOCK-OUT DRUM .....                                   | 20 |
| Shutdown Items: .....                                                     | 20 |
| Periodic On-Line Items: .....                                             | 21 |
| FLAME FRONT GENERATOR .....                                               | 21 |
| Periodic On-Line Items: .....                                             | 21 |



## I. GENERAL INFORMATION &amp; EQUIPMENT DESCRIPTION

**General Information**

|                        |   |                                         |
|------------------------|---|-----------------------------------------|
| Flare Tip              | : | EEF-U-18 with 2 pilots                  |
| Pilot Style            | : | EEP-210 burning natural gas             |
| Ignition Device        | : | »Auto/Manual FFG (modified by Customer) |
| Purge Reduction Device | : | AR-18 Airrestor                         |
| Purge Rate             | : | 7.0 Nm <sup>3</sup> /Hr                 |

The flare tip is mounted on a self supported stack riser to provide an overall height of 20.0 m.

An integral combination drum is located in the base of the Flare Stack.

**WARNING**

- ◆ Do not operate this equipment outside the design limits or make any modifications, adjustments, or changes affecting the design criteria without John Zink's prior written consent. Injury to persons and damage to equipment may result.

**DESIGN PROCESS DATA****PROCESS SPECIFICATIONS**

| WASTE GAS COMPONENTS                  | Waste Gas Composition (mol%) |                       |
|---------------------------------------|------------------------------|-----------------------|
|                                       | CASE-A<br>(EXISTING PLANT)   | CASE-B<br>(NEW PLANT) |
| METHANE                               | 3.18                         | 3.18                  |
| CO <sub>2</sub> + H <sub>2</sub> O    | 0.54                         | 0.54                  |
| HYDROGEN                              | 64.19                        | 64.19                 |
| CARBON MONOXIDE                       | 32.09                        | 32.09                 |
| MAX. GAS TEMP. (DEG C)                | 90                           | Ambient               |
| MOLE WEIGHT                           | 11.11                        | 11.11                 |
| FLOW RATE (KG/HR)                     | 4590                         | 15606                 |
| AVAIL. PRESSURE (KG/CM <sup>2</sup> ) | 0.1                          | 0.1                   |

NOTE : Case-A and Case-B waste gas shall not come simultaneously.

»\*D101

**EEF-U-18 Utility Flare**

The utility style flare is an unassisted flare tip to be used with gases, which are innately smokeless or for reliefs where smoking is not a concern. This may be due to location or that the size of the release precludes smoke control.

The EEF-U-18 is equipped with 2 continuous burning pilots.

The flare tip is equipped with a 310/309 stainless windshield. It is a sacrificial element to minimize wind pulldown of the flame, coming in contact with the flare barrel.

**AR-18 Airrestor**

The AR-18 Airrestor is a velocity driven purge reduction device. The Airrestor is designed to maintain an oxygen level of 6-8% at the base of the stack. A continuous purge rate of 0.04 ft/sec stack velocity is required. Minimum purge rate is 7.0 NM<sup>3</sup>/Hr. Refer to Section II, "Safety in Flare Operation and Purging" for more details.

**EEP-210 Energy Efficient Pilot**

The pilot provided is a model EEP-210. Prior to installation or startup, perform a visual inspection of the pilot to assure all passages are clear and have not been fouled during storage or erection at the job site.

Also prior to connecting any of the pilot connections the lines to the pilot should be cleared by high velocity air or some other means to eliminate potential fouling material. The gas orifice at the pilot has a small sacrificial strainer immediately ahead of it, but should it plug due to weld slag, mill scale, etc. the pilot which is the main safety device would be eliminated.

John Zink recommends a separate filter at grade suitable for particulates to allow removal of foreign material at an accessible location.

Fuel gas supplied to the pilot must be a regulated supply with a regulator of a design to prevent pressure swings. The supply should also be liquid-free. Liquids can cause pilot failure by momentarily blocking the restriction orifice at the pilot.

| <u>Fuel</u> | <u>Supply Pressure</u> | <u>Fuel Consumption</u>             | <u>Remarks</u> |
|-------------|------------------------|-------------------------------------|----------------|
| LPG         | 0.7 BARG (10 PSIG)     | 0.5 NM <sup>3</sup> /Hr (per pilot) |                |

**NOTE**

The standard pilot is subject to flash back at hydrogen contents above 30% by volume.

## **Combination Drum**

Combination drum consists of integrated KO Drum section and Water Seal Drum Section.

### Knock-Out Drum Section

The KO Drum section is a 2,150 mm ID x 2,830 mm T/T vessel with a 18" N.D. tangential inlet and a 20" N.D. vertical top outlet. Specially designed to remove mist and particles from the flare gases, by cyclone effect.

### Water Seal Drum Section

The Water Seal Drum section is a 2,150 mm ID x 1,986 mm T/T vessel with a 20" bottom inlet and a 30" N.D. vertical top outlet. Specially designed individual internals below the liquid level suppress pulsation which otherwise could be caused by liquid movement inside the vessel.

The Water Seal Drum serves a number of important purposes. First, the submersion of the inlet pipe creates a positive barrier to air infiltration into the flare header. Second, the use of a non-volatile seal fluid creates an effective barrier to burnback and/or flashback from the tip. Specially designed flame-arresting internals can greatly improve the effectiveness of the flame barrier. Third, by injecting a continuous stream of purge gas into the main flare header the header pressure is maintained at a positive level at all times. This ensures that any leaks in the flare header will leak gas out rather than allowing air to be drawn in.

## **Auto-Manual Flame Front Generator**

The Automatic-Manual Flame Front Generator (AMFFG) is an ignitor system in which a hydrocarbon gas-air ignition mixture is generated at a mixing tee. The ignition gas mixture flows through an ignition line to the pilot tip. After filling the ignition line with the hydrocarbon gas-air ignition mixture, an electrical spark is generated at the mixing tee. A point source of flame then travels through the ignition line and ignites the pilot gas at the pilot tip. Multiple pilots are individually ignited in sequence in the manual mode of operation. The ignition source can be in excess of 300 meters from the pilot.

An additional level of safety is obtained by constantly monitoring the temperature of the flare pilot(s). In the rare event of a pilot failure, a temperature switch will provide a visual/audible alarm. In the automatic mode, the AMFFG can perform a re-ignition of the failed pilot automatically.

## **II. SAFETY IN FLARE OPERATION AND PURGING**

---

### **General Comments**

Flares can pose one of the most serious safety hazards to the facility if improperly operated. The potential exists for an explosion or detonation to occur in your flare system.

Three elements are required before such an explosion or detonation will occur. There must be a source of fuel, a source of ignition, and oxygen. Two of these elements, fuel (waste gas) and a source of ignition (pilots), are always present in a flare system. The safety of the system is totally dependent upon the prevention of air infiltration into the flare. The most effective method for the prevention of air infiltration is the introduction of a purge gas. As energy costs have risen, more attention has been given to the cost of these purge gases. At the same time, efforts have increased to reduce or eliminate relief valve leakage. The net result was to reduce purge gas requirements which in turn have produced a significant reduction in the normal flow to the flare.

If oxygen is present in a flare system, there is a danger of an explosion if the flare pilot(s) are ignited before a purge has been conducted from the beginning of the flare gas system all the way to the flare tip. A volume of non-condensable gas equal to ten (10) or more times the volume of the flare system must be used in order to insure low or zero oxygen levels. The flare system includes all the piping from the relief valves to the flare stack and up to the exit of the flare at the burning point.

In the case of a "hot gas" relief, it is necessary to provide a quantity of purge gas which is equal to twice the anticipated shrinkage rate. This is required due to the cooling of the gas volume in the flare system.

### **Suitable Purge Gases**

A suitable purge gas for the flare system is any gas or mixture of gases which a) cannot reach a dew point at any condition of ambient temperature normal to the job site, b) which cannot self-detonate, and c) which does not contain oxygen. If the average molecular weight of the flared gases exceeds 30, there should be a calculation of the dew point potential for the flared gases. The volume of the flared gas which can go to dew point should be added to the volume required for a calculated flare tip velocity.

Since a dew point can occur readily during the cold season, it is suggested that the extra purge gas volume be on temperature control for atmospheric temperature and also for admission only when a low temperature can cause a dew point situation to exist. This will save purge gas volume which can be quite expensive.

Suitable purge gases are natural gas, propane, nitrogen, inert gas, carbon dioxide or butane. Steam as a purge gas is not recommended for two reasons. The first is that the steam is initially at an elevated temperature and the steam content of the flare will shrink as the steam cools and condenses. This will allow air to draw back into the flare system. The second is that as the steam condenses, water will be left in the flare system to partially block the system, create a freezing hazard at low temperatures, and by its "wetting" action, encourage accelerated corrosion.

### Admission Point for the Purge Gas

In all cases, the purge gas must enter the flare system immediately downstream of the first relief valve so that the purge gas will "sweep" the entire system. If there is more than one header feeding into the flare duct, each header should be purged or there must be an entry of gas to each header which enters the system.

The pilots should be ignited only after the system has been purged as recommended and preferably as the purge gas is still being admitted. If the purge gas is combustible, the burning of the purge gas at the flare will be proof of pilot ignition.

### Alarm for Purge Failure

It is recommended that there be a pressure switch immediately upstream of the orifice which regulates the purge volume so that an alarm will sound if the purge gas pressure at that point falls below a set level. The pressure setting should correspond to the minimum purge rate required by the flare system. Upstream of the orifice and pressure switch, it is further recommended that the purge gas pass through a strainer in which the mesh openings are not more than one-quarter of the diameter of the limiting orifice.

### WARNING

- ◆ Failure to provide a purge flow adequate to prevent air ingress or failure to limit oxygen entering the flare system can create an explosion potential. Confirm that the flare system is essentially oxygen-free prior to pilot ignition.

### Minimum Purge Gas Rate

This flare system requires a minimum continuous purge gas flow of 7.0 NM<sup>3</sup>/Hr. Initial purging of the flare system may require a substantially higher flow rate to establish the oxygen-free condition.

### III. PRE-STARTUP CHECK LIST

Before starting up the flare, checks should be made of the following items:

1. Verify that all flare components are installed in accordance with applicable drawings.
2. Verify that all electrical devices are connected to the proper power sources.
3. Make sure that the thermocouple extension wire used is adequate for the radiation load and is proper for the thermocouple used. (JZ supply wire shall be used.)

| NOTE                                                                                                    |
|---------------------------------------------------------------------------------------------------------|
| Cross connecting the red and yellow wires anywhere in the circuit will nullify the thermocouple output. |

4. All system lines should be dry and free of dirt and foreign material. This should be done prior to connecting pilot gas lines at the pilots. Pilot gas lines should be confirmed as free and dry by removing the mixer spud and strainer screen and blowing with clean dry air. Reinstall spud and screen when clear flow is confirmed.
5. Check that all drain and vent valves are closed and that all drain and vent plugs are tightly secured. A drain plug or valve is required at each low point in each pilot ignition line.
6. All manual valves in the pilot gas and waste gas systems should be closed.
7. Check that all instruments are properly calibrated. Check that all setpoints are properly adjusted.
8. The pilot ignition lines must be dry and unobstructed so that the flame front is not quenched or blocked.
9. Confirm that all loop seals are sealed by adding an appropriate fluid to the seal leg.
10. Check that all purge gas injection points are connected and ready for use.

#### Knock-Out Drum Checklist

1. Check that any connections are tightly secured.  
Visually inspect all pressure containing connections.
2. Check that drain valve is tightly closed and block valves for level gauge are opened.
3. For ease of checking during operation, mark the HLL on the level gauge.
4. Verify set point for level high alarm.

**Liquid Seal Drum Checklist**

1. Check that any connections are tightly secured.  
Visually inspect all pressure containing connections.
2. Check that drain valve is tightly closed and block valves for level gauge are opened.
3. Fill drum to the normal liquid level (NLL). For ease of checking during startup, mark the NLL on the level gauge.
4. Verify set points for level control.



## IV. OPERATING INSTRUCTIONS

---

### Utility Flare

#### Start-Up and Operation:

1. Prepare the system for startup per Section III, "Pre-Startup Checklist".
2. Purge the system in accordance with the Section II "Safety in Flare Operation and Purging". A continuous purge gas rate of (113 SCFH) should be used.
3. Light the pilots per Section V "Pilot Lighting Procedure".
4. The flare is now ready to receive waste gas.

#### Shutdown:

1. Shutdown the waste gas flow.
2. Extinguish the pilots by closing the pilot fuel gas block valve.
3. Shutdown the purge gas flow.
4. Close all hand valves.
5. Close all utility gas supply systems.

### Airrestor

The purpose of the Airrestor is to reduce the amount of purge gas required to protect the equipment. Under certain wind conditions or certain flaring conditions it may be necessary to increase the purge rate temporarily. The purge rate should be increased whenever there is evidence of burnback in the stack. Burnback can be identified by damage to stack paint below the flare tip or by a red glow at night.

The minimum purge rate for this Airrestor is 3.2 Nm<sup>3</sup>/H (113 SCFH).

### WARNING

If the Airrestor is not purged continuously, the Airrestor will not function properly and may allow air to enter the flare stack. This may cause an internal explosion in the flare system.

**Knock-Out Drum**

1. Prepare the knock-out drum for startup per Section III, "Knock-Out Drum Pre-Startup Checklist".

**Liquid Seal Drum**

1. Prepare the water seal drum for startup per Section III, "Water Seal Drum Pre-Startup Checklist".
2. When the water seal is in operation, maintain the liquid level at the normal liquid level (NLL), as below.
  - 2.1 Establish a control set point (LSH) slightly below the NLL. When liquid level rises above this level, stop injection of seal fluid by LV-01.  
Recommended LSH =  $NLL - 10 \text{ mm}$
  - 2.2 Establish a control set point (LSL) slightly below the LSH. When liquid level falls below this level, inject seal fluid to raise the liquid level by LV-01.  
Recommended LSL =  $NLL - 60 \text{ mm}$
  - 2.3 Establish a alarm set point (LSHH) slightly upper the NLL. When liquid level comes this level, alarm will be actuated in DCS system. This event will occur at very rare event only that over-flow line is plugged.  
Recommended LSL =  $NLL + 100 \text{ mm}$
  - 2.4 Establish a alarm set point (LSLL) slightly below the LSL. When liquid level falls this level, alarm will be actuated in DCS system. In this event, operator shall come to site to check water supply system.  
Recommended LSL =  $NLL - 110 \text{ mm}$
  - 2.5 Establish a small flow of seal fluid into the drum through bypass orifice, RO-01, of LV-01 Level Control Valve. The required flow rate must be slightly more than the evaporation and entrainment losses during normal operation. Recommended flow rate is 0.24 m<sup>3</sup>/Hr, and may adjust to suit field conditions.

## V. PILOT LIGHTING PROCEDURE

### Pilot Ignition Using Auto-Manual Flame Front Generator (FFG)

1. Purge the flare system with nitrogen, natural gas, propane or any gas that will not go to dew point, until all the air (oxygen) has been replaced with purge gas. A large flow rate may be required to achieve the air-free condition in a timely manner. Once the initial purge is complete, continue to purge at the recommended continuous rate. (See Section II "Safety in Flare Operation and Purging.")

#### NOTE

If an O<sub>2</sub> analyzer is not available, the initial purge process should be continued until at least 10 system volumes of purge gas have been injected.

2. Blow down the air and gas lines to the FFG at the blow down valves (furnished by customer) in order to remove condensate. Open all ignition line drains. Blow down each ignition line, one at a time.
3. Close all drains. Close the air and ignition gas block valves.
4. Turn the "FFG Auto-Manual" switch to the "Manual" position.
5. Turn the "Power Off-On" switch to the "On" position. This will energize the white "Panel Power On". This will also energize the red "Pilot Failure" lights whenever the pilots are not lit. The air and gas solenoid valves will open and the green "Fuel On" light will be lit. Depress the "Ignition" push button. Check for a spark at the sight port on the ignition mixing casting.
6. Check each ignition line for blockage as follows:
  - 6.1 Open one of ignition valves using the pilot selector switch on the panel.
  - 6.2 Open the air block valve to obtain pressure on the air pressure gauge.
  - 6.3 Close the air block valve. Pressure should fall off rapidly on the pressure gauge. If the pressure does not fall off rapidly, investigate and correct the blockage in the corresponding ignition line.
  - 6.4 Repeat this procedure for another ignition line.

7. The screwdriver set point adjustment on the temperature switch will be set to measure approximately 5 mV which is equivalent to 120 °C on a Type K thermocouple. This is the standard pre-set by John Zink but may be field adjusted with a milivolt input source.

**CAUTION**

**Do not** adjust the factory setting for zero and span. The only temperature switch adjustment which may be necessary is the set point

Lower set point on the temperature switch will give the system a quick response when lighting the pilots. However in case of pilot failure the response time before a pilot failure alarm will be long because the thermocouple must cool to a lower temperature. Higher set points will give a quick response to a pilot failure, but slow response during pilot ignition. Too high a setting will result in false alarms.

8. Open the pilot gas valve and set the pilot gas regulator at 0.7 BARG. Purge the fuel gas line to the pilots. The purge time will depend on the distance from the pilot gas valve to the pilots.
9. Open the air and ignition gas block valves. Set the air and the ignition gas regulators at 1.0 BARG.
10. Open a pilot selector solenoid valve using the pilot selector switch. Purge the ignition line to the selected pilot for 10-20 seconds in order to fill the ignition line with a combustible gas/air mixture. The purge time will depend on the distance from the FFG to the pilot(s).

11. Quickly press and release the "Ignition" push button.

**CAUTION**

**Do not hold the "Ignition" push button down. This will create a steady flame inside the ignition line which will damage the pilot selector solenoid valves and the paint on the ignition piping.**

Visually check for a steady flame in the sight glass. If a steady flame is observed, shut off the ignition gas at the block valve immediately for a moment.

**NOTE**

When the pilot thermocouple senses a flame, the respective red "Pilot Failure" light will be off. Depending on the temperature setpoint of the temperature switch, the time to heat up the thermowell may be several minutes. If any doubt exists, use the visual pilot verification procedure.

12. If the pilot does not light, repeat steps #10 and #11.
13. If repeating steps #10 and #11 two or three times does not light the pilot, reduce the ignition gas pressure slightly. Then again repeat steps #10 and #11. If necessary, continue to adjust fuel and air pressures and repeat the ignition attempts until the pilot is lit.

**NOTE**

It is recommended that the customer make a record of the air and ignition gas pressure which worked best in order to simplify future start up attempts.

14. Repeat steps #10 and #11 for the other pilots one at a time.
15. After the pilots are lit and ignition is verified, the flare is ready for service.
16. Close the ignition gas block valve at the FFG. Open each of the pilot selector solenoid valves using the pilot selector switch on the panel. Allow the air to flush each ignition line clear for about 30 seconds. This will remove combustion products left over from the ignition process which can be corrosive.

17. Once all the pilots are proved and the ignition lines flushed with air, turn the "FFG Auto-Manual" switch to the "Auto" position. Only the white "Power On" light will be lit.
18. Open the ignition gas block valve at the FFG.
19. If a pilot and/or a thermocouple failure occurs, the appropriate red "Pilot Failure" light will be illuminate. The respective alarm contacts will close to light or sound a remote alarm (remote alarm supplied by the customer). With the "FFG Auto-Manual" switch in the "Auto" position, the FFG will attempt to re-light the failed pilot automatically as follows :
  - 19.1 The air and ignition gas solenoid valves will open and the green "Ignition Gas On" light will be lit.
  - 19.2 The pilot selector solenoid valve for the failed pilot will open. The other selector solenoid valve will be closed.
  - 19.3 A timer will delay for several seconds to allow the selected ignition line to fill with the fuel-air mixture.
  - 19.4 The ignition transformer will be energized for a very short time to create a spark.
  - 19.5 A timer will delay for about a minute to allow for thermocouple response time on the failed pilot.
  - 19.6 If the selected pilot thermocouple does not indicate pilot ignition, steps 19.4 and 19.5 are repeated.
  - 19.7 After the last attempt or after the pilot thermocouple indicates ignition, the air and ignition gas solenoid valves will close and the green "Fuel On" light will be off.

### **Visual Pilot Verification**

1. Open the pilot ignition valve for the pilot to be verified. Make sure all other pilot ignition valves are closed.
2. Close the air block valve on the FFG.
3. Open the ignition gas block valve on the FFG for about two (2) minutes. This fills a section of ignition line with fuel gas.
4. Open the air block valve on the FFG. This blows the slug of fuel gas through the ignition hood at a fairly high flow rate.
5. If the selected pilot is lit, a prominent yellow flame will appear at the pilot. The yellow flame will last for about ten (10) seconds.
6. Close the ignition gas block valve on the FFG. Allow airflow to clear the ignition line for about one (1) minute.
7. Close the air block valve on the FFG. Close the pilot selector valve.

## VI. MAINTENANCE RECOMMENDATIONS

Periodic maintenance is essential to keep the flare system operating properly. The following recommendations are provided as minimum guidelines for maintaining a safe and effective flare system. These recommendations are in addition to the basic maintenance requirements of individual components. Refer to Section VII "Vendor Information" for component maintenance recommendations.

The following sections are divided into Shutdown Items and Periodic On-line Items. Shutdown Items are those items which can only be accomplished safely during a flare shutdown. Periodic On-line Items are those items which can be accomplished safely with the flare on-line. Periodic On-line Items should also be checked during a flare shutdown.

### WARNING

- ◆ Access to flare tips and pilots while the flare is on-line is not safe. Excessive radiation, flame lick and/or toxic gas exposure may cause injury or death.

### Purge System

#### Shutdown Items:

1. Pull, clean and confirm size of purge gas flow meter.
2. Test flow switch for low purge gas pressure alarm. Check calibration and set point per vendor information.

### Pilots

#### Shutdown Items:

1. Inspect pilot tip for visible deformations and weld cracks. Replace in kind if necessary.
2. Inspect pilot mixer for cracks. Replace in kind if necessary.
3. Inspect orifice spud. Ensure spud is straight and plumb. Clean orifice and confirm drilling. Replace in kind if necessary.
4. Inspect strainer at pilot mixer. Clean screen and replace in kind if necessary.
5. Replace pilot thermocouple. Ensure that the thermocouple tip seats fully in the thermowell.

### NOTE

If the T/C has been in service more than 12 months, replace it regardless of apparent condition.

6. Inspect ignition lines for low points and sagging. If possible, correct low points by adjusting the slope of the line. Any low points which cannot be eliminated must be equipped with drain plugs. Drain all low points.
7. Break the ignition line at the base of the stack (and/or any other low point). Vigorously rattle the ignition line to remove scale.
8. Inspect strainer at grade. Clean screen and replace in kind if necessary.
9. Check pilot gas regulator. Replace diaphragm on a regular schedule.

**Periodic On-Line Items:**

Access to pilots while the flare is on-line is not safe. Inspection can be accomplished using binoculars when necessary. From a safe distance, inspect the pilot at night for any sign of a red glow.

1. The back of the ignition hood normally glows dull red. This is caused by a small pilot stability fire which burns continuously inside the hood.
2. A dull glow slightly farther down the ignition line of the downwind pilot may be caused by the normal ignition hood fire. Re-inspect after the wind direction changes.
3. A bright red glow on the ignition hood and/or smoke at the pilot indicates that raw gas is being fed into the ignition line. Close the ignition gas valve at the FFG. Open the air valve at the FFG for several minutes to cool the pilot hood. Close the air valve and reinspect the pilot.
4. Paint damage and/or a red glow at the FFG also indicates an open or leaky ignition gas valve on the FFG. Close the gas valve immediately.
5. A glow near the pilot mixer indicates that the pilot has flashed back to the mixer. This usually indicates that the pilot tip has deteriorated significantly. Replace the pilot tip as soon as possible. The following procedure should be followed to try to eliminate the burning at the mixer.
  - 5.1 Release enough combustible gas to the flare to establish a steady flame on the flare tip. Maintain this gas flow to the flare throughout the procedure.
  - 5.2 Extinguish the pilots by shutting off the pilot gas supply valve.
  - 5.3 Allow time for the mixers to cool.
  - 5.4 Open the pilot gas supply valve and relight the pilots.
  - 5.5 When pilot ignition is confirmed, resume normal purge rates to the flare.

**Utility Flare****Shutdown Items:**

1. Check purge system. (See Purge System maintenance list.)
2. Remove and check pilots. (See EEP Pilots maintenance list.)
3. Inspect body of flare tip.



- 3.1 Check all welds for cracking.
- 3.2 Check for visible deformation of cylinder.
- 3.3 Check flame retention ring segments. Replace any worn or missing segments.
4. Inspect windshield.
  - 4.1 Check for visible deformation of cylinder. Repair or replace if necessary
  - 4.2 Check all welds for cracking.
5. Inspect Body Flange (if applicable).
  - 6.1 If flange is opened, replace gasket. Also replace all bolts in kind complete with lock washers or double nuts, if necessary.
  - 6.2 Replace and/or install double nuts on studs to proper torque specifications.
6. Check FFG. (See FFG maintenance list.)

**Periodic On-Line Items:**

1. Check purge system. (See Purge System maintenance list.)
2. Check pilots. (See EEP Pilots maintenance list.)
3. Check FFG. (See FFG maintenance list.)

**Airrestor****Shutdown Items:**

1. Remove any foreign material which may have accumulated in the bottom of the airrestor.
2. Check material thickness of Airrestor plate. This is especially important in corrosive gas service or if any obstruction of the drain line has allowed water to remain in the unit for an extended period of time.

**Liquid Seal Drum & Knock-Out Drum****Shutdown Items:**

1. Drain the drum completely. Inspect inside the bottom head for accumulated solids. Remove any such solids.

**CAUTION**

Follow safe vessel entry procedures as required by plant standards.

2. Inspect water seal internals for accumulated solids, cracks, plugging or other obvious damage. Clean or repair as required.
3. Check level instruments per vendor information.

**Periodic On-Line Items:**

1. Check physical liquid level in the gauge glass on a regular schedule. Use gauge glass level to check level control instruments.
2. Skim any accumulated hydrocarbon liquids from the surface of the liquid on a regular schedule.
3. If waste gas contains any acidic or alkaline compounds, monitor pH of seal fluid. Treat or replace seal fluid before pH becomes corrosive to vessel metallurgy.

**Flame Front Generator**

Since the Flame Front Generator is located at an accessible location, maintenance can be performed at any time. All Periodic On-Line Items should be checked during any shutdown.

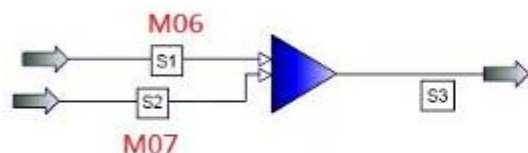
**Periodic On-Line Items:**

1. Check regulators on air and ignition gas. Replace diaphragms on a regular schedule.
2. Clean air and ignition gas orifices.
3. Clean and gap spark plug. Correct gap can be measured with an ordinary business card. Replace spark plug if ceramic insulator is damaged.
4. Clean sight glass on ignition chamber. Replace if cracked or opaque.
5. Drain ignition lines at low point drains on a regular schedule, at least weekly.

附件十一、廢氣燃燒塔A602原廠設計資料

|                                                                                                                                                                                                |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                               |                                                                                                                                                                                                                                                                                         |                                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
|  長春石油化學<br> 長春人造樹脂<br>大連化學工業 |                      | <b>Specification Sheet</b><br><br><b>Flare Stack</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                               | <input type="checkbox"/> 長春石油化學<br><input type="checkbox"/> 長春人造樹脂<br><input checked="" type="checkbox"/> 大連化工公司<br><input type="checkbox"/> 長春化工(盤錦)公司<br><input type="checkbox"/> 新竹廠<br><input type="checkbox"/> 苗栗廠<br><input type="checkbox"/> 大發廠<br><input type="checkbox"/> 盤錦廠 | Project :<br><b>AAL5 / BDO6</b><br><br><input type="checkbox"/> 麥寮廠<br><input type="checkbox"/> 盤錦廠 |
| Project : <b>AAL5/BDO6</b>                                                                                                                                                                     |                      | Tag. No. : <b>PK-881</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                               |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Equipment Requirements                                                                                                                                                                         |                      | <b>New</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                               |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Type of Flare                                                                                                                                                                                  |                      | <b>Enclosed Ground Flare</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                               |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Purge Reduction Device                                                                                                                                                                         |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                               |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Flare Stack                                                                                                                                                                                    |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                               |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Smokeless by                                                                                                                                                                                   |                      | <input type="checkbox"/> Gas Assist<br><input type="checkbox"/> High Pressure Relief Gas                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <input type="checkbox"/> Compress Air<br><input type="checkbox"/> Water Spray | <input type="checkbox"/> Air Blower<br><input type="checkbox"/> Staging                                                                                                                                                                                                                 | <input checked="" type="checkbox"/> Steam ----- <b>4kg/cm2G</b>                                     |
| Assist Gas --                                                                                                                                                                                  |                      | Composition: <b>LNG</b><br>Net Heating Value: <b>7764 Kcal/Nm3</b><br>Pressure: <b>4.0</b> Kg/cm <sup>2</sup> G                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                               |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Stream ( s )                                                                                                                                                                                   |                      | <input checked="" type="checkbox"/> Gas<br><input type="checkbox"/> Liquid<br><input type="checkbox"/> Gas & Liquid                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                               |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Smoke Control System                                                                                                                                                                           |                      | <input checked="" type="checkbox"/> Flow<br><input type="checkbox"/> Optical<br><input type="checkbox"/> Flow & Radiation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                               |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Flare Burner                                                                                                                                                                                   |                      | <input checked="" type="checkbox"/> Continuous<br><input type="checkbox"/> Intermittent ( Auto Control )<br><input type="checkbox"/> Raw Gas - Desert / Arctic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                               |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Pilot Air Inspirator                                                                                                                                                                           |                      | <input checked="" type="checkbox"/> Local<br><input type="checkbox"/> Remote                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                               |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Pilot Flame Control                                                                                                                                                                            |                      | <input type="checkbox"/> No<br><input checked="" type="checkbox"/> Yes - Thermocouple<br><input type="checkbox"/> Single Pilots<br><input checked="" type="checkbox"/> All Pilots                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                               |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Thermocouple (s) per Pilot                                                                                                                                                                     |                      | <input checked="" type="checkbox"/> Single<br><input type="checkbox"/> Dual<br><input type="checkbox"/> Triple                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                               |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Pilot Ignition                                                                                                                                                                                 |                      | <input checked="" type="checkbox"/> Flame-front Generator<br><input type="checkbox"/> Inspiring Ignitor<br><input type="checkbox"/> Spark Probe Ignitor<br><input checked="" type="checkbox"/> Manual<br><input checked="" type="checkbox"/> Automatic<br><input checked="" type="checkbox"/> With Pilot Flame Control<br><input type="checkbox"/> One Pilot<br><input checked="" type="checkbox"/> All Pilots                                                                                                                                                                                                                                                                         |                                                                               |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Ignition Enclosure Type                                                                                                                                                                        |                      | <b>NEMA 4X</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                               |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Pilot Ignition Back - up                                                                                                                                                                       |                      | <input type="checkbox"/> Built - in Battery Pack<br><input checked="" type="checkbox"/> Piezo Electric<br><input type="checkbox"/> Portable Battery Pack                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                               |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Pilot / Ignition Utilities :                                                                                                                                                                   |                      | Fuel Gas Net Heating Value - <b>7764 Kcal/Nm3</b> Pressure , kg/cm <sup>2</sup> G <b>4.0</b><br><input checked="" type="checkbox"/> Natural Gas<br><input type="checkbox"/> Propane<br><input type="checkbox"/> Ethylene<br><input type="checkbox"/> Sour Gas<br><input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                              |                                                                               |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Compressed Air Available                                                                                                                                                                       |                      | <input checked="" type="checkbox"/> Yes<br><input checked="" type="checkbox"/> Dry<br><input type="checkbox"/> Wet<br><input type="checkbox"/> No<br>Pressure , kg/cm <sup>2</sup> G : <b>Refer to Basic Engineering Design Data(BEDD)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                               |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Electric Available                                                                                                                                                                             |                      | <input checked="" type="checkbox"/> Yes<br><b>220 Volts 60 Hz 1/3 Phase</b><br><b>440 Volts 60 Hz 1/3 Phase</b><br><input type="checkbox"/> No<br><input type="checkbox"/> Solar<br><input type="checkbox"/> Portable Battery Pack                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                               |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Aux. Equipment                                                                                                                                                                                 |                      | <input checked="" type="checkbox"/> Water Seal<br><input checked="" type="checkbox"/> Level Controls<br><input type="checkbox"/> Flare Tip Davit<br><input type="checkbox"/> Painters Trolley<br><input checked="" type="checkbox"/> Insulation<br><input type="checkbox"/> Flame Arrestor<br><input type="checkbox"/> Steam Trace / Heating Coil<br><input type="checkbox"/> Saf-T-Climb<br><input checked="" type="checkbox"/> Flame Detection<br><input type="checkbox"/> Aircraft Lights - Fixed/Lowering Type<br><input checked="" type="checkbox"/> Ladders<br><input checked="" type="checkbox"/> Platform<br><input checked="" type="checkbox"/> KO Drum (Disentrainment Drum) |                                                                               |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Painting : <b>According to Painting Standard of Ta-Fa Area</b>                                                                                                                                 |                      | Internal Coating :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                               |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Gas Composition :                                                                                                                                                                              |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                               |                                                                                                                                                                                                                                                                                         |                                                                                                     |
|                                                                                                                                                                                                |                      | case1<br><b>BDO6 emergency</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | case2<br><b>AAL5 Action II Purge</b>                                          |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Flow Rate                                                                                                                                                                                      | kg/h                 | <b>22,950</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>97,356</b>                                                                 |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| M.W.                                                                                                                                                                                           | kg/kg-mol            | <b>10.99</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>38.92</b>                                                                  |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Temp.                                                                                                                                                                                          | °C                   | <b>40</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>57.5</b>                                                                   |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Pressure                                                                                                                                                                                       | mmAqG                | <b>1000</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>1000</b>                                                                   |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| LHV                                                                                                                                                                                            | kcal/Nm <sup>3</sup> | <b>2,736</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>11,019</b>                                                                 |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Composition                                                                                                                                                                                    | mol%                 | <b>100.0</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>100.0</b>                                                                  |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| H2                                                                                                                                                                                             |                      | <b>64.19</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                               |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| CO / CH4                                                                                                                                                                                       |                      | <b>32.09 / 3.18</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                               |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| CO2                                                                                                                                                                                            |                      | <b>0.40</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>18.42</b>                                                                  |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Water                                                                                                                                                                                          |                      | <b>0.14</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>14.65</b>                                                                  |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| O2                                                                                                                                                                                             |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>3.46</b>                                                                   |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Propylene                                                                                                                                                                                      |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>46.15</b>                                                                  |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Propane                                                                                                                                                                                        |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>6.92</b>                                                                   |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Allyl Acetate                                                                                                                                                                                  |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>2.33</b>                                                                   |                                                                                                                                                                                                                                                                                         |                                                                                                     |
| Nitrogen                                                                                                                                                                                       |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>8.08</b>                                                                   |                                                                                                                                                                                                                                                                                         |                                                                                                     |

※KO drum inlet pressure  
 ※If LHV< 2669Kcal/Nm<sup>3</sup> (300BTU/ft<sup>3</sup>)  
 · then need assist gas



|                             |             | M06      | M07      |           |
|-----------------------------|-------------|----------|----------|-----------|
|                             |             | S1       | S2       | S3        |
| Stream Name                 |             | BDO vent | AAL vent |           |
| Stream Description          |             | Vapor    | Vapor    |           |
| Stream Phase                |             |          |          | Vapor     |
| Total Mass Rate             | KG/HR       | 22950.00 | 97355.99 | 120306.01 |
| Temperature                 | C           | 40.00    | 57.50    | 51.95     |
| Pressure                    | KG/CM2      | 1.1330   | 1.1330   | 1.1330    |
| Total Molecular Weight      |             | 10.99    | 38.92    | 26.22     |
| Total Enthalpy              | M*KCAL/HR   | 0.78     | 13.01    | 13.79     |
| Liquid Weight Fraction      |             | 0.00     | 0.00     | 0.00      |
| Total Weight Comp. Percents |             |          |          |           |
| H2O                         |             | 0.2294   | 6.7810   | 5.5312    |
| N2                          |             | 0.0000   | 5.8156   | 4.7062    |
| O2                          |             | 0.0000   | 2.8446   | 2.3020    |
| CO2                         |             | 1.6012   | 20.8284  | 17.1606   |
| H2                          |             | 11.7700  | 0.0000   | 2.2453    |
| CO                          |             | 61.7589  | 0.0000   | 15.5968   |
| PROPENE                     |             | 0.0000   | 49.8966  | 40.3782   |
| PROPANE                     |             | 0.0000   | 7.8402   | 6.3446    |
| AACETAT                     |             | 0.0000   | 5.9935   | 4.8502    |
| METHANE                     |             | 4.6404   | 0.0000   | 0.8852    |
| Total Molar Comp. Percents  |             |          |          |           |
| H2O                         |             | 0.1400   | 14.6485  | 8.0489    |
| N2                          |             | 0.0000   | 8.0792   | 4.4041    |
| O2                          |             | 0.0000   | 3.4597   | 1.8859    |
| CO2                         |             | 0.4000   | 18.4182  | 10.2220   |
| H2                          |             | 64.1900  | 0.0000   | 29.1988   |
| CO                          |             | 32.0900  | 0.0000   | 14.5971   |
| PROPENE                     |             | 0.0000   | 46.1454  | 25.1547   |
| PROPANE                     |             | 0.0000   | 6.9193   | 3.7718    |
| AACETAT                     |             | 0.0000   | 2.3298   | 1.2700    |
| METHANE                     |             | 3.1800   | 0.0000   | 1.4465    |
| Vapor Mass Rate             | KG/HR       | 22950.00 | 97355.99 | 120306.01 |
| Vapor Act. Vol. Rate        | M3/HR       | 48945.56 | 61427.91 | 111358.30 |
| Vapor Std. Vol. Rate        | M3/HR       | 46789.47 | 56071.51 | 102860.98 |
| Vapor Molecular Weight      |             | 10.99    | 38.92    | 26.22     |
| Vapor Sp. Enthalpy          | KCAL/KG     | 33.98    | 133.61   | 114.61    |
| Vapor CP                    | KCAL/KG-C   | 0.64     | 0.35     | 0.40      |
| Vapor Z (from density)      |             | 1.0006   | 0.9924   | 0.9974    |
| Vapor Act. Density          | KG/M3       | 0.469    | 1.585    | 1.080     |
| Vapor Therm. Cond.          | KCAL/HR-M-C | 0.082    | 0.018    | 0.039     |
| Vapor Viscosity             | CP          | 0.015    | 0.012    | 0.013     |
| Liquid Mass Rate            | KG/HR       | n/a      | n/a      | n/a       |
| Liquid Act. Rate (vol)      | M3/HR       | n/a      | n/a      | n/a       |
| Liquid Molecular Weight     |             | n/a      | n/a      | n/a       |
| Liquid Sp. Enthalpy         | KCAL/KG     | n/a      | n/a      | n/a       |
| Liquid CP                   | KCAL/KG-C   | n/a      | n/a      | n/a       |
| Liquid Z (from density)     |             | n/a      | n/a      | n/a       |
| Liquid Act. Density         | KG/M3       | n/a      | n/a      | n/a       |
| Liquid Surface Tension,     | DYNE/CM     | n/a      | n/a      | n/a       |
| Liquid Therm. Cond.         | KCAL/HR-M-C | n/a      | n/a      | n/a       |
| Liquid Viscosity            | CP          | n/a      | n/a      | n/a       |

|                                                                                   |                                                        |                  |               |               |
|-----------------------------------------------------------------------------------|--------------------------------------------------------|------------------|---------------|---------------|
|  | <b>DESTRUCTION EFFICIENCY CALCULATION</b>              |                  |               | ITAS doc. no. |
|                                                                                   | PROJECT: ENCLOSED GROUND FLARE AAL5 PROJECT - DAIHATSU |                  |               | Revision      |
|                                                                                   |                                                        |                  |               | 0             |
| ITAS REF. C.27412/12                                                              | CUSTOMER: KENTEX INT.                                  | LOCATION: P.R.C. | ISSUED : M.P. | Date          |
|                                                                                   |                                                        |                  |               | 31/08/2012    |

EPA  
AP-42 5th ed. (Compilation of Air Pollutant Emission Factors)  
Volume 1 (Stationary Point and Area Sources)  
Chapter 13.5 (Industrial Flares)

NOx products  
0,068 lb/MBtu  
0,1223 kg/Mkcal

CO products  
0,37 lb/MBtu  
0,6655 kg/Mkcal

HC unburned  
0,14 lb/MBtu (as methane equivalent)  
0,2518 kg/Mkcal  
0,01574 kmol/Mkcal

|                 |           |                |          |        |
|-----------------|-----------|----------------|----------|--------|
| Q GAS           | 120,306   | kg/h           | 4590,08  | kmol/h |
| LHV             | 6,195     | kcal/kg        |          |        |
| MW              | 26,2      | kg/kmol        |          |        |
| Heat            | 745,3     | Mkcal/h        |          |        |
| Stoich. Air     | 8,6       | kg aria/kg gas |          |        |
| Excess Air      | 206%      |                |          |        |
| Q flue gas      | 3289960,1 | kg/h           | 113446,9 | kmol/h |
| MW flue gas     | 29        |                |          |        |
| Volume flue gas | 2541481   | Nm3/h          |          |        |

|     |       |        |
|-----|-------|--------|
| NOx | 91,15 | kg/h   |
|     | 1,98  | kmol/h |
|     | 17    | ppm    |
|     | 36    | mg/Nm3 |

|    |        |        |
|----|--------|--------|
| CO | 495,99 | kg/h   |
|    | 17,71  | kmol/h |
|    | 156    | ppm    |
|    | 195    | mg/Nm3 |

|    |        |        |
|----|--------|--------|
| HC | 307,47 | kg/h   |
|    | 11,73  | kmol/h |
|    | 103    | ppm    |
|    | 121    | mg/Nm3 |

|                               |      |   |
|-------------------------------|------|---|
| <b>DESTRUCTION EFFICIENCY</b> | 99,7 | % |
|-------------------------------|------|---|

### 3. TECHNICAL DATA

#### 3.1. TECHNICAL DATA ENCLOSED GROUND FLARE

|    |                       |             |                  |          |  |
|----|-----------------------|-------------|------------------|----------|--|
| 1. | <b>Site Data</b>      |             |                  |          |  |
| 2. | Ambient Pressure      | 1.016 bara  | Solar Radiation  | Excluded |  |
| 3. | Ambient temperature   | -20 / +35°C | Wind Speed for   | N/A      |  |
| 4. | Ambient Rel. Humidity | 18 / 90%    | Rad. Calculation |          |  |
| 5. | Design Wind Speed for | 30 m/s      | Seismicity       | N/A      |  |
| 6. | structure             |             |                  |          |  |

|     |                                |                      |               |               |  |
|-----|--------------------------------|----------------------|---------------|---------------|--|
| 7.  | <b>Process data</b>            |                      |               |               |  |
| 8.  | Fluid                          |                      | BDO6          | AAL5          |  |
| 9.  | Case                           |                      | 1             | 2             |  |
| 10. | Frequency                      |                      | <i>Emerg.</i> | <i>Future</i> |  |
| 11. | Flow rate                      | kg/h                 | 22,950        | 97,356        |  |
| 12. | Gas Temperature                | °C                   | 40            | 38.92         |  |
| 13. | Molecular Weight               |                      | 10.99         | 2.80          |  |
| 14. | L.H.V.                         | kcal/kg              | 5,903         | 6,668         |  |
| 15. | Cp / Cv Ratio                  |                      | 1.40          | 289           |  |
| 16. | Sonic Velocity                 | m/s                  | 575           | 1,107         |  |
| 17. | Flare header diameter          | inch                 | TBA           | TBA           |  |
| 18. | Mach No. in the header         |                      |               |               |  |
| 19. | Gas Velocity in header         | m/s                  |               |               |  |
| 20. | Pressure Drop                  | mmWC                 | < 1,000       | 700           |  |
| 21. | Gas Pressure                   | mmWC                 | 1,000         | 1,000         |  |
| 22. | Comb. chamber height           | m                    | 30            |               |  |
| 23. | Comb. chamber dia.             | m                    | 12            |               |  |
| 24. | Number of stages               |                      | 2             | 4             |  |
| 25. | <b>Q.ty of burners 0.4 t/h</b> |                      |               | 15            |  |
| 26. | <b>Q.ty of burners 1 t/h</b>   |                      | 23            | 92            |  |
| 27. | Flame Lib. 0.4 t/h             | MW                   |               | 3             |  |
| 28. | Flame Length (max.)            | m                    |               | 4             |  |
| 29. | Flame Liberation 1 t/h         | MW                   |               | 8             |  |
| 30. | Flame Length (max.)            | m                    |               | 6             |  |
| 31. | Pilot quantity                 |                      | 4             | 8             |  |
| 32. | Burner Design Temp.            | °C                   | 850           | 850           |  |
| 33. | Burner Design                  | kg/cm <sup>2</sup> g | 3.5           | 3.5           |  |
| 34. | Smokeless Operation            |                      | Yes 100%      | Yes 100%      |  |
| 35. | Smokeless Flowrate             | kg/h                 | 22,950        | 97,356        |  |
| 36. | Steam for smokeless            | kg/h                 | 2,295         | 29,750        |  |
| 37. |                                |                      |               |               |  |
| 38. |                                |                      |               |               |  |
| 39. |                                |                      |               |               |  |
| 40. |                                |                      |               |               |  |
| 41. |                                |                      |               |               |  |

For equipment data see attachment



## 附件十二、A602 因製程歲(停)修使用時機廢氣量之估算方式

M06 或 M07 歲修使用 FLARE 時間及排放量說明：107 年 10/2~3 二天為 M06 製程歲造成使用事件日，使用事件報告書如附件，2017/10/2~3

M06 歲修使用 FLARE 排放量如下表，小時最大量為 6446 m<sup>3</sup>

| 日期    | 2018年10月2日        | 2018年10月3日        |
|-------|-------------------|-------------------|
| 當日時間  | 廢氣燃燒塔逐時累計廢氣流量(m3) | 廢氣燃燒塔逐時累計廢氣流量(m3) |
| 00:00 | 540.48            | 2000.62           |
| 01:00 | 1093.37           | 3332.03           |
| 02:00 | 2554.83           | 4031.95           |
| 03:00 | 5915.52           | 5481.31           |
| 04:00 | 8391.07           | 6956.13           |
| 05:00 | 14837.39          | 8300.51           |
| 06:00 | 17688.03          | 8832.71           |
| 07:00 | 21134.62          | 10177.89          |
| 08:00 | 23761.64          | 10637.39          |
| 09:00 | 25875.89          | 12084.04          |
| 10:00 | 27967.51          | 12699.12          |
| 11:00 | 30539.35          | 13800.63          |
| 12:00 | 32560.88          | 14441.82          |
| 13:00 | 34572.74          | 15306.93          |
| 14:00 | 36584.05          | 17205.63          |
| 15:00 | 38513.45          | 17939.9           |
| 16:00 | 40513.06          | 18755.43          |
| 17:00 | 42286.37          | 19504.46          |
| 18:00 | 45990.47          | 21364.93          |
| 19:00 | 47746.24          | 22594.92          |
| 20:00 | 48312.99          | 23825.54          |
| 21:00 | 49037             | 25660.14          |
| 22:00 | 49618.14          | 27073.07          |
| 23:00 | 51852.74          | 29246.34          |

| 日期    | 2018年10月2日               | 2018年10月3日               |
|-------|--------------------------|--------------------------|
| 當日時間  | A602廢氣燃燒塔每小時廢氣<br>流量(m3) | A602廢氣燃燒塔每小時廢氣<br>流量(m3) |
| 00:00 | 540.48                   | 2000.62                  |
| 01:00 | 552.89                   | 1331.41                  |
| 02:00 | 1461.46                  | 699.92                   |
| 03:00 | 3360.69                  | 1449.36                  |
| 04:00 | 2475.55                  | 1474.82                  |
| 05:00 | 6446.32                  | 1344.38                  |
| 06:00 | 2850.64                  | 532.2                    |
| 07:00 | 3446.59                  | 1345.18                  |
| 08:00 | 2627.02                  | 459.5                    |
| 09:00 | 2114.25                  | 1446.65                  |
| 10:00 | 2091.62                  | 615.08                   |
| 11:00 | 2571.84                  | 1101.51                  |
| 12:00 | 2021.53                  | 641.19                   |
| 13:00 | 2011.86                  | 865.11                   |
| 14:00 | 2011.31                  | 1898.7                   |
| 15:00 | 1929.4                   | 734.27                   |
| 16:00 | 1999.61                  | 815.53                   |
| 17:00 | 1773.31                  | 749.03                   |
| 18:00 | 3704.1                   | 1860.47                  |
| 19:00 | 1755.77                  | 1229.99                  |
| 20:00 | 566.75                   | 1230.62                  |
| 21:00 | 724.01                   | 1834.6                   |
| 22:00 | 581.14                   | 1412.93                  |
| 23:00 | 2234.6                   | 2173.27                  |

# 廢氣燃燒塔使用事件報告書

| 一、廢氣燃燒塔使用事件基本資料                                                                                                                        |                  | 三、成分及濃度分析結果                |                    |          | 四、進廢氣排放量 |           | 五、空氣污染物排放量                 |  |
|----------------------------------------------------------------------------------------------------------------------------------------|------------------|----------------------------|--------------------|----------|----------|-----------|----------------------------|--|
| 1、公私場所名稱                                                                                                                               | 大連化工大發廠          | 進廢氣成分                      | 單位                 | 濃度       | (kg/日)   | 排放量(kg/日) | 污染物                        |  |
| 2、管制編號                                                                                                                                 | S2005652         | Hydrogen (H <sub>2</sub> ) | %                  | 40.7782  | 1900     |           | 23、SOx                     |  |
| 3、負責人姓名                                                                                                                                | 蔡智全              | Oxygen (O <sub>2</sub> )   | %                  | 1.7405   | 1290     |           | 24、NOx                     |  |
| 4、負責人電話                                                                                                                                | (07)788-1165     | Nitrogen (N <sub>2</sub> ) | %                  | 38.4633  | 24942    |           | 25、VOCs                    |  |
| 5、填表人姓名                                                                                                                                | 沈明宗              | Carbon Dioxide             | %                  | 0        | 0        |           | 六、採取減量措施                   |  |
| 6、填表人電話                                                                                                                                | (07)788-1165#976 | Methane (C1)               | %                  | 3.3529   | 1247     |           | 26、符合使用計畫書登載之<br>廢氣減量措施項次  |  |
| 7、燃燒塔編號                                                                                                                                | A602             | Ethane (C2)                | %                  | 0        | 0        |           | 否                          |  |
| 8、日期                                                                                                                                   | 2018/10/2        | Ethylene(C2=)              | %                  | 0        | 0        |           | 27、未符合使用計畫書登載廢氣減量措施之改善說明:無 |  |
| 9、發生時間(起)                                                                                                                              | 5:15             | Propane (C3)               | %                  | 6.5812   | 4436     |           |                            |  |
| 10、發生時間(迄)                                                                                                                             | 0:00             | Propylene (C3=)            | %                  | 3.6531   | 2463     |           |                            |  |
| 11、採樣時間                                                                                                                                | 12:20            | C4's                       | %                  | 0.119    | 80       |           |                            |  |
| 12、合計發生時數                                                                                                                              | 19               | C5's                       | %                  | 0.0001   | 0        |           |                            |  |
| 13、年累計時數                                                                                                                               | 46               | C6+                        | %                  | 0        | 0        |           | 28、說明:                     |  |
| 14、年累計日數                                                                                                                               | 4                | H <sub>2</sub> S           | ppm                | 0        | 0        |           |                            |  |
| 15、全廠燃燒塔使用日數                                                                                                                           | 4                | CO                         | %                  | 5.3117   | 3154     |           |                            |  |
| 二、符合廢氣燃燒塔使用計畫書之說明                                                                                                                      |                  |                            |                    |          |          |           |                            |  |
| 16、使用事件之污染源                                                                                                                            | M06              | GC total                   | %                  | 100      |          |           |                            |  |
| 17、符合使用計畫書項次                                                                                                                           | M06製程歲修          |                            |                    |          |          |           | 七、其它規定項目                   |  |
| 18、說明: M06製程歲修期間之廢氣, 為確保製程操作之安全, 故須將製程之廢氣導入A602處理, 因此造成發生廢氣燃燒塔使用事件(>15,000M3/day)(參考附件一Flare使用計畫書P.30說明)。主要排放污染源說明參附件二(Flare使用計畫書P.35) |                  | 19、合計VOCs進廢氣排放量(kg/日)      |                    |          | 6979     |           |                            |  |
|                                                                                                                                        |                  | 20、總淨熱值                    | MJ/Nm <sup>3</sup> | 12.63    |          |           |                            |  |
|                                                                                                                                        |                  | 21、廢氣流量                    | Nm <sup>3</sup> /日 | 51852.74 |          |           |                            |  |
|                                                                                                                                        |                  | 22、廢氣分子量                   |                    | 18.46    |          |           |                            |  |



# 廢氣燃燒塔使用事件報告書

| 一、廢氣燃燒塔使用事件基本資料                                                                                                                     |                  | 三、成分及濃度分析結果                |                    |          | 四、進廢氣排放量 |                            | 五、空氣污染物排放量 |  |
|-------------------------------------------------------------------------------------------------------------------------------------|------------------|----------------------------|--------------------|----------|----------|----------------------------|------------|--|
| 1、公私場所名稱                                                                                                                            | 大連化工大發廠          | 進廢氣成分                      | 單位                 | 濃度       | (kg/日)   | 污染物                        | 排放量(kg/日)  |  |
| 2、管制編號                                                                                                                              | S2005652         | Hydrogen (H <sub>2</sub> ) | %                  | 21.7     | 570      | 23、SOx                     | 2.69       |  |
| 3、負責人姓名                                                                                                                             | 蔡智全              | Oxygen (O <sub>2</sub> )   | %                  | 0.6      | 251      | 24、NOx                     | 13.25      |  |
| 4、負責人電話                                                                                                                             | (07)788-1165     | Nitrogen (N <sub>2</sub> ) | %                  | 55.1935  | 20187    | 25、VOCs                    | 21.37      |  |
| 5、填表人姓名                                                                                                                             | 沈明宗              | Carbon Dioxide             | %                  | 0        | 0        | 六、採取減量措施                   |            |  |
| 6、填表人電話                                                                                                                             | (07)788-1165#976 | Methane (C1)               | %                  | 5.318    | 1115     | 26、符合使用計畫書登載之廢氣減量措施項次      | 否          |  |
| 7、燃燒塔編號                                                                                                                             | A602             | Ethane (C2)                | %                  | 0        | 0        | 27、未符合使用計畫書登載廢氣減量措施之改善說明:無 |            |  |
| 8、日期                                                                                                                                | 2018/10/3        | Ethylene(C2=)              | %                  | 0        | 0        |                            |            |  |
| 9、發生時間(起)                                                                                                                           | 12:45            | Propane (C3)               | %                  | 6.2252   | 2367     |                            |            |  |
| 10、發生時間(迄)                                                                                                                          | 0:00             | Propylene (C3=)            | %                  | 0.0449   | 17       |                            |            |  |
| 11、採樣時間                                                                                                                             | 12:20            | C4's                       | %                  | 0.3907   | 149      |                            |            |  |
| 12、合計發生時數                                                                                                                           | 11               | C5's                       | %                  | 0.0001   | 0        | 七、其它規定項目                   |            |  |
| 13、年累計時數                                                                                                                            | 57               | C6+                        | %                  | 0.0217   | 11       |                            |            |  |
| 14、年累計日數                                                                                                                            | 5                | H <sub>2</sub> S           | ppm                | 0        | 0        |                            |            |  |
| 15、全廠燃燒塔使用日數                                                                                                                        | 5                | CO                         | %                  | 10.5059  | 3518     |                            |            |  |
| 二、符合廢氣燃燒塔使用計畫書之說明                                                                                                                   |                  | GC total                   | %                  | 100      |          |                            |            |  |
| 16、使用事件之污染源                                                                                                                         | M06              |                            | %                  |          |          | 28、說明:                     |            |  |
| 17、符合使用計畫書項次                                                                                                                        | M06製程歲修          |                            |                    |          |          |                            |            |  |
| 18、說明: M06製程歲修期間之廢氣,為確保製程操作之安全,故須將製程之廢氣導入A602處理,因此造成發生廢氣燃燒塔使用事件(>15,000M3/day)(參考附件一Flare使用計畫書P.30說明)。主要排放污染源說明參附件二(Flare使用計畫書P.35) |                  | 19、合計VOCs進廢氣排放量(kg/日)      |                    |          | 2543     |                            |            |  |
|                                                                                                                                     |                  | 20、總淨熱值                    | MJ/Nm <sup>3</sup> | 12.14    |          |                            |            |  |
|                                                                                                                                     |                  | 21、廢氣流量                    | Nm <sup>3</sup> /日 | 29246.34 |          |                            |            |  |
|                                                                                                                                     |                  | 22、廢氣分子量                   |                    | 22.51    |          |                            |            |  |

# 附件十二-1、E712 氧化爐清爐 A602 廢氣燃燒塔使用事件報告書

## 廢氣燃燒塔使用事件報告書

| 一、廢氣燃燒塔使用事件基本資料                                                                                                                                                                            |                  | 三、成分及濃度分析結果                |                    | 四、進廢氣排放量<br>(kg/日) | 五、空氣污染物排放量                 |           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|----------------------------|--------------------|--------------------|----------------------------|-----------|
| 1、公私場所名稱                                                                                                                                                                                   | 大連化工大發廠          | 進廢氣成分                      | 單位                 | 濃度                 | 污染物                        | 排放量(kg/日) |
| 2、管制編號                                                                                                                                                                                     | S2005652         | Hydrogen (H <sub>2</sub> ) | %                  | 32.8193            | 3.6541                     | 0         |
| 3、負責人姓名                                                                                                                                                                                    | 蔡智全              | Oxygen (O <sub>2</sub> )   | %                  | 0.9397             | 24、NOx                     | 7.41      |
| 4、負責人電話                                                                                                                                                                                    | (07)788-1165     | Nitrogen (N <sub>2</sub> ) | %                  | 35.2013            | 25、VOCs                    | 12.61     |
| 5、填表人姓名                                                                                                                                                                                    | 沈明宗              | Carbon Dioxide             | %                  | 0                  | 六、採取減量措施                   |           |
| 6、填表人電話                                                                                                                                                                                    | (07)788-1165#976 | Methane (C1)               | %                  | 11.9186            | 26、符合使用計畫書登載之<br>廢氣減量措施項次  | 否         |
| 7、燃燒塔編號                                                                                                                                                                                    | A602             | Ethane (C2)                | %                  | 0.4258             | 27、未符合使用計畫書登載廢氣減量措施之改善說明:無 |           |
| 8、日期                                                                                                                                                                                       | 2018/12/28       | Ethylene(C2=)              | %                  | 0                  |                            |           |
| 9、發生時間(起)                                                                                                                                                                                  | 17:30            | Propane (C3)               | %                  | 1.4111             |                            |           |
| 10、發生時間(迄)                                                                                                                                                                                 | 0:00             | Propylene (C3=)            | %                  | 0.7031             |                            |           |
| 11、採樣時間                                                                                                                                                                                    | 17:36            | C4's                       | %                  | 1.258              |                            |           |
| 12、合計發生時數                                                                                                                                                                                  | 7                | C5's                       | %                  | 0.0021             | 七、其它規定項目                   |           |
| 13、年累計時數                                                                                                                                                                                   | 136              | C6+                        | %                  | 0.001              |                            |           |
| 14、年累計日數                                                                                                                                                                                   | 11               | H <sub>2</sub> S           | ppm                | 0                  |                            |           |
| 15、全廠燃燒塔使用日數                                                                                                                                                                               | 11               | CO                         | %                  | 15.32              |                            |           |
| 二、符合廢氣燃燒塔使用計畫書之說明                                                                                                                                                                          |                  |                            |                    | 0                  |                            |           |
| 16、使用事件之污染源                                                                                                                                                                                | M06              | GC total                   | %                  | 100                | 28、說明:                     |           |
| 17、符合使用計畫書項次                                                                                                                                                                               | 緊急狀況一            |                            |                    |                    |                            |           |
| 18、說明: E712(高溫氧化爐)為一獨立廢氣廢液處理系統,但從其設備或異常暫停到開始處理廢氣期間(緊急狀況一),為確保製程操作之安全,故須將製程之廢氣導入A602處理,待E712穩定後再將廢氣切換回去,因此造成發生廢氣燃燒塔使用事件(>15,000M3/day)(參考附件一Flare使用計畫書P.24說明)。主要排放污染源說明參附件二(Flare使用計畫書P.32) |                  | 19、合計VOCs進廢氣排放量(kg/日)      |                    | 802                |                            |           |
|                                                                                                                                                                                            |                  | 20、總淨熱值                    | MJ/Nm <sup>3</sup> | 12.82              |                            |           |
|                                                                                                                                                                                            |                  | 21、廢氣流量                    | Nm <sup>3</sup> /日 | 16351.78           |                            |           |
|                                                                                                                                                                                            |                  | 22、廢氣分子量                   |                    | 17.90              |                            |           |



# 廢氣燃燒塔使用事件報告書

| 一、廢氣燃燒塔使用事件基本資料                                                                                                                                                                             |                  | 三、成分及濃度分析結果                       |                    |         | 四、進廢氣排放量 |                            | 五、空氣污染物排放量 |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------------------------|--------------------|---------|----------|----------------------------|------------|--|
| 1、公私場所名稱                                                                                                                                                                                    | 大連化工大發廠          | 進廢氣成分                             | 單位                 | 濃度      | (kg/日)   | 污染物                        | 排放量(kg/日)  |  |
| 2、管制編號                                                                                                                                                                                      | S2005652         | Hydrogen (H <sub>2</sub> )        | %                  | 0       | 0        | 23、SO <sub>x</sub>         | 0.31       |  |
| 3、負責人姓名                                                                                                                                                                                     | 蔡智全              | Oxygen (O <sub>2</sub> )          | %                  | 3.551   | 170      | 24、NO <sub>x</sub>         | 1.51       |  |
| 4、負責人電話                                                                                                                                                                                     | (07)788-1165     | Nitrogen (N <sub>2</sub> )        | %                  | 50.1004 | 2094     | 25、VOCs                    | 5.34       |  |
| 5、填表人姓名                                                                                                                                                                                     | 沈明宗              | Carbon Dioxide (CO <sub>2</sub> ) | %                  | 15.846  | 662      | 六、採取減量措施                   |            |  |
| 6、填表人電話                                                                                                                                                                                     | (07)788-1165#976 | Methane (C1)                      | %                  | 0.307   | 7        | 26、符合使用計畫書登載之廢氣減量措施項次      | 否          |  |
| 7、燃燒塔編號                                                                                                                                                                                     | A602             | Ethane (C2)                       | %                  | 0.0981  | 4        | 27、未符合使用計畫書登載廢氣減量措施之改善說明:無 |            |  |
| 8、日期                                                                                                                                                                                        | 2018/12/28       | Ethylene(C2=)                     | %                  | 0.1075  | 4        |                            |            |  |
| 9、發生時間(起)                                                                                                                                                                                   | 17:30            | Propane (C3)                      | %                  | 10.49   | 456      |                            |            |  |
| 10、發生時間(迄)                                                                                                                                                                                  | 0:00             | Propylene (C3=)                   | %                  | 19.5    | 847      |                            |            |  |
| 11、採樣時間                                                                                                                                                                                     | 17:36            | C4's                              | %                  | 0       | 0        |                            |            |  |
| 12、合計發生時數                                                                                                                                                                                   | 7                | C5's                              | %                  | 0       | 0        |                            |            |  |
| 13、年累計時數                                                                                                                                                                                    | 136              | C6+                               | %                  | 0       | 0        |                            |            |  |
| 14、年累計日數                                                                                                                                                                                    | 11               | H <sub>2</sub> S                  | ppm                | 0       | 0        |                            |            |  |
| 15、全廠燃燒塔使用日數                                                                                                                                                                                | 11               | CO                                | %                  | 0       | 0        |                            |            |  |
| 二、符合廢氣燃燒塔使用計畫書之說明                                                                                                                                                                           |                  |                                   |                    |         |          |                            |            |  |
| 16、使用事件之污染源                                                                                                                                                                                 | M07              | GC total                          | %                  | 100     |          |                            |            |  |
| 17、符合使用計畫書項次                                                                                                                                                                                | 緊急狀況一            |                                   |                    |         |          |                            |            |  |
| 18、說明: E712(高溫氧化爐)為一獨立廢氣廢液處理系統,但從其故障或異常需停修到開始處理廢氣期間(緊急狀況一),為確保製程操作之安全,故須將製程之廢氣導入A602處理,待E712穩定後再將廢氣切換回去,因此造成發生廢氣燃燒塔使用事件(>15,000M3/day)(參考附件一Flare使用計畫書P.24說明)。主要損壞污染源說明參附件二(Flare使用計畫書P.32) |                  | 19、合計VOCs進廢氣排放量(kg/日)             |                    |         | 1311     | 七、其它規定項目                   |            |  |
|                                                                                                                                                                                             |                  | 20、總淨熱值                           | MJ/Nm <sup>3</sup> | 26.5    | 28、說明:   |                            |            |  |
|                                                                                                                                                                                             |                  | 21、廢氣流量                           | Nm <sup>3</sup> /日 | 3341.57 |          |                            |            |  |
|                                                                                                                                                                                             |                  | 22、廢氣分子量                          |                    |         | 34.78    |                            |            |  |

| 日期    | 2018年12月28日       |
|-------|-------------------|
| 當日時間  | 廢氣燃燒塔逐時累計廢氣流量(m3) |
| 00:00 | 79.59             |
| 01:00 | 611.49            |
| 02:00 | 1524.37           |
| 03:00 | 2386.41           |
| 04:00 | 3211.14           |
| 05:00 | 4008.37           |
| 06:00 | 4784.34           |
| 07:00 | 5568.92           |
| 08:00 | 6397.72           |
| 09:00 | 7282.45           |
| 10:00 | 8164.78           |
| 11:00 | 9063.74           |
| 12:00 | 9995.92           |
| 13:00 | 10932.17          |
| 14:00 | 11915.83          |
| 15:00 | 12834.47          |
| 16:00 | 13718.78          |
| 17:00 | 14602.17          |
| 18:00 | 15442.32          |
| 19:00 | 16313.26          |
| 20:00 | 17179.5           |
| 21:00 | 18016.4           |
| 22:00 | 18853.39          |
| 23:00 | 19701.93          |

## 廢氣燃燒塔使用事件報告書

| 一、廢氣燃燒塔使用事件基本資料                                                                                                                                 |                  | 三、成分及濃度分析結果                |     |                    |          | 四、進廢氣排放量 | 五、空氣污染物排放量                 |           |  |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------|----------------------------|-----|--------------------|----------|----------|----------------------------|-----------|--|--|
| 1、公私場所名稱                                                                                                                                        | 大連化工大發廠          | 進廢氣成分                      | 單位  | M06濃度              | M07濃度    | (kg/日)   | 污 染 物                      | 排放量(kg/日) |  |  |
| 2、管制編號                                                                                                                                          | S2005652         | Hydrogen (H <sub>2</sub> ) | %   | 37.2               | 0        | 769      | 23、SO <sub>x</sub>         | 4.23      |  |  |
| 3、負責人姓名                                                                                                                                         | 李明沼              | Oxygen (O <sub>2</sub> )   | %   | 0.01               | 2.878    | 949      | 24、NO <sub>x</sub>         | 20.84     |  |  |
| 4、負責人電話                                                                                                                                         | (07)788-1165     | Nitrogen (N <sub>2</sub> ) | %   | 9.86               | 47.19    | 16411    | 25、VOCs                    | 31.31     |  |  |
| 5、填表人姓名                                                                                                                                         | 沈明宗              | Carbon Dioxide             | %   | 0                  | 11.345   | 3264     | 六、採取減量措施                   |           |  |  |
| 6、填表人電話                                                                                                                                         | (07)788-1165#267 | Methane (C1)               | %   | 3.68               | 0.226    | 645      | 26、符合使用計畫書登載之廢氣減量措施項次      | 否         |  |  |
| 7、燃燒塔編號                                                                                                                                         | A602             | Ethane (C2)                | %   | 0.204              | 0.842    | 292      |                            |           |  |  |
| 8、日期                                                                                                                                            | 2015/1/31        | Ethylene(C2=)              | %   | 0                  | 0.079    | 22       | 27、未符合使用計畫書登載廢氣減量措施之改善說明:無 |           |  |  |
| 9、發生時間(起)                                                                                                                                       | 8:00             | Propane (C3)               | %   | 0.329              | 11.886   | 3653     |                            |           |  |  |
| 10、發生時間(迄)                                                                                                                                      | 23:59            | Propylene (C3=)            | %   | 0.005              | 24.941   | 7460     |                            |           |  |  |
| 11、採樣時間                                                                                                                                         | 17:55            | C4's                       | %   | 0.333              | 0.000    | 100      |                            |           |  |  |
| 12、合計發生時數                                                                                                                                       | 16               | C5's                       | %   | 0.014              | 0        | 4        |                            |           |  |  |
| 13、年累計時數                                                                                                                                        | 132              | C6+                        | %   | 0.0021             | 0        | 1        |                            |           |  |  |
| 14、年累計日數                                                                                                                                        | 10               | H <sub>2</sub> S           | ppm | 0                  | 0        | 0        |                            |           |  |  |
| 15、全廠燃燒塔使用日數                                                                                                                                    | 10               | CO                         | %   | 48.3               | 0        | 12733    |                            |           |  |  |
| 二、符合廢氣燃燒塔使用計畫書之說明                                                                                                                               |                  |                            |     |                    |          |          |                            |           |  |  |
| 16、使用事件之污染源                                                                                                                                     | M06及M07          | GC total                   | %   | 100                | 100      |          |                            |           |  |  |
| 17、符合使用計畫書項次                                                                                                                                    | 歲修一              |                            |     |                    |          |          |                            |           |  |  |
| 18、說明：M07製程試車初開俾時，因製程跳車釋壓閥跳脫，依製程之正常安全設定，將跳脫之可燃氣體緊急排至廢氣燃燒塔(A602)處理，但造成發生廢氣燃燒塔使用事件(>15,000M3/day)(參考附件一Flare使用計畫書P.14說明)。主要排放污染來源說明參附件二(Flare使用計畫 |                  | 19、合計VOCs進廢氣排放量(kg/日)      |     |                    |          | 11531    | 七、其它規定項目                   |           |  |  |
|                                                                                                                                                 |                  | 20、總淨熱值                    |     | MJ/Nm <sup>3</sup> | 22.61    |          |                            |           |  |  |
|                                                                                                                                                 |                  | 21、廢氣流量                    |     | Nm <sup>3</sup> /日 | 46007.19 |          |                            |           |  |  |
|                                                                                                                                                 |                  | 22、廢氣分子量                   |     |                    | 17.04    | 34.83    |                            |           |  |  |



附件十三、製程開車使用時機(因應產能調整之計畫性開/停俾，相對應之停工至少一個月以上)廢氣量估算

一、M04 因應產能調整之計畫性開/停車(105 年 1 月 14 日停車，105 年 7 月 18 開車)使用 FLARE 時間及排放量說明：105 年 7/18~20 共三天因為 M04 製程開車造成使用事件日，使用事件報告書如附件，2016/7/18~20 M04 每小時排放量如下表，開車期間最大排放量為 4489.28 m<sup>3</sup>

| 日期<br>當日時間 | 2016/7/18<br>廢氣燃燒塔逐時廢氣流量(m <sup>3</sup> ) | 2016/7/19 | 2016/7/20 |
|------------|-------------------------------------------|-----------|-----------|
| 00:00      | 0                                         | 3761.76   | 1533.29   |
| 01:00      | 0                                         | 3647.83   | 1297.23   |
| 02:00      | 0                                         | 4431.05   | 870.89    |
| 03:00      | 0                                         | 3248.26   | 1101.4    |
| 04:00      | 5.77                                      | 2582.89   | 1184.34   |
| 05:00      | 0                                         | 2671.95   | 1774.91   |
| 06:00      | 0.25                                      | 4013.14   | 2087.89   |
| 07:00      | 0                                         | 3275.28   | 2219.71   |
| 08:00      | 0                                         | 3499.22   | 1639.52   |
| 09:00      | 0                                         | 4253.04   | 1036.96   |
| 10:00      | 0                                         | 3814.22   | 435.76    |
| 11:00      | 26.26                                     | 3458.15   | 1321.43   |
| 12:00      | 115.44                                    | 2522.7    | 1555.31   |
| 13:00      | 705.15                                    | 2793.02   | 1815.02   |
| 14:00      | 4373.33                                   | 3159.14   | 1648.43   |
| 15:00      | 3733.01                                   | 2756.6    | 1586.15   |
| 16:00      | 4489.28                                   | 2712.84   | 1657.14   |
| 17:00      | 3582.8                                    | 2726.52   | 1391.85   |
| 18:00      | 2607.71                                   | 2186.63   | 1651.17   |
| 19:00      | 3559.08                                   | 1939.31   | 1483.63   |
| 20:00      | 3737.34                                   | 2103.26   | 1375.4    |
| 21:00      | 3377.2                                    | 1922.42   | 1357.6    |
| 22:00      | 3845.26                                   | 1455.55   | 1389.03   |
| 23:00      | 3596.26                                   | 1887.98   | 804.78    |

# 廢氣燃燒塔使用事件報告書

| 一、廢氣燃燒塔使用事件基本資料                                                                                                                             |                  | 三、成分及濃度分析結果                       |     |          | 四、進廢氣排放量(kg/日) | 五、空氣污染物排放量                 |           |  |
|---------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------------------------|-----|----------|----------------|----------------------------|-----------|--|
| 1、公私場所名稱                                                                                                                                    | 大連化工大發廠          | 進廢氣成分                             | 單位  | 濃度       |                | 污染物                        | 排放量(kg/日) |  |
| 2、管制編號                                                                                                                                      | S2005652         | Hydrogen (H <sub>2</sub> )        | %   | 53.285   | 1896           | 23、SO <sub>x</sub>         | 3.64      |  |
| 3、負責人姓名                                                                                                                                     | 蔡智全              | Oxygen (O <sub>2</sub> )          | %   | 0.3425   | 194            | 24、NO <sub>x</sub>         | 17.93     |  |
| 4、負責人電話                                                                                                                                     | (07)788-1165     | Nitrogen (N <sub>2</sub> )        | %   | 15.0752  | 7462           | 25、VOCs                    | 25.95     |  |
| 5、填表人姓名                                                                                                                                     | 沈明宗              | Carbon Dioxide (CO <sub>2</sub> ) | %   | 0        | 0              | 六、採取減量措施                   |           |  |
| 6、填表人電話                                                                                                                                     | (07)788-1165#267 | Methane (C1)                      | %   | 0        | 0              | 26、符合使用計畫書登錄之廢氣減量措施項次      | 否         |  |
| 7、燃燒塔編號                                                                                                                                     | A404             | Ethane (C2)                       | %   | 0.00241  | 1              | 27、未符合使用計畫書登錄廢氣減量措施之改善說明:無 |           |  |
| 8、日期                                                                                                                                        | 2016/7/18        | Ethylene(C2=)                     | %   | 0        | 0              |                            |           |  |
| 9、發生時間(起)                                                                                                                                   | 16:15            | Propane (C3)                      | %   | 0.00176  | 1              |                            |           |  |
| 10、發生時間(迄)                                                                                                                                  | 0:00             | Propylene (C3=)                   | %   | 0.0061   | 3              |                            |           |  |
| 11、採樣時間                                                                                                                                     | 16:35            | C4's                              | %   | 0.004083 | 2              |                            |           |  |
| 12、合計發生時數                                                                                                                                   | 8                | C5's                              | %   | 0        | 0              |                            |           |  |
| 13、年累計時數                                                                                                                                    | 23               | C6+                               | %   | 0        | 0              |                            |           |  |
| 14、年累計日數                                                                                                                                    | 2                | H <sub>2</sub> S                  | ppm | 0        | 0              |                            |           |  |
| 15、全廠燃燒塔使用日數                                                                                                                                | 2                | CO                                | %   | 31.2888  | 14179          |                            |           |  |
| 二、符合廢氣燃燒塔使用計畫書之說明                                                                                                                           |                  |                                   |     |          |                |                            |           |  |
| 16、使用事件之污染源                                                                                                                                 | M04              | GC total                          | %   | 100      |                | 七、其它規定項目                   |           |  |
| 17、符合使用計畫書項次                                                                                                                                | M04製程開停          |                                   |     |          |                |                            |           |  |
| 18、說明:因M04製程(1,4-丁二醇化學製造程序)製程開停,依製程之正當安全設定,將潔淨之可燃氣體緊急排放至廢氣燃燒塔(A404)處理,(>15,000M3/day)(參考附件一Flare使用計畫書P.23說明),主要排放污染來源說明參附件二(Flare使用計畫書P.33) |                  |                                   |     |          | 7              |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          | 28、說明:         |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |
|                                                                                                                                             |                  |                                   |     |          |                |                            |           |  |



廢氣燃燒塔使用事件報告書

| 一、廢氣燃燒塔使用事件基本資料                                                                                                                           |                  |                                   | 三、成分及濃度分析結果 |          |                       | 四、進廢氣排放量(kg/日)     | 五、空氣污染物排放量                 |           |
|-------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------------------------|-------------|----------|-----------------------|--------------------|----------------------------|-----------|
| 1、公私場所名稱                                                                                                                                  | 大連化工大發廠          | 進廢氣成分                             | 單位          | 濃度       |                       | 濃度                 | 污染物                        | 排放量(kg/日) |
| 2、管制編號                                                                                                                                    | S2005652         | Hydrogen (H <sub>2</sub> )        | %           | 56.23    |                       | 3698               | 23、SOx                     | 6.73      |
| 3、負責人姓名                                                                                                                                   | 蔡智全              | Oxygen (O <sub>2</sub> )          | %           | 0.988    |                       | 1033               | 24、NOx                     | 33.15     |
| 4、負責人電話                                                                                                                                   | (07)788-1165     | Nitrogen (N <sub>2</sub> )        | %           | 26.5072  |                       | 24258              | 25、VOCs                    | 38.85     |
| 5、填表人姓名                                                                                                                                   | 沈明宗              | Carbon Dioxide (CO <sub>2</sub> ) | %           | 0        |                       | 0                  | 六、採取減量措施                   |           |
| 6、填表人電話                                                                                                                                   | (07)788-1165#267 | Methane (C1)                      | %           | 0        |                       | 0                  | 26、符合使用計畫書登載之廢氣減量措施項次      | 否         |
| 7、燃燒塔編號                                                                                                                                   | A404             | Ethane (C2)                       | %           | 0.01967  |                       | 17                 | 27、未符合使用計畫書登載廢氣減量措施之改善說明:無 |           |
| 8、日期                                                                                                                                      | 2016/7/19        | Ethylene(C2=)                     | %           | 0        |                       | 0                  |                            |           |
| 9、發生時間(起)                                                                                                                                 | 2:45             | Propane (C3)                      | %           | 0.01209  |                       | 12                 |                            |           |
| 10、發生時間(迄)                                                                                                                                | 0:00             | Propylene (C3=)                   | %           | 0.000356 |                       | 0                  |                            |           |
| 11、採樣時間                                                                                                                                   | 3:05             | C4's                              | %           | 0.0514   |                       | 49                 |                            |           |
| 12、合計發生時數                                                                                                                                 | 21               | C5's                              | %           | 0        |                       | 0                  |                            |           |
| 13、年累計時數                                                                                                                                  | 44               | C6+                               | %           | 0.00692  |                       | 9                  |                            |           |
| 14、年累計日數                                                                                                                                  | 3                | H <sub>2</sub> S                  | ppm         | 0        |                       | 0                  |                            |           |
| 15、全廠燃燒塔使用日數                                                                                                                              | 3                | CO                                | %           | 16.184   |                       | 13560              |                            |           |
| 二、符合廢氣燃燒塔使用計畫書之說明                                                                                                                         |                  |                                   |             |          |                       |                    |                            |           |
| 16、使用事件之污染源                                                                                                                               | M04              | GC total                          | %           | 100      |                       |                    | 七、其它規定項目                   |           |
| 17、符合使用計畫書項次                                                                                                                              | M04製程開停          |                                   |             |          |                       |                    |                            |           |
| 18、說明:因M04製程(1,4-丁二醇化學製造程序)製程開停,依製程之正當安全設施,將潔淨之可燃氣體管線移至廢氣燃燒塔(A404)處理,(>15,000M3/day)(參考附件一Flare使用計畫書P.23說明),主要排放污染源說明參附件二(Flare使用計畫書P.33) |                  |                                   |             |          | 19、合計VOCs進廢氣排放量(kg/日) | 87                 |                            |           |
|                                                                                                                                           |                  |                                   |             |          | 20、總淨熱值               | MJ/Nm <sup>3</sup> |                            |           |
|                                                                                                                                           |                  |                                   |             |          | 21、廢氣流量(全廠總量)         | Nm <sup>3</sup> /日 | 73175.36                   |           |
|                                                                                                                                           |                  |                                   |             |          | 22、廢氣分子量              |                    | 13.40                      |           |

廢氣燃燒塔使用事件報告書

| 一、廢氣燃燒塔使用事件基本資料                                                                                                                            |                  | 三、成分及濃度分析結果                       |                    |          | 四、進廢氣排放量(kg/日) | 五、空氣污染物排放量                 |           |  |
|--------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------------------------|--------------------|----------|----------------|----------------------------|-----------|--|
| 1、公私場所名稱                                                                                                                                   | 大連化工大發廠          | 進廢氣成分                             | 單位                 | 濃度       |                | 污染物                        | 排放量(kg/日) |  |
| 2、管制編號                                                                                                                                     | S2005652         | Hydrogen (H <sub>2</sub> )        | %                  | 61.639   | 2000           | 23、SOx                     | 3.32      |  |
| 3、負責人姓名                                                                                                                                    | 蔡智全              | Oxygen (O <sub>2</sub> )          | %                  | 0.372    | 192            | 24、NOx                     | 16.35     |  |
| 4、負責人電話                                                                                                                                    | (07)788-1165     | Nitrogen (N <sub>2</sub> )        | %                  | 20.84744 | 9411           | 25、VOCs                    | 29.12     |  |
| 5、填表人姓名                                                                                                                                    | 沈明宗              | Carbon Dioxide (CO <sub>2</sub> ) | %                  | 0        | 0              | 六、採取減量措施                   |           |  |
| 6、填表人電話                                                                                                                                    | (07)788-1165#267 | Methane (C1)                      | %                  | 2.896    | 750            | 26、符合使用計畫書登錄之廢氣減量措施項次      | 否         |  |
| 7、燃燒塔編號                                                                                                                                    | A404             | Ethane (C2)                       | %                  | 0.1813   | 79             | 27、未符合使用計畫書登錄廢氣減量措施之改善說明:無 |           |  |
| 8、日期                                                                                                                                       | 2016/7/20        | Ethylene(C2=)                     | %                  | 0        | 0              |                            |           |  |
| 9、發生時間(起)                                                                                                                                  | 9:15             | Propane (C3)                      | %                  | 4.237    | 1988           |                            |           |  |
| 10、發生時間(迄)                                                                                                                                 | 0:00             | Propylene (C3=)                   | %                  | 0.189    | 89             |                            |           |  |
| 11、採樣時間                                                                                                                                    | 9:35             | C4's                              | %                  | 0.11776  | 55             |                            |           |  |
| 12、合計發生時數                                                                                                                                  | 15               | C5's                              | %                  | 0        | 0              |                            |           |  |
| 13、年累計時數                                                                                                                                   | 59               | C6+                               | %                  | 0.0378   | 23             |                            |           |  |
| 14、年累計日數                                                                                                                                   | 4                | H <sub>2</sub> S                  | ppm                | 0        | 0              |                            |           |  |
| 15、全廠燃燒塔使用日數                                                                                                                               | 4                | CO                                | %                  | 9.44     | 3902           |                            |           |  |
| 二、符合廢氣燃燒塔使用計畫書之說明                                                                                                                          |                  |                                   |                    |          |                |                            |           |  |
| 16、使用事件之污染源                                                                                                                                | M04              | GC total                          | %                  | 100      |                |                            |           |  |
| 17、符合使用計畫書項次                                                                                                                               | M04製程開停          |                                   |                    |          |                |                            |           |  |
| 18、說明:因M04製程(1,4-丁二醇化學製造程序)製程開停,係製程之正背安全設定,其潔淨之可燃氣體緊急排送至廢氣燃燒塔(A404)處理,(>15,000M3/day)(參考附件一Flare使用計畫書P.23說明)。主要排氣污染源說明參附件二(Flare使用計畫書P.33) |                  | 19、合計VOCs進廢氣排放量(kg/日)             |                    |          | 2235           | 七、其它規定項目                   |           |  |
|                                                                                                                                            |                  | 20、總淨熱值                           | MJ/Nm <sup>3</sup> |          | 13.40          |                            |           |  |
|                                                                                                                                            |                  | 21、廢氣流量(全廠總量)                     | Nm <sup>3</sup> /日 |          | 36095.93       |                            |           |  |
|                                                                                                                                            |                  | 22、廢氣分子量                          |                    |          | 12.15          |                            |           |  |
|                                                                                                                                            |                  |                                   |                    |          | 28、說明:         |                            |           |  |

二、M06 開車使用 FLARE 時間及排放量說明：105 年 11/18~21 四天及 11/30 一天總共五天為 M06 製程開車造成使用事件日，使用事件報告書如附件，105 年 11/18~21 及 11/30 A602 每小時排放量如下表，M06 開車期間最大排放量為 7902.21 m<sup>3</sup>



| 日期    | 2016/11/18      | 2016/11/19 | 2016/11/20 | 2016/11/21 | 2016/11/30 |
|-------|-----------------|------------|------------|------------|------------|
| 當日時間  | 廢氣燃燒塔逐時廢氣流量(m3) |            |            |            |            |
| 00:00 | 161             | 233.91     | 7578.74    | 178.69     | 161.21     |
| 01:00 | 166.69          | 247.11     | 7902.21    | 674.62     | 204.28     |
| 02:00 | 165.95          | 252.25     | 7807.77    | 1541.15    | 509        |
| 03:00 | 167.41          | 262.19     | 7888.74    | 877.48     | 206.36     |
| 04:00 | 173.88          | 260.97     | 7204.96    | 632.57     | 243.23     |
| 05:00 | 171.11          | 254.72     | 7087.5     | 497.2      | 263.99     |
| 06:00 | 175.46          | 254.17     | 6711.78    | 904.06     | 303.35     |
| 07:00 | 166.23          | 254.09     | 5540.72    | 1367.78    | 345.5      |
| 08:00 | 175.36          | 258.99     | 6584.54    | 1250.3     | 352.66     |
| 09:00 | 284.26          | 264.8      | 6940.38    | 1037.85    | 368.43     |
| 10:00 | 268.8           | 260.74     | 7113.29    | 1347.12    | 419.65     |
| 11:00 | 236.43          | 263.55     | 7556.36    | 263.66     | 4381.8     |
| 12:00 | 254.83          | 327.53     | 7511.03    | 363.81     | 6577.52    |
| 13:00 | 448.91          | 391.81     | 7674.58    | 784.02     | 6649.11    |
| 14:00 | 2179.41         | 5196.35    | 7789.36    | 550.93     | 6715.07    |
| 15:00 | 6396.52         | 5455.58    | 6596.81    | 409.14     | 6201.01    |
| 16:00 | 5596.93         | 6474.31    | 4900.58    | 361.71     | 5642.32    |
| 17:00 | 5610.48         | 7027.17    | 2956.55    | 1355.54    | 5789.4     |
| 18:00 | 1930.84         | 7411.92    | 2541.92    | 1411.61    | 2241.6     |
| 19:00 | 509.14          | 5993.22    | 1855.99    | 1123.88    | 2245.78    |
| 20:00 | 424.16          | 5463.12    | 1209.35    | 1173.61    | 726.9      |
| 21:00 | 318.08          | 4041.98    | 913.46     | 908.05     | 871.38     |
| 22:00 | 265.77          | 4991.13    | 760.05     | 561.66     | 719.73     |
| 23:00 | 261.23          | 7492.36    | 575.23     | 654.51     | 612.65     |

# 廢氣燃燒塔使用事件報告書

| 一、廢氣燃燒塔使用事件基本資料                                                                                                                     |                  | 三、成分及濃度分析結果                       |                    |             | 四、進廢氣排放量(kg/日) |  | 五、空氣污染物排放量                 |           |
|-------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------------------------|--------------------|-------------|----------------|--|----------------------------|-----------|
| 1、公私場所名稱                                                                                                                            | 大連化工大發廠          | 進廢氣成分                             | 單位                 | 濃度          |                |  | 污染物                        | 排放量(kg/日) |
| 2、管制編號                                                                                                                              | S2005652         | Hydrogen (H <sub>2</sub> )        | %                  | 50.5393     | 1204           |  | 23、SO <sub>x</sub>         | 2.44      |
| 3、負責人姓名                                                                                                                             | 蔡智全              | Oxygen (O <sub>2</sub> )          | %                  | 0.9035      | 342            |  | 24、NO <sub>x</sub>         | 12.01     |
| 4、負責人電話                                                                                                                             | (07)788-1165     | Nitrogen (N <sub>2</sub> )        | %                  | 15.78961038 | 5235           |  | 25、VOCs                    | 19.23     |
| 5、填表人姓名                                                                                                                             | 沈明宗              | Carbon Dioxide (CO <sub>2</sub> ) | %                  | 0           | 0              |  | 六、採取減量措施                   |           |
| 6、填表人電話                                                                                                                             | (07)788-1165#976 | Methane (C1)                      | %                  | 0           | 0              |  | 26、符合使用計畫書登載之廢氣減量措施項次      |           |
| 7、燃燒塔編號                                                                                                                             | A602             | Ethane (C2)                       | %                  | 0.227962    | 73             |  | 否                          |           |
| 8、日期                                                                                                                                | 2016/11/18       | Ethylene(C2=)                     | %                  | 0           | 0              |  | 27、未符合使用計畫書登載廢氣減量措施之改善說明:無 |           |
| 9、發生時間(起)                                                                                                                           | 16:00            | Propane (C3)                      | %                  | 0.084396    | 29             |  |                            |           |
| 10、發生時間(迄)                                                                                                                          | 0:00             | Propylene (C3=)                   | %                  | 0.011719    | 4              |  |                            |           |
| 11、採樣時間                                                                                                                             | 16:15            | C4's                              | %                  | 1.024125    | 353            |  |                            |           |
| 12、合計發生時數                                                                                                                           | 8                | C5's                              | %                  | 0.000284448 | 0              |  |                            |           |
| 13、年累計時數                                                                                                                            | 113              | C6+                               | %                  | 0.00320317  | 1              |  |                            |           |
| 14、年累計日數                                                                                                                            | 9                | H <sub>2</sub> S                  | ppm                | 0           | 0              |  |                            |           |
| 15、全廠燃燒塔使用日數                                                                                                                        | 9                | CO                                | %                  | 31.4159     | 9536           |  |                            |           |
| 二、符合廢氣燃燒塔使用計畫書之說明                                                                                                                   |                  |                                   |                    |             |                |  |                            |           |
| 16、使用事件之污染源                                                                                                                         | M06              | G/C total                         | %                  | 100         |                |  |                            |           |
| 17、符合使用計畫書項次                                                                                                                        | M06 製程開停         |                                   |                    |             |                |  |                            |           |
| 18、說明: M06製程設備開停之廢氣,為確保製程操作之安全,故須將製程之廢氣導入A602處理,因此造成發生廢氣燃燒塔使用事件(>15,000M3/day)(參考附件一Flare使用計畫書P.28說明)。主要排放污染源說明參附件二(Flare使用計畫書P.35) |                  | 19、合計VOCs進廢氣排放量(kg/日)             |                    |             | 461            |  | 七、其它規定項目                   |           |
|                                                                                                                                     |                  | 20、總淨熱值                           | MJ/Nm <sup>3</sup> | 12.05       |                |  | 28、說明:                     |           |
|                                                                                                                                     |                  | 21、廢氣流量(全廠總量)                     | Nm <sup>3</sup> /日 | 26508.88    |                |  |                            |           |
|                                                                                                                                     |                  | 22、廢氣分子量                          |                    | 14.56       |                |  |                            |           |



# 廢氣燃燒塔使用事件報告書

| 一、廢氣燃燒塔使用事件基本資料                                                                                                                     |                  | 三、成分及濃度分析結果                       |          |          | 四、進廢氣排放量(kg/日) | 五、空氣污染物排放量                         |           |
|-------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------------------------|----------|----------|----------------|------------------------------------|-----------|
| 1、公私場所名稱                                                                                                                            | 大連化工大發廠          | 進廢氣成分                             | 單位       | 濃度       |                | 污染物                                | 排放量(kg/日) |
| 2、管制編號                                                                                                                              | S2005652         | Hydrogen (H <sub>2</sub> )        | %        | 56.35    | 3208           | 23、SOx                             | 5.83      |
| 3、負責人姓名                                                                                                                             | 蔡智全              | Oxygen (O <sub>2</sub> )          | %        | 0.408    | 369            | 24、NOx                             | 28.69     |
| 4、負責人電話                                                                                                                             | (07)788-1165     | Nitrogen (N <sub>2</sub> )        | %        | 13.94355 | 11044          | 25、VOCs                            | 49.43     |
| 5、填表人姓名                                                                                                                             | 沈明宗              | Carbon Dioxide (CO <sub>2</sub> ) | %        | 0        | 0              | 六、採取減量措施                           |           |
| 6、填表人電話                                                                                                                             | (07)788-1165#976 | Methane (C1)                      | %        | 0        | 0              | 26、符合使用計畫者<br>登錄之廢氣減量措施            | 否         |
| 7、燃燒塔編號                                                                                                                             | A602             | Ethane (C2)                       | %        | 0.0369   | 28             | 否                                  |           |
| 8、日期                                                                                                                                | 2016/11/19       | Ethylene(C2=)                     | %        | 0        | 0              | 27、未符合使用計畫者<br>登錄廢氣減量措施<br>之改善說明:無 |           |
| 9、發生時間(起)                                                                                                                           | 15:15            | Propane (C3)                      | %        | 0.01285  | 11             |                                    |           |
| 10、發生時間(迄)                                                                                                                          | 0:00             | Propylene (C3=)                   | %        | 0.006    | 5              |                                    |           |
| 11、採樣時間                                                                                                                             | 15:45            | C4's                              | %        | 2.0014   | 1648           |                                    |           |
| 12、合計發生時數                                                                                                                           | 9                | C5's                              | %        | 0.0007   | 1              |                                    |           |
| 13、年累計時數                                                                                                                            | 122              | C6+                               | %        | 0.0021   | 2              |                                    |           |
| 14、年累計日數                                                                                                                            | 10               | H <sub>2</sub> S                  | ppm      | 0        | 0              |                                    |           |
| 15、全廠燃燒塔使用日數                                                                                                                        | 10               | CO                                | %        | 27.2385  | 19753          |                                    |           |
| 二、符合廢氣燃燒塔使用計畫書之說明                                                                                                                   |                  |                                   |          |          |                |                                    |           |
| 16、使用事件之污染源                                                                                                                         | M06              | GC total                          | %        | 100      |                |                                    |           |
| 17、符合使用計畫書項次                                                                                                                        | M06 製程開俾         |                                   |          |          |                |                                    |           |
| 18、說明:M06製程開俾期間之廢氣，為確保製程操作之安全，故須將製程之廢氣導入A602處理，因此造成發生廢氣燃燒塔使用事件(>15,000MJ/day)(參考附件一Flare使用計畫書P.28說明)，主要排放污染來源說明參附件二(Flare使用計畫書P.35) |                  | 19、合計VOCs進廢氣排放量(kg/日)             | 1695     |          |                | 七、其它規定項目                           |           |
|                                                                                                                                     |                  | 20、總淨熱值 MJ/Nm <sup>3</sup>        | 12.96    |          |                | 28、說明:                             |           |
|                                                                                                                                     |                  | 21、廢氣流量(全廠總量) Nm <sup>3</sup> /日  | 63333.97 |          |                |                                    |           |
|                                                                                                                                     |                  | 22、廢氣分子重量                         | 12.80    |          |                |                                    |           |

廢氣燃燒塔使用事件報告書

| 一、廢氣燃燒塔使用事件基本資料                                                                                                                                     |                  | 三、成分及濃度分析結果                       |                    |            | 四、進廢氣排放量(kg/日) |  | 五、空氣污染物排放量                |           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------------------------|--------------------|------------|----------------|--|---------------------------|-----------|
| 1、公私場所名稱                                                                                                                                            | 大連化工大發廠          | 進廢氣成分                             | 單位                 | 濃度         | 量(kg/日)        |  | 污染物                       | 排放量(kg/日) |
| 2、管制編號                                                                                                                                              | S2005652         | Hydrogen (H <sub>2</sub> )        | %                  | 38.4763    | 4537           |  | 23、SO <sub>x</sub>        | 12.07     |
| 3、負責人姓名                                                                                                                                             | 蔡智全              | Oxygen (O <sub>2</sub> )          | %                  | 4.7827     | 8967           |  | 24、NO <sub>x</sub>        | 59.43     |
| 4、負責人電話                                                                                                                                             | (07)788-1165     | Nitrogen (N <sub>2</sub> )        | %                  | 19.5083429 | 32010          |  | 25、VOCs                   | 99.42     |
| 5、填表人姓名                                                                                                                                             | 沈明宗              | Carbon Dioxide (CO <sub>2</sub> ) | %                  | 0          | 0              |  | 六、採取減量措施                  |           |
| 6、填表人電話                                                                                                                                             | (07)788-1165#976 | Methane (CH <sub>4</sub> )        | %                  | 0          | 0              |  | 26、符合使用計畫登載之廢氣減量措施項次      |           |
| 7、燃燒塔編號                                                                                                                                             | A602             | Ethane (C <sub>2</sub> )          | %                  | 0.01152    | 18             |  | 否                         |           |
| 8、日期                                                                                                                                                | 2016/11/20       | Ethylene (C <sub>2</sub> =)       | %                  | 0          | 0              |  | 27、未符合使用計畫登載廢氣減量措施之改善說明:無 |           |
| 9、發生時間(起)                                                                                                                                           | 1:00             | Propane (C <sub>3</sub> )         | %                  | 0.05632    | 96             |  |                           |           |
| 10、發生時間(迄)                                                                                                                                          | 0:00             | Propylene (C <sub>3</sub> =)      | %                  | 0.0021     | 4              |  |                           |           |
| 11、採樣時間                                                                                                                                             | 1:10             | C <sub>4</sub> 's                 | %                  | 2.2216084  | 3789           |  |                           |           |
| 12、合計發生時數                                                                                                                                           | 23               | C <sub>5</sub> 's                 | %                  | 0.000502   | 1              |  |                           |           |
| 13、年累計時數                                                                                                                                            | 145              | C <sub>6</sub> +                  | %                  | 0.01671    | 37             |  |                           |           |
| 14、年累計日數                                                                                                                                            | 11               | H <sub>2</sub> S                  | ppm                | 0          | 0              |  |                           |           |
| 15、全廠燃燒塔使用日數                                                                                                                                        | 11               | CO                                | %                  | 34.9208    | 52460          |  |                           |           |
| 二、符合廢氣燃燒塔使用計畫書之說明                                                                                                                                   |                  | G <sub>C</sub> total              | %                  | 100        |                |  |                           |           |
| 16、使用事件之污染源                                                                                                                                         | M06              |                                   |                    |            |                |  |                           |           |
| 17、符合使用計畫書項次                                                                                                                                        | M06 製程開停         |                                   |                    |            |                |  |                           |           |
| 18、說明: M06製程開停期間之廢氣, 為確保製程操作之安全, 故須將製程之廢氣導入A602處理, 因此造成發生廢氣燃燒塔使用事件(>15,000M <sup>3</sup> /day)(參考附件一Flare使用計畫書P.28說明)。主要排放污染源說明參附件二(Flare使用計畫書P.35) |                  | 19、合計VOCs進廢氣排放量(kg/日)             |                    |            | 3945           |  | 七、其它規定項目                  |           |
|                                                                                                                                                     |                  | 20、總淨熱值                           | MJ/Nm <sup>3</sup> | 12.59      |                |  | 28、說明:                    |           |
|                                                                                                                                                     |                  | 21、廢氣流量(全廠總量)                     | Nm <sup>3</sup> /日 | 131201.9   |                |  |                           |           |
|                                                                                                                                                     |                  | 22、廢氣分子量                          |                    | 17.56      |                |  |                           |           |



# 廢氣燃燒塔使用事件報告書

A13-9

| 一、廢氣燃燒塔使用事件基本資料                                                                                                                     |                  | 三、成分及濃度分析結果                       |     |         | 四、進廢氣排放量(kg/日) |  | 五、空氣污染物排放量                 |           |
|-------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------------------------|-----|---------|----------------|--|----------------------------|-----------|
| 1、公私場所名稱                                                                                                                            | 大連化工大發廠          | 進廢氣成分                             | 單位  | 濃度      |                |  | 污染物                        | 排放量(kg/日) |
| 2、管制編號                                                                                                                              | S2005652         | Hydrogen (H <sub>2</sub> )        | %   | 57.35   | 1043           |  | 23、SOx                     | 1.86      |
| 3、負責人姓名                                                                                                                             | 蔡智全              | Oxygen (O <sub>2</sub> )          | %   | 0.3499  | 101            |  | 24、NOx                     | 9.16      |
| 4、負責人電話                                                                                                                             | (07)788-1165     | Nitrogen (N <sub>2</sub> )        | %   | 17.2941 | 4376           |  | 25、VOCs                    | 14.67     |
| 5、填表人姓名                                                                                                                             | 沈明宗              | Carbon Dioxide (CO <sub>2</sub> ) | %   | 0       | 0              |  | 六、採取減量措施                   |           |
| 6、填表人電話                                                                                                                             | (07)788-1165#976 | Methane (C1)                      | %   | 5.13    | 744            |  | 26、符合使用計畫書登錄之廢氣減量措施項次<br>否 |           |
| 7、燃燒塔編號                                                                                                                             | A602             | Ethane (C2)                       | %   | 0.2127  | 52             |  |                            |           |
| 8、日期                                                                                                                                | 2016/11/21       | Ethylene(C2=)                     | %   | 0       | 0              |  | 27、未符合使用計畫書登錄廢氣減量措施之改善說明:無 |           |
| 9、發生時間(起)                                                                                                                           | 17:30            | Propane (C3)                      | %   | 0.5296  | 139            |  |                            |           |
| 10、發生時間(迄)                                                                                                                          | 0:00             | Propylene (C3=)                   | %   | 0.0089  | 2              |  |                            |           |
| 11、採樣時間                                                                                                                             | 17:35            | C4's                              | %   | 0.30858 | 81             |  |                            |           |
| 12、合計發生時數                                                                                                                           | 7                | C5's                              | %   | 0.00259 | 1              |  |                            |           |
| 13、年累計時數                                                                                                                            | 152              | C6+                               | %   | 0.02593 | 9              |  |                            |           |
| 14、年累計日數                                                                                                                            | 12               | H <sub>2</sub> S                  | ppm | 0       | 0              |  |                            |           |
| 15、全廠燃燒塔使用日數                                                                                                                        | 12               | CO                                | %   | 18.29   | 4237           |  |                            |           |
| 二、符合廢氣燃燒塔使用計畫書之說明                                                                                                                   |                  |                                   |     |         |                |  |                            |           |
| 16、使用事件之污染源                                                                                                                         | M06              | GC total                          | %   | 100     |                |  |                            |           |
| 17、符合使用計畫書項次                                                                                                                        | M06 製程開停         |                                   |     |         |                |  |                            |           |
| 18、說明:M06製程開停期間之廢氣,為確保製程操作之安全,故須將製程之廢氣導入A602處理,因此造成發生廢氣燃燒使用事件(>15,000MJ/day)(參考附件一Flare使用計畫書P.28說明)。主要排放污染源來源說明參附件二(Flare使用計畫書P.35) |                  | 19、合計VOCs進廢氣排放量(kg/日)             |     |         | 285            |  | 七、其它規定項目                   |           |
|                                                                                                                                     |                  | 20、總淨熱值                           |     |         | 12.04          |  | 28、說明:                     |           |
|                                                                                                                                     |                  | 21、廢氣流量(全廠總量)                     |     |         | 20230.95       |  |                            |           |
|                                                                                                                                     |                  | 22、廢氣分子量                          |     |         | 12.27          |  |                            |           |







# Certificate of Analysis

大發廠-大連化學工業股份有限公司  
 高雄市大寮區大發工業區華西路19之2號  
 83164 高雄市  
 臺灣

三福氣體股份有限公司  
 中山北路二段21號  
 商工大樓,5樓  
 10450 台北  
 臺灣  
 Tel: 886-2-25214161  
 Fax: 886-2-25618991  
 Date Printed:

08 DEC 2014

Customer Ship-to: 756997  
 Customer Order No: TFB4A273  
 Sales Order No.: 1119355791  
 Delivery No.: 8036965636  
 Delivery Vehicle: 7271

Container Type: X40S - 40L Steel Cylinder  
 Outlet Valve Connection: JIS W22 L  
 Net Weight: 1.925 kg  
 Fill Pressure @ 35 °C: 117.0 bar-g  
 Fill Pressure @ 35 °C: 119.307 kg/cm2  
 Contents @ 0°C, 1013 mbar: 3.910 Nm3

|                                            |                                       |                              |                                |
|--------------------------------------------|---------------------------------------|------------------------------|--------------------------------|
| Material<br><b>113825</b> Mixture of Gases | Mfg. Date<br>03 DEC 2014              | Analysis Date<br>03 DEC 2014 | Best if Used By<br>03 DEC 2016 |
| Batch<br><b>1885654</b>                    | Inspection Lot<br><b>040005587203</b> | Quantity<br>1 EA             | Source Location<br>7209        |

CTN,SN: FB16GDH,SM33780;

| LOWER LIMIT            | UPPER LIMIT | NOMINAL VALUE | ACTUAL VALUE | UNIT | EXPANDED UNCERT. | NO REPS | ANALYTICAL |      |        |
|------------------------|-------------|---------------|--------------|------|------------------|---------|------------|------|--------|
|                        |             |               |              |      |                  | STD DEV | PHASE      | FREQ | METHOD |
| <b>Carbon Dioxide</b>  |             |               |              |      |                  |         |            |      |        |
| 0.450                  | 0.550       | 0.500         | 0.507        | %(V) |                  |         | V          | B    | GC     |
| <b>Methane</b>         |             |               |              |      |                  |         |            |      |        |
| 3.33                   | 3.68        | 3.50          | 3.55         | %(V) |                  |         | V          | B    |        |
| <b>Carbon Monoxide</b> |             |               |              |      |                  |         |            |      |        |
| 30.4                   | 33.6        | 32.0          | 32.6         | %(V) |                  |         | V          | B    | GC     |
| <b>Hydrogen</b>        |             |               |              |      |                  |         |            |      |        |
|                        |             |               | 63.343       | %(V) |                  |         |            | C    |        |

This certificate is issued electronically and is valid without a signature.

## REMARKS:

Phase: L=Liquid, V=Vapor  
 Analytical Frequency: I=Individual, B=Batch  
 C= Calculated, S=Source, G=Guaranteed

曾文慶 12/9 dec/2014

DUAL-1

**Certificate of Analysis**

大發廠-大連化學工業股份有限公司  
高雄市大寮區大發工業區華西路19之2號  
83164 高雄市  
臺灣

三福氣體股份有限公司  
中山北路二段21號  
商工大樓5樓  
10450 台北  
臺灣

Tel: 886-2-25214161  
Fax: 886-2-25618991  
Date Printed:

08 DEC 2014

Customer Ship-to: 756997  
Customer Order No: TFB4A273  
Sales Order No.: 1119355791  
Delivery No.: 8036965636  
Delivery Vehicle: 7271

Container Type: X40S - 40L Steel Cylinder  
Outlet Valve Connection: JIS W22 L  
Net Weight: 2.675 kg  
Fill Pressure @ 35 °C: 117.0 bar-g  
Fill Pressure @ 35 °C: 119.307 kg/cm2  
Contents @ 0°C, 1013 mbar: 3.967 Nm3

|                                     |                                |                              |                                |
|-------------------------------------|--------------------------------|------------------------------|--------------------------------|
| Material<br>113826 Mixture of Gases | Mfg. Date<br>03 DEC 2014       | Analysis Date<br>03 DEC 2014 | Best if Used By<br>03 DEC 2016 |
| Batch<br>1885653                    | Inspection Lot<br>040005587204 | Quantity<br>1 EA             | Source Location<br>7209        |

CTN,SN: FD50CDR,NO1326;

| LOWER<br>LIMIT          | UPPER<br>LIMIT | NOMINAL<br>VALUE | ACTUAL<br>VALUE | UNIT | EXPANDED<br>UNCERT. | NO REPS<br>STD DEV | ANALYTICAL |      |        |
|-------------------------|----------------|------------------|-----------------|------|---------------------|--------------------|------------|------|--------|
|                         |                |                  |                 |      |                     |                    | PHASE      | FREQ | METHOD |
| Methane<br>9.50         | 10.50          | 10.00            | 9.99            | %(V) |                     |                    | V          | B    | GC     |
| Carbon Monoxide<br>42.8 | 47.3           | 45.0             | 45.0            | %(V) |                     |                    | V          | B    | GC     |
| Hydrogen                |                |                  | 45.01           | %(V) |                     |                    |            | C    | TOA    |

This certificate is issued electronically and is valid without a signature.

**REMARKS:**

Phase: L=Liquid, V=Vapor  
Analytical Frequency: I=Individual, B=Batch  
C= Calculated, S=Source, G=Guaranteed

DUAL-2

日入度 12/9 check o/c

**Certificate of Analysis**

大發廠-大連化學工業股份有限公司  
高雄市大寮區大發工業區華西路19之2號  
83164 高雄市  
TAIWAN

三福氣體股份有限公司  
中山北路二段21號  
商工大樓5樓  
10450 台北  
TAIWAN  
Tel: 886-2-25214161  
Fax: 886-2-25618991  
Date Printed:

09 JUN 2015

Customer Ship-to: 756997  
Customer Order No: 34QC11500051-1-1  
Sales Order No.: 1120736876  
Delivery No.: 8039792709  
Delivery Vehicle: 7271

Container Type: X29A - 29L Aluminum Cylinder  
Outlet Valve Connection: CGA350  
Net Weight: 3.672 kg  
Fill Pressure @ 35 °C: 117.0 bar-g  
Fill Pressure @ 35 °C: 119.307 kg/cm2  
Contents @ 0 °C, 1013 mbar: 2.929 Nm3

|                                            |                                       |                              |                                |
|--------------------------------------------|---------------------------------------|------------------------------|--------------------------------|
| Material<br><b>315098</b> Mixture of Gases | Mfg. Date<br>29 MAY 2015              | Analysis Date<br>31 MAY 2015 | Best if Used By<br>29 MAY 2016 |
| Batch<br><b>1973889</b>                    | Inspection Lot<br><b>040005849365</b> | Quantity<br>1 EA             | Source Location<br>7209        |

CTN,SN: FB22DKV,CC76038;

| LOWER LIMIT | UPPER LIMIT | NOMINAL VALUE | ACTUAL VALUE | UNIT   | EXPANDED UNCERT. | NO REPS<br>STD DEV | ANALYTICAL |      |        |
|-------------|-------------|---------------|--------------|--------|------------------|--------------------|------------|------|--------|
|             |             |               |              |        |                  |                    | PHASE      | FREQ | METHOD |
| Ethylene    |             | 500.0         | 525.0        | ppm mo | ± 1%rel          |                    | I          |      | Grav   |
| Ethane      |             | 300.0         | 295.0        | ppm mo | ± 2%rel          |                    | I          |      | Grav   |
| Acetylene   |             | 60.0          | 59.0         | ppm mo | ± 2%rel          |                    | I          |      | Grav   |
| Propylene   |             | 0.5000        | 0.5100       | % mole | ± 1%rel          |                    | I          |      | Grav   |
| Propane     |             | 0.1000        | 0.1000       | % mole | ± 1%rel          |                    | I          |      | Grav   |
| Methane     |             | 20.00         | 19.70        | ppm mo | ± 2%rel          |                    | I          |      | Grav   |
| Nitrogen    |             |               | 99.200       | % mole | ± 0.1%rel        |                    | I          |      | Grav   |

*C3H6 & Alkene*

*劉士誠 check ok  
2015/6/10*

This certificate is issued electronically and is valid without a signature.

**REMARKS:**

Analytic Freq : I = Individual analysis, B = Batch analysis, C = Calculated value, S = Source.  
The suffix (m) in the Unit of Measure refers to mass.

The expanded uncertainty has been calculated with a coverage factor k=2.

This certificate is produced in accordance with ISO 6141.

The results shown above are traceable to national or international standards through a rigorous preparation system in which International Reference Materials, ISO 6142 and ISO 6143 are used.

To obtain details about the applicable traceability, please contact us.

Do not use below a pressure of 3 bar (excluding product supplied at less than 10 bar).  
Maintain storage and use temperature between -10 and 50 °C.



# 2015年度檢量校正計畫表

製表日期: 2015 08月03日

| 月次   | 1/1~1/31                                                                                                                                                                                                    | 2/1~2/28             | 3/1~3/31                | 4/1~4/30              | 5/1~5/31                | 6/1~6/30                | 7/1~7/31              | 8/1~8/31                | 9/1~9/30                | 10/1~10/31            | 11/1~11/30              | 12/1~12/31              |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------------------|-----------------------|-------------------------|-------------------------|-----------------------|-------------------------|-------------------------|-----------------------|-------------------------|-------------------------|
| 進度內容 | 1. 滴定液                                                                                                                                                                                                      | 1. 滴定液               | 1. 滴定液                  | 1. 滴定液                | 1. 滴定液                  | 1. 滴定液                  | 1. 滴定液                | 1. 滴定液                  | 1. 滴定液                  | 1. 滴定液                | 1. 滴定液                  | 1. 滴定液                  |
|      | 2. 比重儀CHECK                                                                                                                                                                                                 | 2. 比重儀CHECK          | 2. 比重儀CHECK             | 2. 比重儀CHECK           | 2. 比重儀CHECK             | 2. 比重儀CHECK             | 2. 比重儀CHECK           | 2. 比重儀CHECK             | 2. 比重儀CHECK             | 2. 比重儀CHECK           | 2. 比重儀CHECK             | 2. 比重儀CHECK             |
|      | 3. pH meter                                                                                                                                                                                                 | 3. pH meter          | 3. pH meter             | 3. pH meter           | 3. pH meter             | 3. pH meter             | 3. pH meter           | 3. pH meter             | 3. pH meter             | 3. pH meter           | 3. pH meter             | 3. pH meter             |
|      | 4. 天平CHECK                                                                                                                                                                                                  | 4. 天平CHECK           | 4. 天平CHECK              | 4. 天平CHECK            | 4. 天平CHECK              | 4. 天平CHECK              | 4. 天平CHECK            | 4. 天平CHECK              | 4. 天平CHECK              | 4. 天平CHECK            | 4. 天平CHECK              | 4. 天平CHECK              |
|      | 5. 氣體分析檢量                                                                                                                                                                                                   | 5. 氣體分析檢量            | 5. 氣體分析檢量               | 5. 氣體分析檢量             | 5. 氣體分析檢量               | 5. 氣體分析檢量               | 5. 氣體分析檢量             | 5. 氣體分析檢量               | 5. 氣體分析檢量               | 5. 氣體分析檢量             | 5. 氣體分析檢量               | 5. 氣體分析檢量               |
|      | 6. BDOP (PE20/21)                                                                                                                                                                                           | 6. BDOP (PE20/21)    | 6. BDOP (PE20/21)       | 6. BDOP (PE20/21)     | 6. BDOP (PE20/21)       | 6. BDOP (PE20/21)       | 6. BDOP (PE20/21)     | 6. BDOP (PE20/21)       | 6. BDOP (PE20/21)       | 6. BDOP (PE20/21)     | 6. BDOP (PE20/21)       | 6. BDOP (PE20/21)       |
|      | 7. MPOP (HP-4B)                                                                                                                                                                                             | 7. MPOP (HP-4B)      | 7. MPOP (HP-4B)         | 7. MPOP (HP-4B)       | 7. MPOP (HP-4B)         | 7. MPOP (HP-4B)         | 7. MPOP (HP-4B)       | 7. MPOP (HP-4B)         | 7. MPOP (HP-4B)         | 7. MPOP (HP-4B)       | 7. MPOP (HP-4B)         | 7. MPOP (HP-4B)         |
|      | 8. BDOHP(PE-20/21)                                                                                                                                                                                          | 8. BDOHP(PE-20/21)   | 8. BDOHP(PE-20/21)      | 8. BDOHP(PE-20/21)    | 8. BDOHP(PE-20/21)      | 8. BDOHP(PE-20/21)      | 8. BDOHP(PE-20/21)    | 8. BDOHP(PE-20/21)      | 8. BDOHP(PE-20/21)      | 8. BDOHP(PE-20/21)    | 8. BDOHP(PE-20/21)      | 8. BDOHP(PE-20/21)      |
|      | 9. IBA (PE-24)                                                                                                                                                                                              | 9. NPA(XM)(HP-7A)    | 9. TPHL (HP-1B)         | 9. IBA (PE-24)        | 9. Heavy(PE-5B)         | 9. TPHL (HP-1B)         | 9. IBA (PE-24)        | 9. Heavy(PE-5B)         | 9. TPHL (HP-1B)         | 9. IBA (PE-24)        | 9. Heavy(PE-5B)         | 9. TPHL (HP-1B)         |
|      | 10. 671B (PE-24)                                                                                                                                                                                            | 10. 641T (PE-22/23)  | 10. 200&301T (PE-17/18) | 10. 671B (PE-24)      | 10. 641T (PE-22/23)     | 10. 200&301T (PE-17/18) | 10. 671B (PE-24)      | 10. 641T (PE-22/23)     | 10. 200&301T (PE-17/18) | 10. 671B (PE-24)      | 10. 641T (PE-22/23)     | 10. 200&301T (PE-17/18) |
|      | 11. SCRUBBER (HP-7A)                                                                                                                                                                                        | 11. THF (PE-7B)      | 11. T301B (PE-13/14)    | 11. SCRUBBER (HP-7A)  | 11. THF (PE-7B)         | 11. T301B (PE-13/14)    | 11. SCRUBBER (HP-7A)  | 11. THF (PE-7B)         | 11. T301B (PE-13/14)    | 11. SCRUBBER (HP-7A)  | 11. THF (PE-7B)         | 11. T301B (PE-13/14)    |
|      | 12. 551T(PE-15/19)                                                                                                                                                                                          | 12. 545T (PE-15/19)  | 12. 400 (PE-13/14/15)   | 12. 551T(PE-15/19)    | 12. 545T (PE-15/19)     | 12. 400 (PE-13/14)      | 12. 551T(PE-15/19)    | 12. 545T (PE-15/19)     | 12. 400 (PE-13/14)      | 12. 551T(PE-15/19)    | 12. 545T (PE-15/19)     | 12. 400 (PE-13/14)      |
|      | 13. 551B(PE-15/19)                                                                                                                                                                                          | 13. 581T (PE-15/19)  | 13. Allyoln (PE-7B)     | 13. 551B(PE-15/19)    | 13. 581T (PE-15/19)     | 13. Allyoln (PE-7B)     | 13. 551B(PE-15/19)    | 13. 581T (PE-15/19)     | 13. Allyoln (PE-7B)     | 13. 551B(PE-15/19)    | 13. 581T (PE-15/19)     | 13. Allyoln (PE-7B)     |
|      | 14. 500T(HP-3A)                                                                                                                                                                                             | 14. Heavy (HP-3B)    | 14. R261ABCO(PE-6A)     | 14. 500T(HP-3A)       | 14. THF-UNDECANE(PE-16) | 14. R261ABCO(PE-6A)     | 14. 500T(HP-3A)       | 14. THF-UNDECANE(PE-16) | 14. R261ABCO(PE-6A)     | 14. 500T(HP-3A)       | 14. THF-UNDECANE(PE-16) | 14. R261ABCO(PE-6A)     |
|      | 15. TPH (HP-1A/2B)                                                                                                                                                                                          | 15. TK-602(PE-5A)    | 15. AA(PE-7A)           | 15. TPH (HP-1A/2B)    | 15. TK-602(PE-5A)       | 15. AA(PE-7A)           | 15. TPH (HP-1A/2B)    | 15. TK-602(PE-5A)       | 15. AA(PE-7A)           | 15. TPH (HP-1A/2B)    | 15. TK-602(PE-5A)       | 15. AA(PE-7A)           |
|      | 16. MeOH(PE-22)                                                                                                                                                                                             | 16. T205B(PE-6A)     | 16. T-305B(PE-9)        | 16. MeOH(PE-22)       | 16. T205B(PE-6A)        | 16. T-305B(PE-9)        | 16. MeOH(PE-22)       | 16. T205B(PE-6A)        | 16. T-305B(PE-9)        | 16. MeOH(PE-22)       | 16. T205B(PE-6A)        | 16. T-305B(PE-9)        |
|      | 17. 600 (PE-22/23)                                                                                                                                                                                          | 17. T-106B(PE-6A)    | 17. T-324B(PE-11)       | 17. 600 (PE-22/23)    | 17. T-106B(PE-6A)       | 17. T-324B(PE-11)       | 17. 600 (PE-22/23)    | 17. T-106B(PE-6A)       | 17. T-324B(PE-11)       | 17. 600 (PE-22/23)    | 17. T-106B(PE-6A)       | 17. T-324B(PE-11)       |
|      | 18. 585F(PE-19)                                                                                                                                                                                             | 18. V-304(PE-8)      | 18. V501-HQHT(HP-4A)    | 18. 585F(PE-15/19)    | 18. V-304(PE-8)         | 18. V501-HQHT(HP-4A)    | 18. 585F(PE-15/19)    | 18. V-304(PE-8)         | 18. V501-HQHT(HP-4A)    | 18. 585F(PE-15/19)    | 18. V-304(PE-8)         | 18. V501-HQHT(HP-4A)    |
|      | 19. RAW-MeOH(PE-16)                                                                                                                                                                                         | 19. V-201(PE-9)      | 19. 405T-HQHT(HP-4A)    | 19. RAW-MeOH(HP-4A)   | 19. V-201(PE-9)         | 19. 405T-HQHT(HP-4A)    | 19. RAW-MeOH(HP-4A)   | 19. V-201(PE-9)         | 19. 405T-HQHT(HP-4A)    | 19. RAW-MeOH(HP-4A)   | 19. V-201(PE-9)         | 19. 405T-HQHT(HP-4A)    |
|      | 20. HT-Toluene(PE-5A)                                                                                                                                                                                       | 20. 451B(PE-5A)      | 20. SCRUB-AAL(HP-7A)    | 20. HT-Toluene(PE-5A) | 20. 451B(PE-5A)         | 20. SCRUB-AAL(HP-7A)    | 20. HT-Toluene(PE-5A) | 20. 451B(PE-5A)         | 20. SCRUB-AAL(HP-7A)    | 20. HT-Toluene(PE-5A) | 20. 451B(PE-5A)         | 20. SCRUB-AAL(HP-7A)    |
|      | 21. 124O(PE-6A)                                                                                                                                                                                             | 21. T-405T(PE-11)    | 21. C2H2 (PE-3A)        | 21. 124O(PE-6A)       | 21. T-405T(PE-11)       | 21. C2H2 (PE-3A)        | 21. 124O(PE-6A)       | 21. T-405T(PE-11)       | 21. C2H2 (PE-3A)        | 21. 124O(PE-6A)       | 21. T-405T(PE-11)       | 21. C2H2 (PE-3A)        |
|      | 22. V-200(PE-6A)                                                                                                                                                                                            | 22. 405B(PE-9)       | 22. THC (PE-3A)         | 22. V-200(PE-6A)      | 22. 405B(PE-9)          | 22. THC (PE-3A)         | 22. V-200(PE-6A)      | 22. 405B(PE-9)          | 22. THC (PE-3A)         | 22. V-200(PE-6A)      | 22. 405B(PE-9)          | 22. THC (PE-3A)         |
|      | 23. H-120(PE-8)                                                                                                                                                                                             | 23. 406B(PE-5A)      | 23. 124W(PE-5A)         | 23. H-120(PE-8)       | 23. 406B(PE-5A)         | 23. 124W(PE-5A)         | 23. H-120(PE-8)       | 23. 406B(PE-5A)         | 23. 124W(PE-5A)         | 23. H-120(PE-8)       | 23. 406B(PE-5A)         | 23. 124W(PE-5A)         |
|      | 24. 401B(PE-5A)                                                                                                                                                                                             | 24. UV(SiO2)         | 24. UV(N3TA160)         | 24. 401B(PE-5A)       | 24. UV(COD)             | 24. 電導度計                | 24. 401B(PE-5A)       | 24. 電導度計                | 24. 401B(PE-5A)         | 24. 電導度計              | 24. 401B(PE-5A)         | 24. 電導度計                |
|      | 25. T-401T(PE-11)                                                                                                                                                                                           | 25. UV(聯聚)           | 25. UV(聯聚)              | 25. T-401T(PE-11)     | 25. B級計量容器校正            | 25. T-401T(PE-11)       | 25. T-401T(PE-11)     | 25. T-401T(PE-11)       | 25. T-401T(PE-11)       | 25. T-401T(PE-11)     | 25. T-401T(PE-11)       | 25. T-401T(PE-11)       |
|      | 26. 301O(PE-9)                                                                                                                                                                                              | 26. 301O(PE-9)       | 26. 電導度計                | 26. 301O(PE-9)        | 26. 301O(PE-9)          | 26. 301O(PE-9)          | 26. 301O(PE-9)        | 26. 301O(PE-9)          | 26. 301O(PE-9)          | 26. 301O(PE-9)        | 26. 301O(PE-9)          | 26. 301O(PE-9)          |
|      | 27. 301W(PE-5A)                                                                                                                                                                                             | 27. 301W(PE-5A)      | 27. 301W(PE-5A)         | 27. 301W(PE-5A)       | 27. 301W(PE-5A)         | 27. 301W(PE-5A)         | 27. 301W(PE-5A)       | 27. 301W(PE-5A)         | 27. 301W(PE-5A)         | 27. 301W(PE-5A)       | 27. 301W(PE-5A)         | 27. 301W(PE-5A)         |
|      | 28. 203T_THC(PE-3A)                                                                                                                                                                                         | 28. 203T_THC(PE-3A)  | 28. 203T_THC(PE-3A)     | 28. 203T_THC(PE-3A)   | 28. 203T_THC(PE-3A)     | 28. 203T_THC(PE-3A)     | 28. 203T_THC(PE-3A)   | 28. 203T_THC(PE-3A)     | 28. 203T_THC(PE-3A)     | 28. 203T_THC(PE-3A)   | 28. 203T_THC(PE-3A)     | 28. 203T_THC(PE-3A)     |
|      | 29. UD-BDO-IS(PE-19)                                                                                                                                                                                        | 29. UD-BDO-IS(PE-19) | 29. 溫度設備校正              | 29. 溫度設備校正            | 29. 溫度設備校正              | 29. 溫度設備校正              | 29. 溫度設備校正            | 29. 溫度設備校正              | 29. 溫度設備校正              | 29. 溫度設備校正            | 29. 溫度設備校正              | 29. 溫度設備校正              |
|      |                                                                                                                                                                                                             |                      | 30. Alkene(PE-3A)       | 30. Alkene(PE-3A)     |                         |                         |                       |                         |                         | 29. Alkene(PE-3A)     |                         |                         |
| 備註說明 | 1. 氣體分析檢量項目包括: (a)DUAL.M(PE-1B、HP-6B), (b)MGAS.M(PE-1A、HP-6A), (c)GAS.M(PE-4B), (d)MET.M(PE-2B、HP-7B), (e)106T.M,203T.M(PE-3A), (f)C3H6.mth(PE-3A), (g)C3H6_S.mth(PE-3B), (h)CO2.mth(PE-4A), (i)O2.M(PE-4B) |                      |                         |                       |                         |                         |                       |                         |                         |                       |                         |                         |
|      | 2. 氣體分析方法: (a)THC.M: 以C2H2.M之甲烷感度作計算, (b)203T_THC: 以203T.M之甲烷感度作計算                                                                                                                                          |                      |                         |                       |                         |                         |                       |                         |                         |                       |                         |                         |
|      | 3. 滴定液包括: (a)容積式Karl-Fischer(換新滴定液需標定), (b)酸鹼液, (c)其他臨時需測試之滴定液於使用前標定                                                                                                                                        |                      |                         |                       |                         |                         |                       |                         |                         |                       |                         |                         |
|      | 4. AA由檢驗人於分析前進行檢量。                                                                                                                                                                                          |                      |                         |                       |                         |                         |                       |                         |                         |                       |                         |                         |
|      | 5. 設備異常時, 待修復後應立即進行相關必須之檢校作業。                                                                                                                                                                               |                      |                         |                       |                         |                         |                       |                         |                         |                       |                         |                         |
|      | 6. 製程有變動時, 檢校方式應配合實況進行調整。                                                                                                                                                                                   |                      |                         |                       |                         |                         |                       |                         |                         |                       |                         |                         |





#方法名稱：scrubber.M

| SAMPDATE<br>取樣日期 | SAMPNO<br>取樣編號 | AVERAGE_A<br>CHN<br>(I)<br>(O)        | AVERAGE_B<br>PAL<br>(I)<br>(O)        | AVERAGE_C<br>DMC<br>(I)<br>(O)        | AVERAGE_D<br>THF<br>(I)<br>(O)        | AVERAGE_E<br>MeOH<br>(I)<br>(O)        | AVERAGE_F<br>IPA<br>(I)<br>(O)        | AVERAGE_G<br>Benzene<br>(I)<br>(O)        | AVERAGE_H<br>NPA<br>(I)<br>(O)        | AVERAGE_I<br>IBA<br>(I)<br>(O)        | AVERAGE_J<br>AAL<br>(I)<br>(O)        | AVERAGE_K<br>NBA<br>(I)<br>(O)        |
|------------------|----------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|----------------------------------------|---------------------------------------|-------------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| 2015/01/31       | C2015010004    | 0.0000148                             | 0.0000489                             | 0.0000117                             | 0.0000296                             | 0.0001119                              | 0.0000404                             | 0.0000151                                 | 0.0000340                             | 0.0000239                             | 0.0000430                             | 0.0000244                             |
| 2015/04/30       | B5E30L2208     | 0.0000254                             | 0.0000636                             | 0.0000247                             | 0.0000320                             | 0.0000565                              | 0.0000388                             | 0.0000229                                 | 0.0000311                             | 0.0000268                             | 0.0000382                             | 0.0000276                             |
| 2015/07/31       | C2015070028    | 0.0000091                             | 0.0000345                             | 0.0000129                             | 0.0000220                             | 0.0000890                              | 0.0000319                             | 0.0000090                                 | 0.0000251                             | 0.0000174                             | 0.0000314                             | 0.0000179                             |
| SAMPDATE<br>取樣日期 | SAMPNO<br>取樣編號 | RSD_A<br>CHN<br>(I) <=5.00 %<br>(O) % | RSD_B<br>PAL<br>(I) <=5.00 %<br>(O) % | RSD_C<br>DMC<br>(I) <=5.00 %<br>(O) % | RSD_D<br>THF<br>(I) <=5.00 %<br>(O) % | RSD_E<br>MeOH<br>(I) <=5.00 %<br>(O) % | RSD_F<br>IPA<br>(I) <=5.00 %<br>(O) % | RSD_G<br>Benzene<br>(I) <=5.00 %<br>(O) % | RSD_H<br>NPA<br>(I) <=5.00 %<br>(O) % | RSD_I<br>IBA<br>(I) <=5.00 %<br>(O) % | RSD_J<br>AAL<br>(I) <=5.00 %<br>(O) % | RSD_K<br>NBA<br>(I) <=5.00 %<br>(O) % |
| 2015/01/31       | C2015010004    | 0.47                                  | 1.61                                  | 0.90                                  | 0.18                                  | 0.01                                   | 0.22                                  | 0.59                                      | 0.34                                  | 0.31                                  | 0.26                                  | 1.28                                  |
| 2015/04/30       | B5E30L2208     | 3.34                                  | 3.00                                  | 2.58                                  | 0.22                                  | 0.63                                   | 0.36                                  | 3.09                                      | 0.68                                  | 0.53                                  | 0.19                                  | 1.02                                  |
| 2015/07/31       | C2015070028    | 1.26                                  | 0.53                                  | 1.02                                  | 2.85                                  | 2.02                                   | 2.00                                  | 1.10                                      | 2.27                                  | 2.23                                  | 2.34                                  | 2.65                                  |
| 取樣日期:            | 2015/07/31     | 保存地點:                                 |                                       | 保存人:                                  |                                       | 備註:                                    |                                       | 簽收人:                                      | 劉士誠                                   | 簽收時間:                                 | 2015/07/21                            | 16:43                                 |
| 取樣時間:            | 16:43          | 保存期限:                                 |                                       | 清除日期:                                 |                                       |                                        |                                       | 分析人:                                      | 劉士誠                                   | 分析時間:                                 | 2015/07/21                            | 16:47                                 |
| 取樣人:             | 劉士誠            | 保存原因:                                 |                                       | 清除人員:                                 |                                       |                                        |                                       | 判定人:                                      | 吳尚臻                                   | 判定時間:                                 | 2015/07/31                            | 17:56                                 |

#方法名稱：scrub-AAL.M

| SAMPDATE<br>取樣日期 | SAMPNO<br>取樣編號 | AVERAGE_A<br>Acrolein<br>(I)<br>(O) | AVERAGE_B<br>AAC<br>(I)<br>(O) | AVERAGE_C<br>AAL<br>(I)<br>(O) | AVERAGE_D<br>ALAC<br>(I)<br>(O) | AVERAGE_E<br>AA<br>(I)<br>(O) | AVERAGE_F<br>IPA<br>(I)<br>(O) |
|------------------|----------------|-------------------------------------|--------------------------------|--------------------------------|---------------------------------|-------------------------------|--------------------------------|
| 2015/03/13       | B5D13P5859     | 0.000041                            | 0.000035                       | 0.000028                       | 0.000029                        | 0.000096                      | 0.000045                       |
| 2015/06/30       | C2015060001    | 0.000013                            | 0.000015                       | 0.000016                       | 0.000013                        | 0.000039                      | 0.000012                       |

| SAMPDATE<br>取樣日期 | SAMPNO<br>取樣編號 | RSD_A<br>Acrolein<br>(I) <=5.00 %<br>(O) % | RSD_B<br>AAC<br>(I) <=5.00 %<br>(O) % | RSD_C<br>AAL<br>(I) <=5.00 %<br>(O) % | RSD_D<br>ALAC<br>(I) <=5.00 %<br>(O) % | RSD_E<br>AA<br>(I) <=5.00 %<br>(O) % | RSD_F<br>IPA<br>(I) <=5.00 %<br>(O) % |
|------------------|----------------|--------------------------------------------|---------------------------------------|---------------------------------------|----------------------------------------|--------------------------------------|---------------------------------------|
| 2015/03/13       | B5D13P5859     | 0.36                                       | 3.56                                  | 3.96                                  | 4.33                                   | 2.78                                 | 0.12                                  |
| 2015/06/30       | C2015060001    | 0.38                                       | 1.15                                  | 3.38                                  | 0.77                                   | 3.22                                 | 3.13                                  |

|       |            |       |  |       |  |     |  |      |     |       |            |       |
|-------|------------|-------|--|-------|--|-----|--|------|-----|-------|------------|-------|
| 取樣日期: | 2015/06/30 | 保存地點: |  | 保存人:  |  | 備註: |  | 簽收人: | 郭永欽 | 簽收時間: | 2015/06/03 | 10:50 |
| 取樣時間: | 10:50      | 保存期限: |  | 清除日期: |  |     |  | 分析人: | 郭永欽 | 分析時間: | 2015/06/12 | 14:03 |
| 取樣人:  | 郭永欽        | 保存原因: |  | 清除人員: |  |     |  | 判定人: | 吳尚臻 | 判定時間: | 2015/07/02 | 08:53 |

#方法名稱：alkene.M

| SAMPDATE<br>取樣日期 | SAMPNO<br>取樣編號 | AVERAGE_A<br>methane<br>(I)<br>(O)    | AVERAGE_B<br>ethane<br>(I)<br>(O)    | AVERAGE_C<br>ethylene<br>(I)<br>(O)    | AVERAGE_D<br>propane<br>(I)<br>(O)    | AVERAGE_E<br>propylene<br>(I)<br>(O)    | AVERAGE_F<br>iso-butane<br>(I)<br>(O)    | AVERAGE_G<br>n-butane<br>(I)<br>(O)     | AVERAGE_H<br>actylene<br>(I)<br>(O)    |
|------------------|----------------|---------------------------------------|--------------------------------------|----------------------------------------|---------------------------------------|-----------------------------------------|------------------------------------------|-----------------------------------------|----------------------------------------|
| 2015/04/20       | B5E20K1338     | 0.0000035                             | 0.0000017                            | 0.0000017                              | 0.0000012                             | 0.0000011                               | 0.00000079                               | 0.00000076                              | 0.0000021                              |
| 2015/07/13       | B5H13P3234     | 0.0000039                             | 0.0000018                            | 0.0000018                              | 0.0000012                             | 0.0000012                               | 0.00000083                               | 0.00000080                              | 0.0000022                              |
| SAMPDATE<br>取樣日期 | SAMPNO<br>取樣編號 | RSD_A<br>methane<br>(I) <=5.00<br>(O) | RSD_B<br>ethane<br>(I) <=5.00<br>(O) | RSD_C<br>ethylene<br>(I) <=5.00<br>(O) | RSD_D<br>propane<br>(I) <=5.00<br>(O) | RSD_E<br>propylene<br>(I) <=5.00<br>(O) | RSD_F<br>iso-butane<br>(I) <=5.00<br>(O) | RSD_G<br>n-methane<br>(I) <=5.00<br>(O) | RSD_H<br>actylene<br>(I) <=5.00<br>(O) |
| 2015/04/20       | B5E20K1338     | 0.47                                  | 0.07                                 | 0.10                                   | 0.43                                  | 0.26                                    | 0.05                                     | 0.19                                    | 0.22                                   |
| 2015/07/13       | B5H13P3234     | 3.33                                  | 0.47                                 | 0.40                                   | 0.49                                  | 0.56                                    | 0.58                                     | 0.57                                    | 0.06                                   |

|       |            |       |     |       |  |     |   |      |     |       |            |       |
|-------|------------|-------|-----|-------|--|-----|---|------|-----|-------|------------|-------|
| 取樣日期: | 2015/07/13 | 保存地點: |     | 保存人:  |  | 備註: | 0 | 簽收人: | 劉士誠 | 簽收時間: | 2015/07/13 | 15:32 |
| 取樣時間: | 15:32      | 保存期限: | / / | 清除日期: |  |     |   | 分析人: | 劉士誠 | 分析時間: | 2015/07/14 | 10:11 |
| 取樣人:  | 劉士誠        | 保存原因: |     | 清除人員: |  |     |   | 判定人: | 吳尚臻 | 判定時間: | 2015/07/15 | 16:35 |



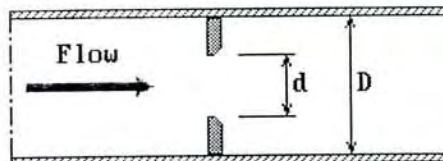
#方法名稱：GAS.M

| SAMPDATE<br>取樣日期 | SAMPNO<br>取樣編號 | AVERAGE_A<br>64.10% H2 area<br><br>(I)<br>(O)        | AVERAGE_B<br>3.51% CH4 area<br><br>(I)<br>(O)        | AVERAGE_C<br>31.90% CO area<br><br>(I)<br>(O)        | AVERAGE_D<br>45.25% H2 area<br><br>(I)<br>(O)        | AVERAGE_E<br>9.50% CH4 area<br><br>(I)<br>(O)        | AVERAGE_F<br>44.80% CO area<br><br>(I)<br>(O)        | AVERAGE_G<br>O2 factor<br><br>(I)<br>(O)        | AVERAGE_H<br>N2 factor<br><br>(I)<br>(O)        |
|------------------|----------------|------------------------------------------------------|------------------------------------------------------|------------------------------------------------------|------------------------------------------------------|------------------------------------------------------|------------------------------------------------------|-------------------------------------------------|-------------------------------------------------|
| 2015/01/31       | C2015010023    | 9768720                                              | 165008                                               | 518067                                               | 7216865                                              | 472280                                               | 723919                                               | 0.000047                                        | 0.000062                                        |
| 2015/02/28       | C2015020016    | 9768300                                              | 164605                                               | 517368                                               | 7215702                                              | 471758                                               | 718417                                               | 0.000047                                        | 0.000062                                        |
| 2015/03/31       | C2015030017    | 9712712                                              | 161847                                               | 514853                                               | 7188524                                              | 469127                                               | 716798                                               | 0.000048                                        | 0.000063                                        |
| 2015/04/30       | B5E30L1352     | 9729092                                              | 162819                                               | 516338                                               | 7197485                                              | 470527                                               | 716604                                               | 0.000047                                        | 0.000063                                        |
| 2015/05/28       | B5F28N0439     | 9699900                                              | 163833                                               | 513321                                               | 7156386                                              | 467187                                               | 715524                                               | 0.000048                                        | 0.000063                                        |
| 2015/06/29       | B5G29N5055     | 9676958                                              | 161828                                               | 510733                                               | 7140818                                              | 464494                                               | 713767                                               | 0.000048                                        | 0.000063                                        |
| 2015/07/30       | B5H30P0231     | 9720396                                              | 163859                                               | 515310                                               | 7196866                                              | 465926                                               | 714162                                               | 0.000048                                        | 0.000063                                        |
| SAMPDATE<br>取樣日期 | SAMPNO<br>取樣編號 | RSD_A<br>64.10% H2 area<br><br>(I) <=5.00 %<br>(O) % | RSD_B<br>3.51% CH4 area<br><br>(I) <=5.00 %<br>(O) % | RSD_C<br>31.90% CO area<br><br>(I) <=5.00 %<br>(O) % | RSD_D<br>45.25% H2 area<br><br>(I) <=5.00 %<br>(O) % | RSD_E<br>9.50% CH4 area<br><br>(I) <=5.00 %<br>(O) % | RSD_F<br>44.80% CO area<br><br>(I) <=5.00 %<br>(O) % | RSD_G<br>O2 factor<br><br>(I) <=5.00 %<br>(O) % | RSD_H<br>N2 factor<br><br>(I) <=5.00 %<br>(O) % |
| 2015/01/31       | C2015010023    | 0.02                                                 | 0.63                                                 | 0.00                                                 | 0.02                                                 | 0.04                                                 | 0.10                                                 | 0.31                                            | 0.29                                            |
| 2015/02/28       | C2015020016    | 0.01                                                 | 0.15                                                 | 0.43                                                 | 0.07                                                 | 0.04                                                 | 0.06                                                 | 0.12                                            | 0.12                                            |
| 2015/03/31       | C2015030017    | 0.06                                                 | 0.22                                                 | 0.16                                                 | 0.02                                                 | 0.14                                                 | 0.04                                                 | 0.16                                            | 0.39                                            |
| 2015/04/30       | B5E30L1352     | 0.07                                                 | 0.34                                                 | 0.23                                                 | 0.10                                                 | 0.10                                                 | 0.21                                                 | 0.04                                            | 0.03                                            |
| 2015/05/28       | B5F28N0439     | 0.02                                                 | 0.26                                                 | 0.23                                                 | 0.04                                                 | 0.28                                                 | 0.16                                                 | 0.07                                            | 0.13                                            |
| 2015/06/29       | B5G29N5055     | 0.02                                                 | 0.03                                                 | 0.27                                                 | 0.18                                                 | 0.36                                                 | 0.16                                                 | 0.21                                            | 0.00                                            |
| 2015/07/30       | B5H30P0231     | 0.20                                                 | 0.35                                                 | 0.55                                                 | 0.02                                                 | 0.23                                                 | 0.09                                                 | 0.04                                            | 0.13                                            |

|       |            |       |     |       |  |     |   |      |     |       |            |       |
|-------|------------|-------|-----|-------|--|-----|---|------|-----|-------|------------|-------|
| 取樣日期: | 2015/07/30 | 保存地點: |     | 保存人:  |  | 備註: | 0 | 簽收人: | 簡錦堂 | 簽收時間: | 2015/07/30 | 15:02 |
| 取樣時間: | 15:02      | 保存期限: | / / | 清除日期: |  |     |   | 分析人: | 吳尚臻 | 分析時間: | 2015/07/31 | 17:56 |
| 取樣人:  | 簡錦堂        | 保存原因: |     | 清除人員: |  |     |   | 判定人: | 吳尚臻 | 判定時間: | 2015/07/31 | 17:56 |

A404備用廢氣流量計(FI2-8401)

| ***** ORIFICE SIZING ***** |              |          |                                    |
|----------------------------|--------------|----------|------------------------------------|
| ITEM                       | VALUE        | UNIT     | ***** CALCULATION *****            |
| Kind of Orifice            | Flange       |          |                                    |
| Tag no.                    | FI2-8401     |          | Max. Reynolds Number 972600        |
| Fluid Name                 | GAS          |          | Nor. Reynolds Number 279600        |
| Pipe Inside Diameter D     | 447.6        | mm       | Diameter Ratio $\beta$ 0.5963      |
| Kind of Fluid              | Gas          |          | Flow Coefficient $\alpha$ 0.6483   |
| Scale Condition            | Oper. Cond.  |          | Expansion Factor $\epsilon$ 0.9965 |
| Unit of Flow               | kg/h         |          | Orifice Diameter $d$ 266.9 mm      |
| Full Scale                 | F 16000      | kg/h     | Upstream Tap Location 25.4 mm      |
| Normal Flow Rate           | N 4600       | kg/h     | Downstream Tap Location 25.4 mm    |
| Normal Temperature         | T 25         | °C       | Max. Pressure loss 938.0 mmH2O     |
| Unit of Pressure           | kg/cm2 G     |          | Flow Range 8.6 ~ 100.0 %           |
| Normal Pressure            | P 0.10       | kg/cm2 G |                                    |
| Deviation Factor           | K 1          |          |                                    |
| Relative Humidity          | $\phi$       | %        |                                    |
| Density                    | $\rho$ 0.514 | kg/m3    |                                    |
| Viscosity                  | $\mu$ 0.013  | cP       |                                    |
| Isentropic Exponent        | k 1.4        |          |                                    |
| Differential Press.        | dP 1500      | mmH2O    |                                    |





# General Specifications

Model EJA110A  
Differential Pressure Transmitter

DP Harp

GS 01C21B01-00E

FI2-8401 廢氣流量

The high performance differential pressure transmitter model EJA110A can be used to measure liquid, gas, or steam flow as well as liquid level, density and pressure. It outputs a 4 to 20 mA DC signal corresponding to the measured differential pressure. Model EJA110A also features remote setup and monitoring through communications with the BRAIN™ terminal and CENTUM CS™ or  $\mu$ XL™ or HART® 275 host.

## STANDARD SPECIFICATIONS

Refer to GS 01C22T02-00E for FOUNDATION Fieldbus communication type and GS 01C22T03-00E for PROFIBUS PA communication type marked with "◇."

## PERFORMANCE SPECIFICATIONS

Zero-based calibrated span, linear output, wetted parts material code 'S' and silicone oil.

### Reference Accuracy of Calibrated Span

(including the effects of zero-based linearity, hysteresis, and repeatability)

$\pm 0.065\%$  of Span

For spans below X

$\pm [0.015 + 0.05 \frac{X}{\text{Span}}]\%$  of Span

where X equals:

| Capsule | X kPa {inH <sub>2</sub> O} |
|---------|----------------------------|
| L       | 3 {12}                     |
| M       | 10 {40}                    |
| H       | 100 {400}                  |
| V       | 1.4 MPa {200 psi}          |

For M type  
Accuracy will be

$\pm [0.015 + 0.05 \times 10 \times 102 / 154]\%$   
 $= 0.343\%$

For L type  
Accuracy is  
 $\pm 0.11\%$

### Square Root Output Accuracy

The square root accuracy is a percent of flow span.

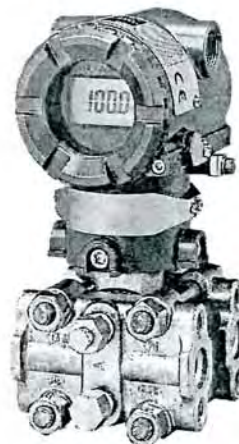
| Output                | Accuracy                                              |
|-----------------------|-------------------------------------------------------|
| 50 % or Greater       | same as reference accuracy                            |
| 50 % to Dropout point | reference accuracy $\times$ 50 square root output (%) |

T00E.EPS

### Ambient Temperature Effects

Total Effects per 28 °C (50 °F) Change

| Capsule | Effect                                            |
|---------|---------------------------------------------------|
| L       | $\pm [0.08\% \text{ Span} + 0.09\% \text{ URL}]$  |
| M       | $\pm [0.07\% \text{ Span} + 0.02\% \text{ URL}]$  |
| H       | $\pm [0.07\% \text{ Span} + 0.015\% \text{ URL}]$ |
| V       | $\pm [0.07\% \text{ Span} + 0.03\% \text{ URL}]$  |



### Static Pressure Effects

#### Total Effects per Change

L capsule

$\pm [0.07\% \text{ Span} + 0.052\% \text{ URL}]$  per 3.4 MPa {500 psi}

M, H and V capsules

$\pm [0.1\% \text{ Span} + 0.028\% \text{ URL}]$  per 6.9 MPa {1000 psi}

#### Effect on Zero (can be corrected at line pressure)

L capsule

$\pm [0.02\% \text{ Span} + 0.052\% \text{ URL}]$  per 3.4 MPa {500 psi}

M, H and V capsules

$\pm 0.028\%$  of URL per 6.9 MPa {1000 psi}

### Overpressure Effects (M, H and V capsules)

$\pm 0.03\%$  of URL per 16 MPa {2300 psi}

### Stability

$\pm 0.1\%$  of URL per 60 months (M, H and V capsules)

$\pm 0.2\%$  of URL per 12 months (L capsule)

### Power Supply Effects "◇"

$\pm 0.005\%$  per Volt (from 21.6 to 32 V DC, 350  $\Omega$ )

## FUNCTIONAL SPECIFICATIONS

### Span & Range Limits

| Measurement Span/Range | kPa                  | inH <sub>2</sub> O/(D1) | mbar/(D3)      | mmH <sub>2</sub> O/(D4)        |
|------------------------|----------------------|-------------------------|----------------|--------------------------------|
| L                      | Span 0.5 to 10       | 2 to 40                 | 5 to 100       | 50 to 1000                     |
|                        | Range -10 to 10      | -40 to 40               | -100 to 100    | -1000 to 1000                  |
| M                      | Span 1 to 100        | 4 to 400                | 10 to 1000     | 100 to 10000                   |
|                        | Range -100 to 100    | -400 to 400             | -1000 to 1000  | -10000 to 10000                |
| H                      | Span 5 to 500        | 20 to 2000              | 50 to 5000     | 0.05 to 5 kgf/cm <sup>2</sup>  |
|                        | Range -500 to 500    | -2000 to 2000           | -5000 to 5000  | -5 to 5 kgf/cm <sup>2</sup>    |
| V*                     | Span 0.14 to 14 MPa  | 20 to 2000 psi          | 1.4 to 140 bar | 1.4 to 140 kgf/cm <sup>2</sup> |
|                        | Range -0.5 to 14 MPa | -71 to 2000 psi         | -5 to 140 bar  | -5 to 140 kgf/cm <sup>2</sup>  |

T01E.EPS

\*1: For Wetted parts material code other than S, the ranges are 0 to 14 MPa, 0 to 2000 psi, 0 to 140 bar, and 0 to 140 kgf/cm<sup>2</sup>.

URL is defined as the Upper Range Limit from the table above.

YOKOGAWA

Yokogawa Electric Corporation  
2-9-32 Nakacho, Musashino-shi, Tokyo, 180-8750 Japan  
Phone: 81-422-52-5690 Fax: 81-422-52-2018

GS 01C21B01-00E  
©Copyright June 1997  
25th Edition Oct. 2008

**Zero Adjustment Limits**

Zero can be fully elevated or suppressed, within the Lower and Upper Range Limits of the capsule.

**External Zero Adjustment "◇"**

External zero is continuously adjustable with 0.01 % incremental resolution of span. Span may be adjusted locally using the digital indicator with range switch.

**Mounting Position Effect**

Rotation in diaphragm plane has no effect. Tilting up to 90 ° will cause zero shift up to 0.4 kPa {1.6 inH<sub>2</sub>O} which can be corrected by the zero adjustment.

**Output "◇"**

Two wire 4 to 20 mA DC output with digital communications, linear or square root programmable. BRAIN or HART FSK protocol are superimposed on the 4 to 20 mA signal.

**Failure Alarm**

Output status at CPU failure and hardware error;  
Up-scale: 110%, 21.6 mA DC or more(standard)  
Down-scale: -5%, 3.2 mA DC or less  
-2.5%, 3.6 mA DC or less (Optional code /F1)

Note: Applicable for Output signal code D and E

**Damping Time Constant (1st order)**

The sum of the amplifier and capsule damping time constant must be used for the overall time constant. Amp damping time constant is adjustable from 0.2 to 64 seconds.

| Capsule (Silicone Oil)      | L   | M   | H and V |
|-----------------------------|-----|-----|---------|
| Time Constant (approx. sec) | 0.4 | 0.3 | 0.3     |

**Ambient Temperature Limits**

(approval codes may affect limits)

-40 to 85 °C (-40 to 185 °F)  
-30 to 80 °C (-22 to 176 °F) with LCD Display

**Process Temperature Limits**

(approval codes may affect limits)

-40 to 120 °C (-40 to 248 °F)

**Ambient Humidity Limits**

5 to 100 % RH @ 40 °C (104 °F)

**Working Pressure Limits (Silicone Oil)****Maximum Pressure Limit**

| Capsule     | Wetted parts material code |                   |
|-------------|----------------------------|-------------------|
|             | H, M, T, A, D, and B       | S                 |
| L           | 3.5 MPa {500 psi}          | 16 MPa {2300 psi} |
| M, H, and V | 16 MPa {2300 psi}          | 16 MPa {2300 psi} |

**Minimum Pressure Limit**

See graph below

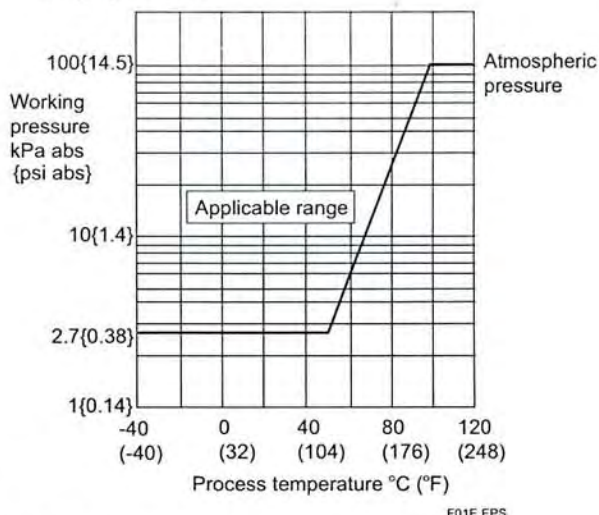


Figure 1. Working Pressure and Process Temperature

**Supply & Load Requirements**

(Safety approvals may affect electrical requirements)

With 24 V DC supply, up to a 570 Ω load can be used. See graph below.

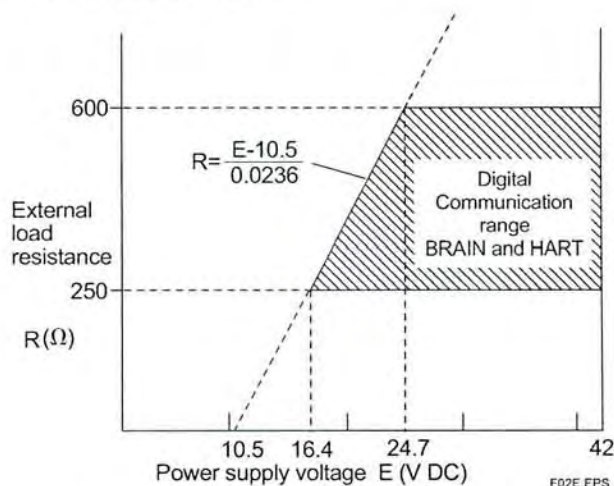


Figure 2. Relationship Between Power Supply Voltage and External Load Resistance

**Supply Voltage "◇"**

10.5 to 42 V DC for general use and flameproof type  
10.5 to 32 V DC for lightning protector (Optional code /A)

10.5 to 30 V DC for intrinsically safe, Type n, nonincendive, or non-sparking type

Minimum voltage limited at 16.4 V DC for digital communications, BRAIN and HART

**Load(Output signal code D and E)**

0 to 1335 Ω for operation

250 to 600 Ω for digital communication



**EMC Conformity Standards "◇" CE , N200**

EN61326-1 Class A, Table2 (For use in industrial locations)

EN61326-2-3

**European Pressure Equipment Directive 97/23/EC**

Sound Engineering Practice

**Communication Requirements "◇"****BRAIN****Communication Distance**

Up to 2 km (1.25 miles) when using CEV polyethylene-insulated PVC-sheathed cables. Communication distance varies depending on type of cable used.

**Load Capacitance**

0.22  $\mu$ F or less (see note)

**Load Inductance**

3.3 mH or less (see note)

**Input Impedance of communicating device**

10 k $\Omega$  or more at 2.4 kHz.

Note : For general-use and Flameproof type.  
For Intrinsically safe type, please refer to  
'OPTIONAL SPECIFICATIONS.'

**□ PHYSICAL SPECIFICATIONS****Wetted Parts Materials****Diaphragm, Cover flange, Process connector, and Vent/Drain Plug**

Refer to 'MODEL AND SUFFIX CODE.'

**Capsule Gasket**

For wetted parts material code S, Teflon-coated SUS316L.

For wetted parts material code other than S, PTFE(Teflon).

**Process Connector Gasket**

PTFE Teflon

Fluorinated rubber for Optional code /N2 and /N3

**Non-wetted Parts Materials****Bolting**

SCM435, SUS630, or SUH660

**Housing**

Low copper cast-aluminum alloy with polyurethane paint (Munsell 0.6GY3.1/2.0)

**Degrees of Protection**

IP67, NEMA4X, JIS C0920 immersion proof

**Cover O-rings**

Buna-N

**Name plate and tag**

SUS304 or SUS316 (option)

**Fill Fluid**

Silicone, Fluorinated oil (option)

**Weight**

3.9 kg (8.6 lb) without integral indicator, mounting bracket, and process connector.

**Connections**

Refer to the model code to specify the process and electrical connection type.

Process Connection of Cover Flange:

DIN 19213 with 7/16 inch  $\times$  20 unf female thread.

**< Settings When Shipped > "◇"**

|                                      |                                                                                                                                                                                                                     |
|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tag Number                           | As specified in order *1                                                                                                                                                                                            |
| Output Mode                          | 'Linear' unless otherwise specified in order                                                                                                                                                                        |
| Display Mode                         | 'Linear' unless otherwise specified in order                                                                                                                                                                        |
| Operation Mode                       | 'Normal' unless otherwise specified in order                                                                                                                                                                        |
| Damping Time Constant *2             | '2 sec.'                                                                                                                                                                                                            |
| Calibration Range Lower Range Value  | As specified in order                                                                                                                                                                                               |
| Calibration Range Higher Range Value | As specified in order                                                                                                                                                                                               |
| Calibration Range Units              | Selected from mmH <sub>2</sub> O, mmAq, mmWG, mmHg, Pa, hPa, kPa, MPa, mbar, bar, gf/cm <sup>2</sup> , kgf/cm <sup>2</sup> , inH <sub>2</sub> O, inHg, ftH <sub>2</sub> O, or psi. (Only one unit can be specified) |

\*1: Up to 16 alphanumeric characters for BRAIN and 8 characters for HART including '-' and '.' will be entered in the amplifier memory. If specified Tag includes other characters than above, it will not be entered in the amplifier memory.

\*2: If using square root output, set damping time constant to 2 sec. or more.

T07E.EPS

**< Related Instruments > "◇"**

Power Distributor: Refer to GS 01B04T01-02E or GS 01B04T02-02E

BRAIN TERMINAL: Refer to GS 01C00A11-00E

**< Reference >**

1. Teflon; Trademark of E.I. DuPont de Nemours & Co.
2. Hastelloy; Trademark of Haynes International Inc.
3. Monel; Trademark of Inco Alloys International, Inc.
4. HART; Trademark of the HART Communication Foundation.
5. FOUNDATION; Trademark of Fieldbus Foundation.
6. PROFIBUS; Registered trademark of Profibus Nutzerorganisation e.v., Karlsruhe, Germany.

**Material Cross Reference Table**

|         |            |
|---------|------------|
| SUS316L | AISI 316L  |
| SUS316  | AISI 316   |
| SUS304  | AISI 304   |
| S25C    | AISI 1025  |
| SCM435  | AISI 4137  |
| SUS630  | ASTM630    |
| SCS14A  | ASTM CF-8M |

T09E.EPS

7. Other company names and product names used in this material are registered trademarks or trademarks of their respective owners.

**< Specification Conformance >**

The model EJA110A maintains a specification conformance to at least 3  $\sigma$ .

## ■ MODEL AND SUFFIX CODES

| Model                                | Suffix Codes              | Description                                                                                              |
|--------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------|
| EJA110A                              | .....                     | Differential pressure transmitter                                                                        |
| Output Signal                        | -D.....                   | 4 to 20 mA DC with digital communication (BRAIN protocol)                                                |
|                                      | -E.....                   | 4 to 20 mA DC with digital communication (HART protocol, refer to GS 01C22T01-00E)                       |
|                                      | -F.....                   | Digital communication (FOUNDATION Fieldbus protocol, refer to GS 01C22T02-00E)                           |
|                                      | -G.....                   | Digital communication (PROFIBUS PA protocol, refer to GS 01C22T03-00E)                                   |
| Measurement span(capsule)            | L.....                    | 0.5 to 10 kPa {50 to 1000 mmH <sub>2</sub> O} {2 to 40 inH <sub>2</sub> O} {5 to 100 mbar}               |
|                                      | M.....                    | 1 to 100 kPa {100 to 10000 mmH <sub>2</sub> O} {4 to 400 inH <sub>2</sub> O} {10 to 1000 mbar}           |
|                                      | H.....                    | 5 to 500 kPa { 0.05 to 5 kgf/cm <sup>2</sup> } {20 to 2000 inH <sub>2</sub> O} {50 to 5000 mbar}         |
|                                      | V.....                    | 0.14 to 14 MPa { 1.4 to 140 kgf/cm <sup>2</sup> } <sup>*1</sup> {20 to 2000 psi} {1.4 to 140 bar}        |
| Wetted parts material <sup>*11</sup> | S#.....                   | [Body] <sup>*2</sup> [Capsule] [Vent plug]                                                               |
|                                      | H#.....                   | SCS14A SUS316L <sup>*5</sup> SUS316                                                                      |
|                                      | M#.....                   | SCS14A Hastelloy C-276 <sup>*6*12</sup> SUS316                                                           |
|                                      | T.....                    | SCS14A Monel <sup>*6</sup> SUS316                                                                        |
|                                      | A#.....                   | Hastelloy C-276 equivalent <sup>*3</sup> Hastelloy C-276 <sup>*6*12</sup> Hastelloy C-276 <sup>*12</sup> |
|                                      | D.....                    | Hastelloy C-276 equivalent <sup>*3</sup> Tantalum <sup>*6</sup> Hastelloy C-276 <sup>*12</sup>           |
|                                      | B#.....                   | Monel equivalent <sup>*4</sup> Monel <sup>*6</sup> Monel                                                 |
| Process connections                  | 0.....                    | without process connector (Rc1/4 female on the cover flanges)                                            |
|                                      | 1.....                    | with Rc1/4 female process connector                                                                      |
|                                      | 2.....                    | with Rc1/2 female process connector                                                                      |
|                                      | 3.....                    | with 1/4 NPT female process connector                                                                    |
|                                      | 4.....                    | with 1/2 NPT female process connector                                                                    |
|                                      | 5.....                    | without process connector (1/4 NPT female on the cover flanges)                                          |
| Bolts and nuts material              | A.....                    | [Maximum working pressure]                                                                               |
|                                      | B.....                    | SCM435 16 MPa {160 kgf/cm <sup>2</sup> } <sup>*9</sup>                                                   |
|                                      | C.....                    | SUS630 16 MPa {160 kgf/cm <sup>2</sup> } <sup>*9</sup>                                                   |
|                                      |                           | SUH660 16 MPa {160 kgf/cm <sup>2</sup> } <sup>*9</sup>                                                   |
| Installation                         | -2.....                   | Vertical impulse piping type, right side high pressure, process connector upside <sup>*7</sup>           |
|                                      | -3.....                   | Vertical impulse piping type, right side high pressure, process connector downside <sup>*7</sup>         |
|                                      | -6.....                   | Vertical impulse piping type, left side high pressure, process connector upside <sup>*7</sup>            |
|                                      | -7.....                   | Vertical impulse piping type, left side high pressure, process connector downside <sup>*7</sup>          |
|                                      | -8.....                   | Horizontal impulse piping type, right side high pressure <sup>*8</sup>                                   |
|                                      | -9.....                   | Horizontal impulse piping type, left side high pressure <sup>*8</sup>                                    |
| Electrical connection                | 0.....                    | G1/2 female, one electrical connection                                                                   |
|                                      | 2.....                    | 1/2 NPT female, two electrical connections without blind plug                                            |
|                                      | 3.....                    | Pg 13.5 female, two electrical connections without blind plug                                            |
|                                      | 4.....                    | M20 female, two electrical connections without blind plug                                                |
|                                      | 5.....                    | G1/2 female, two electrical connections and a blind plug                                                 |
|                                      | 7.....                    | 1/2 NPT female, two electrical connections and a blind plug                                              |
|                                      | 8.....                    | Pg 13.5 female, two electrical connections and a blind plug                                              |
|                                      | 9.....                    | M20 female, two electrical connections and a blind plug                                                  |
|                                      | A.....                    | G1/2 female, two electrical connections and a SUS316 blind plug                                          |
|                                      | C.....                    | 1/2 NPT female, two electrical connections and a SUS316 blind plug                                       |
|                                      | D.....                    | M20 female, two electrical connections and a SUS316 blind plug                                           |
| Integral indicator                   | D.....                    | Digital indicator                                                                                        |
|                                      | E.....                    | Digital indicator with the range setting switch <sup>*10</sup>                                           |
|                                      | N.....                    | (None)                                                                                                   |
| Mounting bracket                     | A.....                    | SECC Carbon steel 2-inch pipe mounting (flat type)                                                       |
|                                      | B.....                    | SUS304 2-inch pipe mounting (flat type)                                                                  |
|                                      | J.....                    | SUS316 2-inch pipe mounting (flat type)                                                                  |
|                                      | C.....                    | SECC Carbon steel 2-inch pipe mounting (L type)                                                          |
|                                      | D.....                    | SUS304 2-inch pipe mounting (L type)                                                                     |
|                                      | K.....                    | SUS316 2-inch pipe mounting (L type)                                                                     |
|                                      | N.....                    | (None)                                                                                                   |
| Optional codes                       | /□ Optional specification |                                                                                                          |

T04E.EPS

The '☆' marks indicate the most typical selection for each specification. Example: EJA110A-DMS5A-92NA/□

The '#' marks indicate the construction materials conform to NACE material recommendations per MR01-75. For the use of SUS316 material, there may be certain limitations for pressure and temperature. Please refer to NACE standards for details.



母火溫度 Sensor

NEW-FLOW sheath type thermocouple is high precision and reliability measuring temperature sensor.

### Technical Data

Head housing: Weather proof. Explosion proof available K, E, J, T type available.

Dial size:  $\varnothing 1.0 \sim \varnothing 8.0$  mm on request

Sheath material: SS316, SS310, Inconel 600 on request

Working temperature limited:  $-200 \sim 1050^{\circ}\text{C}$

according to applicable standards table.

Measuring junction type: Grounded type, Ungrounded type, Ungrounded separated type



II 2 GD  
Ex d IIB+H<sub>2</sub> Gb T6  
Ex tb IIIC Db T85°C



Ex d IIB+H<sub>2</sub> T6

SIL CERTIFICATE



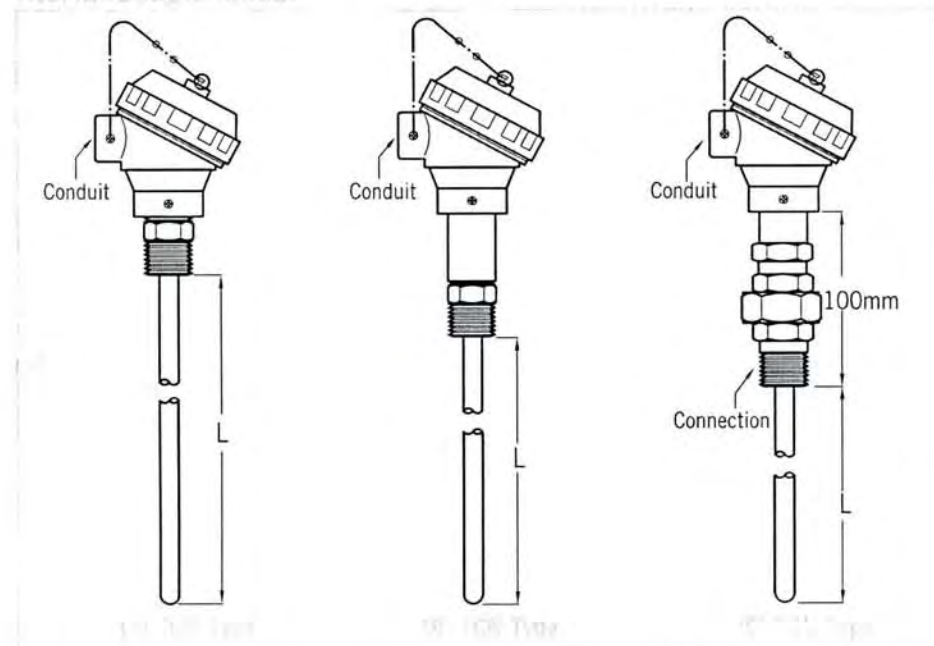
Explosion proof

IP65

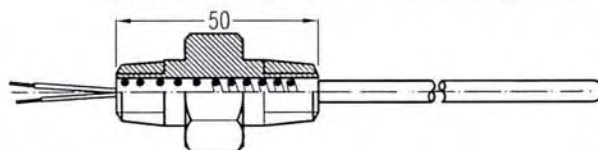
### Element Material

| Symbol | Positive Polarity (+)                | Negative Polarity (-)      |
|--------|--------------------------------------|----------------------------|
| N      | Alloy: nickel, chromium and silicone | Alloy: nickel and silicone |
| K      | Alloy: nickel and chromium           | Alloy: nickel              |
| E      | Alloy: nickel and chromium           | Alloy: copper and nickel   |
| J      | Iron                                 | Alloy: copper and nickel   |
| T      | Copper                               | Alloy: copper and nickel   |

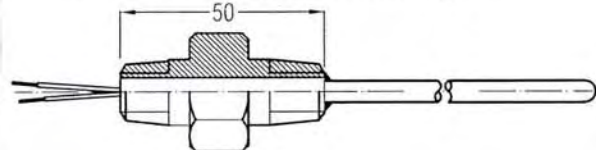
### Thermocouple Model



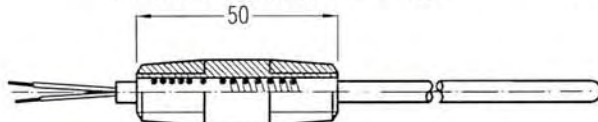
(A) Spring Loading Hexagonal Head Thread Type



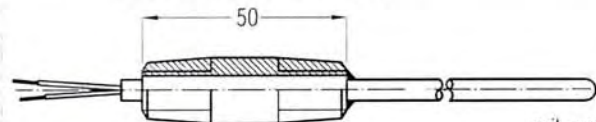
(C) Welded Hexagonal Head Thread Type



(B) Spring Loading Nipple Thread Type



(D) Welded Nipple Thread Type



unit=mm



# General Specifications

Model EJA115  
Low Flow Transmitter

瓦斯流量計 DP Harp

FIZ-840Z

GS 01C22K01-00E

[Style: S3]

The model EJA115 Low Flow Transmitter is a flowmeter comprised of a differential pressure transmitter with an integral orifice and excellent for very low flow measurement. It outputs a 4 to 20 mA DC signal corresponding to the measured flow.

The orifice is available in six types with a bore ranging from 0.508 mm to 6.350 mm. The combination of the bore selection with the differential pressure measurement span variation of the differential pressure transmitter enables a wide range of very small flow measurement.

The model EJA115 also features remote setup and monitoring through communications with the model BT200/100 BRAIN TERMINAL, CENTUM CS/XL system etc.

## STANDARD SPECIFICATIONS

Refer to GS 01C22T02-00E for FOUNDATION Fieldbus communication type and GS 01C22T03-00E for PROFIBUS PA communication type marked with "◇".

### Measurement Ranges:

| Capsule | Differential Pressure Span                          | Water Equivalent Flow l/min | Air Equivalent Flow Nl/min |
|---------|-----------------------------------------------------|-----------------------------|----------------------------|
| L       | 1 to 10 kPa<br>{100 to 1000 mmH <sub>2</sub> O}     | 0.016 to 7.2                | 0.44 to 198                |
| M       | 2 to 100 kPa<br>{200 to 10000 mmH <sub>2</sub> O}   | 0.022 to 23.0               | 0.63 to 635                |
| H       | 20 to 210 kPa<br>{2000 to 21000 mmH <sub>2</sub> O} | 0.07 to 33.0                | 2.0 to 910                 |

T01E.EPS

### Output Signal "◇":

4 to 20 mA DC, 2-wire system with digital communication

### Failure Alarm:

Output status at CPU failure and hardware error;

Up-scale: 110%, 21.6 mA DC or more (standard)

Down-scale: -5%, 3.2 mA DC or less

-2.5%, 3.6 mA DC or less (Optional code /F1)

Note: Applicable for Output signal code D and E

### Supply Voltage "◇":

10.5 to 42 V DC for general use and flameproof type

10.5 to 32 V DC for lightning protector (Optional code /A)

10.5 to 30 V DC for intrinsically safe, Type n, nonincendive, or non-sparking type

10.5 to 28 V DC for TIIS intrinsically safe type

### Conditions of Communication Line "◇":

Power supply voltage; 16.4 to 42 V DC

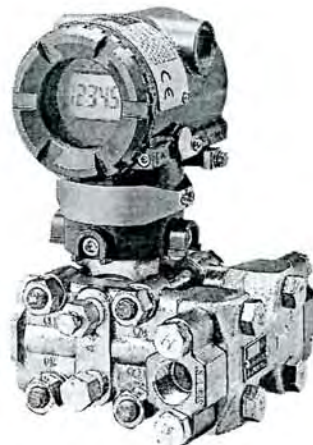
Load resistance; See Figure 1.

Note: In case of an intrinsically safe transmitter, external load resistance includes safety barrier resistance.

Communication distance;

2 km, when CEV polyethylene-insulated PVC-sheathed control cables are used.

Note: Communication distance varies depends on kind of cable.



Load capacitance; 0.22 μF or less.

Load inductance; 3.3 mH or less.

Spacing from power line; 15 cm or more.

Input impedance of receiver connected receiving resistance;  
10 kΩ or more at 2.4 kHz

(See Optional Specifications for Intrinsically safe type)

### Accuracy:

±5 % of span

### Ambient Temperature Limits:

-40 to 85 °C (-40 to 185 °F) (general-use type)

-30 to 80 °C (-22 to 176 °F) (with integral indicator)

(See 'Optional Specifications' for Explosion-protected types)

### Process Temperature Limits:

-40 to 120 °C (-40 to 248 °F) (general use type)

(See 'Optional Specifications' for Explosion-protected types)

### Ambient Humidity Limits:

5 to 100 % R.H.(at 40 °C)

### Working Pressure Limits:

2.7 kPa abs {20 mmHg abs} to maximum working pressure

(See 'Model and Suffix Codes').

For atmospheric pressure or below, see Figure 2.

### Power Supply Effect "◇":

±0.005 %/V (21.6 to 32 V DC, 350 Ω)

### Mounting:

2-inch pipe mounting.

### Mounting Position Effect:

390 Pa {40 mmH<sub>2</sub>O}/90 °.

No effect for displacement parallel to diaphragm.

These errors can be corrected by the zero adjustment.

### Degrees of Protection:

IP67, NEMA4X, JIS C0920 immersion proof

### Explosion-protected Construction:

See 'Optional Specification.'

YOKOGAWA

Yokogawa Electric Corporation  
2-9-32 Nakacho, Musashino-shi, Tokyo, 180-8750 Japan  
Phone: 81-422-52-5690 Fax: 81-422-52-2018

GS 01C22K01-00E  
©Copyright Aug. 1994  
29th Edition Jul. 2009

**Electrical Connection:**

See 'Model and Suffix Codes.'

**Process Connections:**

See 'Model and Suffix Codes.'

**Wetted Parts Material:**

Diaphragm, cover flange, process connector, vent plug, manifold and orifice;

See 'Model and Suffix Codes.'

Capsule gaskets; Teflon-coated JIS SUS316L.

Process connector gasket; PTFE (Teflon)

**Flange Bolts and Nuts Material:**

See 'Model and Suffix Codes.'

**Amplifier Housing:**

Cast aluminum alloy or JIS SCS14A stainless steel (optional)

**Painting:**

Polyurethane resin backed finish

Deep sea moss green (Munsell 0.6GY3.1/2.0)

**Integral Indicator:**

LCD digital indicator (optional)

**Damping Time Constant:**

(Sum of time constants for amplifier assembly and capsule assembly)

Amplifier assembly time constant;

Can be set in 9 increments from 0.2 to 64 sec.

Capsule assembly time constant;

| Capsule             | L           | M           | H           |
|---------------------|-------------|-------------|-------------|
| Time Constant (sec) | Approx. 0.4 | Approx. 0.3 | Approx. 0.3 |

T02E.EPS

**External Zero Adjustment "◇":**

Continuously Adjustable Resolution; 0.01 % of span

**Zero Adjustment Limits:**

Zero can be fully elevated or suppressed as long as low and high range values are within the measurement range limits of the capsule.

**Tag Plate:**

JIS SUS304 or SUS316

**Weight:**

5.6 kg (12.4 lb) without integral indicator and mounting bracket.

Add 1.4 kg (3.1 lb) for JIS SCS14A stainless steel amplifier housing.

**EMC Conformity Standards "◇":**   **N200**

EN61326-1 Class A, Table2 (For use in industrial locations)

EN61326-2-3

**European Pressure Equipment Directive 97/23/EC:**

Sound Engineering Practice

## &lt; Settings When Shipped &gt; "◇"

|                          |                                              |
|--------------------------|----------------------------------------------|
| Tag Number               | As specified in order *1                     |
| Output Mode              | 'Linear' unless otherwise specified in order |
| Display Mode             | 'Square root'                                |
| Operation Mode           | 'Normal' unless otherwise specified in order |
| Damping Time Constant *2 | '2 sec.'                                     |

|                                      |                                                                                                                                                                                                                     |
|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Calibration Range Lower Range Value  | As specified in order                                                                                                                                                                                               |
| Calibration Range Higher Range Value | As specified in order                                                                                                                                                                                               |
| Calibration Range Units              | Selected from mmH <sub>2</sub> O, mmAq, mmWG, mmHg, Pa, hPa, kPa, MPa, mbar, bar, gf/cm <sup>2</sup> , kgf/cm <sup>2</sup> , inH <sub>2</sub> O, inHg, ftH <sub>2</sub> O, or psi. (Only one unit can be specified) |

T05E.EPS

\*1: Up to 16 alphanumeric characters (including - and ·) will be entered in the amplifier memory.

\*2: If using square root output, set damping time constant to 2 sec. or more.

## &lt;Measurement Range (Approximate Value)&gt;

|                                           | Orifice Bore (mm) | L Capsule      | M Capsule      | H Capsule     |
|-------------------------------------------|-------------------|----------------|----------------|---------------|
| Water Equivalent Maximum Flow Range l/min | 0.508             | 0.016 to 0.049 | 0.022 to 0.157 | 0.07 to 0.225 |
|                                           | 0.864             | 0.046 to 0.145 | 0.066 to 0.46  | 0.21 to 0.67  |
|                                           | 1.511             | 0.134 to 0.42  | 0.19 to 1.35   | 0.60 to 1.93  |
|                                           | 2.527             | 0.36 to 1.15   | 0.52 to 3.6    | 1.65 to 5.2   |
|                                           | 4.039             | 0.92 to 2.9    | 1.3 to 9.2     | 4.1 to 13.0   |
|                                           | 6.350             | 2.3 to 7.2     | 3.3 to 23      | 10 to 33      |
| Air Equivalent Maximum Flow Range Nl/min  | 0.508             | 0.44 to 1.40   | 0.63 to 4.4    | 1.98 to 6.4   |
|                                           | 0.864             | 1.30 to 4.10   | 1.85 to 12.9   | 5.8 to 18.5   |
|                                           | 1.511             | 3.7 to 11.7    | 5.3 to 37      | 16.7 to 54    |
|                                           | 2.527             | 10.3 to 32     | 14.6 to 105    | 47 to 150     |
|                                           | 4.039             | 25 to 79       | 36 to 255      | 113 to 370    |
|                                           | 6.350             | 63 to 198      | 89 to 630      | 280 to 910    |

T06E.EPS



## SERIES 454FTB

## SINGLE-POINT INSERTION THERMAL MASS FLOW TRANSMITTERS

## DESCRIPTION

The Series 454FTB represents the Kurz family of state-of-the-art microprocessor based, industrial quality, Single-Point Insertion Mass Flow Transmitters for industrial gases. It has many improvements and features that greatly enhance the performance, including, the new FD2-HT Sensor rated at 260°C, electronic self-check functions, a flow control valve PID controller, a Patented digital thermal anemometer bridge, a more convenient remote electronic mounting configuration, a one-piece PCB for improved reliability and ease-of-use, built-in sensor cleaning purge timer, external inputs/outputs, and many other Kurz engineering and functional features. The 454FTB includes the most advanced temperature compensation, microprocessor technology and the highest repeatability, accuracy, and reliability available. The 454FTB has CE Compliance and a Canadian Registration Number for most applications. The 454FTB meets CSA (USA and Canada), IECEx and ATEX Non-Incendive and Explosion-Proof/Flame-Proof Safety Standards and are IP66/NEMA 4X/7 Rated. Kurz is an ISO 9001 Quality Manufacturer.

## KEY FEATURES

- Constant temperature sensor control circuit.
- Sensors and Electronics (single PCB) are interchangeable. No matched sets.
- 3 Year Warranty. All components pass an extensive accelerated stress test for high reliability.
- Velocity dependent correction factors for Flow Rate.
- Zero velocity is a valid data point.
- Fastest response to temperature and velocity changes in the industry.
- Velocity/Temperature/Mapping (VTM) for wide ranging velocity and temperature.
- Process Temperature Rating of -40°C to +260°C (HT) or -40°C to +500°C (HHT).
- Electronics operating temperature range of -40°C to +65°C, non-condensing.
- Process Pressure Rating up to 300 PSIG.
- Velocity range of 0-24,000 SFPM (112 NMPS).
- Easy-to-use menus for display and configuration including basic setup "Wizard".
- User configurable scrolling or static displays of flow process variables.
- Configuration upload/download software using a PC with USB connection, RS-485 or TCP/IP Modbus.
- Adjustable LCD/Keypad orientation allows viewing of the display for horizontal or vertical installations.
- User selected English or Metric units (SFPM, SCFM, SCFH, PPM, PPH, °F; SMPs, NMPS, NLPM, NCMH, SLPM, SCMH, KGM, KGH, °C).
- USB port for terminal operation.
- Modbus ASCII or RTU communications.
- HART 7 communication option.
- Alloy C-276 all-welded sensor construction.
- Integral or Remote Electronics Enclosure.
- IP66/NEMA 4X/7 dual chamber epoxy painted electronics enclosure.
- Input power options of 85 to 265 VAC 47/63 Hz or 24 VDC.
- Two optically isolated loop-powered 4-20 mA outputs which are user configurable. Typically, one is configured for mass flow rate or mass velocity and the other for process temperature or for PID application (Flow transmitters with the HART communication option have only one 4-20mA output).
- Two optically isolated solid-state alarm/relays (optional).
- Two digital inputs dedicated to Purge and Zero-MidSpan-Span Drift Check (optional).
- One 4-20mA input (optional).
- PID Flow Controller.
- Built-in Zero-MidSpan-Span CEMS electronics drift check circuits.

- Meets EPA Mandatory GHG Certification Requirement in CFR98.34(c)(1).
- 4-20 mA outputs meet NAMUR NE43 recommendations.
- User programmable Access Codes.
- User may change STP reference condition without affecting factory calibration data.
- Automatic Sensor Blockage Correction Factor (SBCF).
- Pulsed output for use as a remote flow totalizer (optional).
- Sensor lead length independent circuitry.
- User-selectable digital filtering.
- Programmable alarm functions.
- Built-in flow totalizers and elapsed time.
- Insensitive to orientation.
- Optional Air Purge Sensor Cleaning System.
- Built-in purge timer and "hold value" feature during purge for use with Model 146 Sensor Cleaning System.
- CE Compliance including EMC, ATEX, LVD, PED, WEEE and ROHS EU Directives.
- Non-Incendive and Explosion-Proof/Flame-Proof Safety Approvals (CSA/ATEX/IECEx).

## APPLICATIONS

- Industrial and process gas mass flows
- Combustion air flow measurements
- EPA Flow Monitors
- Flare stack metering
- Aeration air flow and digester off-gas flow
- Landfill vapor recovery
- Incinerator stack mass flow
- Solvent recovery system mass flow
- VOC mass flow
- Cement plants
- Coal-fired boiler combustion air
- Compressed air
- Natural gas, and most industrial gases
- Semi-conductor processing gas metering
- Nuclear power plants
- Air sampling in D.O.E. facilities
- O.E.M. applications

## OUR MISSION

To manufacture and market the best thermal mass flow meters available and to support our customers in their efforts to improve their business.

# SERIES 454FTB SINGLE-POINT INSERTION THERMAL MASS FLOW TRANSMITTERS

| FIRST DIGIT OF FEATURE 2: SENSOR MATERIAL |                                                                    |
|-------------------------------------------|--------------------------------------------------------------------|
| Option                                    | Description                                                        |
| 3                                         | Alloy C-276                                                        |
| 7                                         | Alloy C-276 with Abrasion-Resistant Chromium Nitride Coating (CrN) |

| SECOND DIGIT OF FEATURE 2: SENSOR SUPPORT AND FLANGE MATERIAL (Note 1) |                                                                                                                                                                 |
|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Option                                                                 | Description                                                                                                                                                     |
| 2                                                                      | 316L Stainless Steel                                                                                                                                            |
| 3                                                                      | Alloy C-276                                                                                                                                                     |
| 8                                                                      | Alloy C-276 with PTFE Teflon Coating cured for chemical resistance. Includes support, sensor and flange; FD2-HHT sensors only, temperature rating of 260°C Max. |

**Note 1:** Sensor Support Material and Optional Flange Material must be the same, see Feature 5.

| FEATURE 3: SENSOR SUPPORT LENGTH L |                  |        |                  |
|------------------------------------|------------------|--------|------------------|
| Option                             | Support Length L | Option | Support Length L |
| B                                  | 6" (125°C Max)   | J      | 30"              |
| C                                  | 9" (260°C Max)   | K      | 36"              |
| D                                  | 12"              | M      | 48"              |
| F                                  | 18"              | P      | 60"              |
| H                                  | 24"              |        |                  |

| FEATURE 4: PROCESS TEMPERATURE COMPENSATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>The influence of temperature on the thermal properties of gases requires temperature compensation of the Thermal Mass Flow Sensor for repeatability and accurate measurements. Standard Temperature Compensation (STC) is used for applications in which the process temperature is below 125°C over a moderate velocity range (Option 1); or below 260°C over more limited velocity range (Option 2).</p> <p>If the process temperature and gas velocity vary widely, Velocity/Temperature/Mapping (VTM) is recommended. VTM (Options 3, 4) includes several calibrations. The multiple velocity calibrations are entered into the Microprocessor which performs a double interpolation between the velocity calibration curves using the built-in process gas temperature measurement. The temperature compensation is based upon air; therefore, the accuracy at a high temperature when using gases other than Air, Nitrogen or Oxygen may be reduced unless a gas correlation is specified (see feature 8).</p> |                                                                                                                                                                                                 |
| Option                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Description                                                                                                                                                                                     |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Standard Temperature Compensation (STC) over process Temperature range of -40°C to +125°C. Accuracy: $\pm$ (1% Reading + 20 SFPM) above or below 25°C (see note 1).                             |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Standard Temperature Compensation (STC) over process Temperature range of 0°C to 260°C. Accuracy: $\pm$ (2% Reading + 20 SFPM) above or below 125°C (see note 1).                               |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Velocity/Temperature/Mapping (VTM) with data sets over process temperature range of 0°C up to 260°C. Accuracy: $\pm$ (2% reading + 20 SFPM).                                                    |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Velocity/Temperature/Mapping (VTM) with data sets over the process temperature range of 0°C up to 500°C. Accuracy: $\pm$ (3% reading + 30 SFPM), Specify Process Temperature Range. HHT Models. |

**Note 1:** An accuracy specification of  $\pm$  (0.025%/°C Reading + 0.25 SFPM/°C) should added for temperatures above or below standard.

| FEATURE 5: OPTIONAL FLANGE CONNECTION SIZE AND RATING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                      |                                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|------------------------------------------|
| <p><b>How to Determine the U, L and L2 Dimensions for a Flange Connection</b></p> <p>When ordering a flange, you must specify the U dimension, and verify that the sensor support length L and L2 are appropriate for the Process Temperature. Kurz recommends that the centerline of the sensor be located at the center of the pipe or duct, and that experimental flow profile tests be made to obtain the velocity profile correction factor (VCF) and enter it into the 454FTB. Refer to the outline drawings in the Series 454FTB Brochure. <b>Note:</b> Flange material must match Sensor Support Material (Feature 2).</p> <p>U = The dimension between the centerline of the mass flow sensor and the flange mounting surface. The minimum U dimension is 4.0".</p> <p>L = The length of the sensor support tube (Feature 3).</p> <p>L2 = The length of sensor support between the flange mounting surface and the sensor support fitting. The minimum L2 is 5 inches for HT process temperatures and 8 inches for HHT process temperatures.</p> <p>L = U + L2 - 2.00"</p> |                                      |                                          |
| Option                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Sensor Support Diameter              | Description                              |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | $\frac{1}{2}$ ", $\frac{3}{4}$ ", 1" | No flange connection                     |
| B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | $\frac{1}{2}$ "                      | $\frac{1}{2}$ ", Class 150, ANSI B16.5   |
| C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | $\frac{1}{2}$ "                      | $\frac{1}{2}$ ", Class 300, ANSI B16.5   |
| D                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | $\frac{1}{2}$ ", $\frac{3}{4}$ "     | $\frac{3}{4}$ ", Class 150, ANSI B16.5   |
| E                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | $\frac{1}{2}$ ", $\frac{3}{4}$ "     | $\frac{3}{4}$ ", Class 300, ANSI B16.5   |
| F                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | $\frac{1}{2}$ ", $\frac{3}{4}$ ", 1" | 1", Class 150, ANSI B16.5                |
| G                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | $\frac{3}{4}$ ", 1"                  | 1", Class 300, ANSI B16.5                |
| H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | $\frac{3}{4}$ ", 1"                  | 1 $\frac{1}{4}$ ", Class 150, ANSI B16.5 |
| I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | $\frac{3}{4}$ ", 1"                  | 1 $\frac{1}{4}$ ", Class 300, ANSI B16.5 |
| J                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | $\frac{3}{4}$ ", 1"                  | 1 $\frac{1}{2}$ ", Class 150, ANSI B16.5 |
| K                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | $\frac{3}{4}$ ", 1"                  | 1 $\frac{1}{2}$ ", Class 300, ANSI B16.5 |
| L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | $\frac{3}{4}$ ", 1"                  | 2", Class 150, ANSI B16.5                |
| M                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | $\frac{3}{4}$ ", 1"                  | 2", Class 300, ANSI B16.5                |
| N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1"                                   | 2 $\frac{1}{2}$ ", Class 150, ANSI B16.5 |
| P                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1"                                   | 2 $\frac{1}{2}$ ", Class 300, ANSI B16.5 |
| S                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1"                                   | 3", Class 150, ANSI B16.5                |
| T                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1"                                   | 3", Class 300, ANSI B16.5                |
| U                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1"                                   | 4", Class 150, ANSI B16.5                |
| V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1"                                   | 4", Class 300, ANSI B16.5                |

**Note:** Flange material must match the Sensor Support Material (Feature 2).

| FEATURE 6: OPTIONAL FLANGE U DIMENSION                                                                                                                                                                                                                                                                                            |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Directions                                                                                                                                                                                                                                                                                                                        |  |
| <p>Divide the U Dimension (inches) by 100, round off the resulting number to the right of the decimal point to three significant digits, enter the resulting three digit number without the decimal point. Enter 000 for no flange connection. <math>U_{MIN} = 4"</math></p> <p>Example: The U Dimension is 7.74"; Enter 077.</p> |  |

| FEATURE 7: GAS VELOCITY CALIBRATION DATA RANGE SFPM (NMPS) (Note 1) |              |        |              |
|---------------------------------------------------------------------|--------------|--------|--------------|
| Option                                                              | Velocity     | Option | Velocity     |
| A                                                                   | $V_{MAX}$    | M      | 6,000 (28.0) |
| B                                                                   | 300 (1.4)    | P      | 9,000 (41.9) |
| C                                                                   | 600 (2.8)    | R      | 12,000 (56)  |
| E                                                                   | 1,000 (4.7)  | T      | 15,000 (70)  |
| G                                                                   | 2,000 (9.3)  | V      | 18,000 (84)  |
| I                                                                   | 3,000 (14)   | X      | 24,000 (112) |
| K                                                                   | 4,000 (18.6) |        |              |

**Note 1:** The Gas Velocity ( $V_g$ ) must be equal to or less than  $V_{MAX}$  for the Process Absolute Temperature and Pressure and for the specific Gas Category and Gas Type as determined using Tables 2 & 3 and Equations 1, 2.



| SERIES 454FTB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | SINGLE-POINT INSERTION THERMAL MASS FLOW TRANSMITTERS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | KEY FEATURES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <p>The Series 454FTB represents the Kurz family of state-of-the-art microprocessor based, industrial quality, Single-Point Insertion Mass Flow Transmitters for industrial gases. It has many improvements and features that greatly enhance the performance, including, the new FD2-HT Sensor rated at 260°C, electronic self-check functions, a flow control valve PID controller, a Patented digital thermal anemometer bridge, a more convenient remote electronic mounting configuration, a one-piece PCB for improved reliability and ease-of-use, built-in sensor cleaning purge timer, external inputs/outputs, and many other Kurz engineering and functional features. The 454FTB includes the most advanced temperature compensation, microprocessor technology and the highest repeatability, accuracy, and reliability available. The 454FTB has CE Compliance and a Canadian Registration Number for most applications. The 454FTB meets CSA (USA and Canada), IECEx and ATEX Non-Incendive and Explosion-Proof/Flame-Proof Safety Standards and are IP66/NEMA 4X/7 Rated. Kurz is an ISO 9001 Quality Manufacturer.</p> | <p><b>進廢氣流量計</b></p> <ul style="list-style-type: none"> <li>■ Constant temperature sensor control circuit.</li> <li>■ Sensors and Electronics (single PCB) are interchangeable. No matched sets.</li> <li>■ 3 Year Warranty. All components pass an extensive accelerated stress test for high reliability.</li> <li>■ Velocity dependent correction factors for Flow Rate.</li> <li>■ Zero velocity is a valid data point.</li> <li>■ Fastest response to temperature and velocity changes in the industry.</li> <li>■ Velocity/Temperature/Mapping (VTM) for wide ranging velocity and temperature.</li> <li>■ Process Temperature Rating of -40°C to +260°C (HT) or -40°C to +500°C (HHT).</li> <li>■ Electronics operating temperature range of -40°C to +65°C, non-condensing.</li> <li>■ Process Pressure Rating up to 300 PSIG.</li> <li>■ Velocity range of 0-24,000 SFPM (112 NMPS).</li> <li>■ Easy-to-use menus for display and configuration including basic setup "Wizard".</li> <li>■ User configurable scrolling or static displays of flow process variables.</li> <li>■ Configuration upload/download software using a PC with USB connection, RS-485 or TCP/IP Modbus.</li> <li>■ Adjustable LCD/Keypad orientation allows viewing of the display for horizontal or vertical installations.</li> <li>■ User selected English or Metric units (SFPM, SCFM, SCFH, PPM, PPH, °F; SMPS, NMPS, NLPM, NCMH, SLPM, SCMh, KGM, KGH, °C).</li> <li>■ USB port for terminal operation.</li> <li>■ Modbus ASCII or RTU communications.</li> <li>■ HART 7 communication option.</li> <li>■ Alloy C-276 all-welded sensor construction.</li> <li>■ Integral or Remote Electronics Enclosure.</li> <li>■ IP66/NEMA 4X/7 dual chamber epoxy painted electronics enclosure.</li> <li>■ Input power options of 85 to 265 VAC 47/63 Hz or 24 VDC.</li> <li>■ Two optically isolated loop-powered 4-20 mA outputs which are user configurable. Typically, one is configured for mass flow rate or mass velocity and the other for process temperature or for PID application (Flow transmitters with the HART communication option have only one 4-20mA output).</li> <li>■ Two optically isolated solid-state alarm/relays (optional).</li> <li>■ Two digital inputs dedicated to Purge and Zero-MidSpan-Span Drift Check (optional).</li> <li>■ One 4-20mA input (optional).</li> <li>■ PID Flow Controller.</li> <li>■ Built-in Zero-MidSpan-Span CEMS electronics drift check circuits.</li> </ul> | <ul style="list-style-type: none"> <li>■ Meets EPA Mandatory GHG Certification Requirement in CFR98.34(c)(1).</li> <li>■ 4-20 mA outputs meet NAMUR NE43 recommendations.</li> <li>■ User programmable Access Codes.</li> <li>■ User may change STP reference condition without affecting factory calibration data.</li> <li>■ Automatic Sensor Blockage Correction Factor (SBCF).</li> <li>■ Pulsed output for use as a remote flow totalizer (optional).</li> <li>■ Sensor lead length independent circuitry.</li> <li>■ User-selectable digital filtering.</li> <li>■ Programmable alarm functions.</li> <li>■ Built-in flow totalizers and elapsed time.</li> <li>■ Insensitive to orientation.</li> <li>■ Optional Air Purge Sensor Cleaning System.</li> <li>■ Built-in purge timer and "hold value" feature during purge for use with Model 146 Sensor Cleaning System.</li> <li>■ CE Compliance including EMC, ATEX, LVD, PED, WEEE and ROHS EU Directives.</li> <li>■ Non-Incendive and Explosion-Proof/Flame-Proof Safety Approvals (CSA/ATEX/IECEX).</li> </ul> <p><b>APPLICATIONS</b></p> <ul style="list-style-type: none"> <li>■ Industrial and process gas mass flows</li> <li>■ Combustion air flow measurements</li> <li>■ EPA Flow Monitors</li> <li>■ Flare stack metering</li> <li>■ Aeration air flow and digester off-gas flow</li> <li>■ Landfill vapor recovery</li> <li>■ Incinerator stack mass flow</li> <li>■ Solvent recovery system mass flow</li> <li>■ VOC mass flow</li> <li>■ Cement plants</li> <li>■ Coal-fired boiler combustion air</li> <li>■ Compressed air</li> <li>■ Natural gas, and most industrial gases</li> <li>■ Semi-conductor processing gas metering</li> <li>■ Nuclear power plants</li> <li>■ Air sampling in D.O.E. facilities</li> <li>■ O.E.M. applications</li> </ul> <p><b>OUR MISSION</b></p> <p>To manufacture and market the best thermal mass flow meters available and to support our customers in their efforts to improve their business.</p> |



# SERIES 454FTB SINGLE-POINT INSERTION THERMAL MASS FLOW TRANSMITTERS

| FIRST DIGIT OF FEATURE 2: SENSOR MATERIAL |                                                                    |
|-------------------------------------------|--------------------------------------------------------------------|
| Option                                    | Description                                                        |
| 3                                         | Alloy C-276                                                        |
| 7                                         | Alloy C-276 with Abrasion-Resistant Chromium Nitride Coating (CrN) |

| SECOND DIGIT OF FEATURE 2: SENSOR SUPPORT AND FLANGE MATERIAL (Note 1) |                                                                                                                                                                 |
|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Option                                                                 | Description                                                                                                                                                     |
| 2                                                                      | 316L Stainless Steel                                                                                                                                            |
| 3                                                                      | Alloy C-276                                                                                                                                                     |
| 8                                                                      | Alloy C-276 with PTFE Teflon Coating cured for chemical resistance. Includes support, sensor and flange; FD2-HHT sensors only; temperature rating of 260°C Max. |

Note 1: Sensor Support Material and Optional Flange Material must be the same, see Feature 5.

| FEATURE 3: SENSOR SUPPORT LENGTH L |                  |        |                  |
|------------------------------------|------------------|--------|------------------|
| Option                             | Support Length L | Option | Support Length L |
| B                                  | 6" (125°C Max)   | J      | 30"              |
| C                                  | 9" (260°C Max)   | K      | 36"              |
| D                                  | 12"              | M      | 48"              |
| F                                  | 18"              | P      | 60"              |
| H                                  | 24"              |        |                  |

| FEATURE 4: PROCESS TEMPERATURE COMPENSATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>The influence of temperature on the thermal properties of gases requires temperature compensation of the Thermal Mass Flow Sensor for repeatability and accurate measurements. Standard Temperature Compensation (STC) is used for applications in which the process temperature is below 125°C over a moderate velocity range (Option 1); or below 260°C over more limited velocity range (Option 2).</p> <p>If the process temperature and gas velocity vary widely, Velocity/Temperature/Mapping (VTM) is recommended. VTM (Options 3, 4) includes several calibrations. The multiple velocity calibrations are entered into the Microprocessor which performs a double interpolation between the velocity calibration curves using the built-in process gas temperature measurement. The temperature compensation is based upon air; therefore, the accuracy at a high temperature when using gases other than Air, Nitrogen or Oxygen may be reduced unless a gas correlation is specified (see feature 8).</p> |                                                                                                                                                                                                 |
| Option                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Description                                                                                                                                                                                     |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Standard Temperature Compensation (STC) over process Temperature range of -40°C to +125°C. Accuracy: $\pm$ (1% Reading + 20 SFPM) above or below 25°C (see note 1).                             |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Standard Temperature Compensation (STC) over process Temperature range of 0°C to 260°C. Accuracy: $\pm$ (2% Reading + 20 SFPM) above or below 125°C (see note 1).                               |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Velocity/Temperature/Mapping (VTM) with data sets over process temperature range of 0°C up to 260°C. Accuracy: $\pm$ (2% reading + 20 SFPM).                                                    |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Velocity/Temperature/Mapping (VTM) with data sets over the process temperature range of 0°C up to 500°C. Accuracy: $\pm$ (3% reading + 30 SFPM). Specify Process Temperature Range. HHT Models. |

| Option | Description                                                                                                                                                                                     |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | Standard Temperature Compensation (STC) over process Temperature range of -40°C to +125°C. Accuracy: $\pm$ (1% Reading + 20 SFPM) above or below 25°C (see note 1).                             |
| 2      | Standard Temperature Compensation (STC) over process Temperature range of 0°C to 260°C. Accuracy: $\pm$ (2% Reading + 20 SFPM) above or below 125°C (see note 1).                               |
| 3      | Velocity/Temperature/Mapping (VTM) with data sets over process temperature range of 0°C up to 260°C. Accuracy: $\pm$ (2% reading + 20 SFPM).                                                    |
| 4      | Velocity/Temperature/Mapping (VTM) with data sets over the process temperature range of 0°C up to 500°C. Accuracy: $\pm$ (3% reading + 30 SFPM). Specify Process Temperature Range. HHT Models. |

Note 1: An accuracy specification of  $\pm$  (0.025%/°C Reading + 0.25 SFPM/°C) should be added for temperatures above or below standard.

| FEATURE 5: OPTIONAL FLANGE CONNECTION SIZE AND RATING |  |
|-------------------------------------------------------|--|
|-------------------------------------------------------|--|

## How to Determine the U, L and L2 Dimensions for a Flange Connection

When ordering a flange, you must specify the U dimension, and verify that the sensor support length L and L2 are appropriate for the Process Temperature. Kurz recommends that the centerline of the sensor be located at the center of the pipe or duct, and that experimental flow profile tests be made to obtain the velocity profile correction factor (VCF) and enter it into the 454FTB. Refer to the outline drawings in the Series 454FTB Brochure. **Note:** Flange material must match Sensor Support Material (Feature 2).

U = The dimension between the centerline of the mass flow sensor and the flange mounting surface. The minimum U dimension is 4.0".

L = The length of the sensor support tube (Feature 3).

L2 = The length of sensor support between the flange mounting surface and the sensor support fitting. The minimum L2 is 5 inches for HT process temperatures and 8 inches for HHT process temperatures.

L = U + L2 - 2.00"

| Option | Sensor Support Diameter | Description                   |
|--------|-------------------------|-------------------------------|
| A      | 1/8", 3/4", 1"          | No flange connection          |
| B      | 1/8"                    | 1/2", Class 150, ANSI B16.5   |
| C      | 1/8"                    | 1/2", Class 300, ANSI B16.5   |
| D      | 1/8", 3/4"              | 3/4", Class 150, ANSI B16.5   |
| E      | 1/8", 3/4"              | 3/4", Class 300, ANSI B16.5   |
| F      | 1/8", 3/4", 1"          | 1", Class 150, ANSI B16.5     |
| G      | 3/8", 1"                | 1", Class 300, ANSI B16.5     |
| H      | 1/4", 1"                | 1 1/4", Class 150, ANSI B16.5 |
| I      | 3/4", 1"                | 1 1/4", Class 300, ANSI B16.5 |
| J      | 3/4", 1"                | 1 1/2", Class 150, ANSI B16.5 |
| K      | 3/4", 1"                | 1 1/2", Class 300, ANSI B16.5 |
| L      | 3/4", 1"                | 2", Class 150, ANSI B16.5     |
| M      | 3/4", 1"                | 2", Class 300, ANSI B16.5     |
| N      | 1"                      | 2 1/2", Class 150, ANSI B16.5 |
| P      | 1"                      | 2 1/2", Class 300, ANSI B16.5 |
| S      | 1"                      | 3", Class 150, ANSI B16.5     |
| T      | 1"                      | 3", Class 300, ANSI B16.5     |
| U      | 1"                      | 4", Class 150, ANSI B16.5     |
| V      | 1"                      | 4", Class 300, ANSI B16.5     |

Note: Flange material must match the Sensor Support Material (Feature 2).

| FEATURE 6: OPTIONAL FLANGE U DIMENSION                                                                                                                                                                                                                                                                                            |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Directions                                                                                                                                                                                                                                                                                                                        |  |
| <p>Divide the U Dimension (inches) by 100, round off the resulting number to the right of the decimal point to three significant digits, enter the resulting three digit number without the decimal point. Enter 000 for no flange connection. <math>U_{min} = 4"</math></p> <p>Example: The U Dimension is 7.74"; Enter 077.</p> |  |

| FEATURE 7: GAS VELOCITY CALIBRATION DATA RANGE SFPM (NMPS) (Note 1) |              |        |              |
|---------------------------------------------------------------------|--------------|--------|--------------|
| Option                                                              | Velocity     | Option | Velocity     |
| A                                                                   | $V_{max}$    | M      | 6,000 (28.0) |
| B                                                                   | 300 (1.4)    | P      | 9,000 (41.9) |
| C                                                                   | 600 (2.8)    | R      | 12,000 (56)  |
| E                                                                   | 1,000 (4.7)  | T      | 15,000 (70)  |
| G                                                                   | 2,000 (9.3)  | V      | 18,000 (84)  |
| I                                                                   | 3,000 (14)   | X      | 24,000 (112) |
| K                                                                   | 4,000 (18.6) |        |              |

Note 1: The Gas Velocity ( $V_g$ ) must be equal to or less than  $V_{max}$  for the Process Absolute Temperature and Pressure and for the specific Gas Category and Gas Type as determined using Tables 2 & 3 and Equations 1, 2.

Under no circumstances is Endress+Hauser liable for errors, neither in the Software and in its documentation, nor for any errors and consequential damage which may arise out of their use. The results in Applicator apply to parameters entered by the user. A change in these parameters could lead to different results. Mandatory data are in the according technical information (TI).

**Endress+Hauser**   
People for Process Automation

## Applicator Sizing - Flow

## 母火燃料(天然氣)流量計

Project : DCC

Customer:

Contact person: --

Phone: --

eMail: --

C.Project No.: 0

Fax: --

TAG :

Timestamp: 2012-08-31 01:25:25 PM CST

Review number: 1

Sales order number:

## Tri-Size Sheet

### General Parameters

|                   |                                          |                      |                         |
|-------------------|------------------------------------------|----------------------|-------------------------|
| Fluid             | Natural Gas 93%CH <sub>4</sub> ... (Gas) | Ref. Temperature     | 0 °C                    |
| State             | Gas                                      | Ref. Pressure        | 1.013 bar <sub>a</sub>  |
| Character         | Clean                                    | Atmospheric Pressure | 1.0132 bar <sub>a</sub> |
| Abrasivity        | Not abrasive                             | Standard             | ANSI/ASME               |
| Fluid Group (PED) | Dangerous Fluid (Fluid group 1)          |                      |                         |

### Sizing and Calculated Results

|                                         | Next Smaller Size         | Current Size              | Next Bigger Size          |                    |
|-----------------------------------------|---------------------------|---------------------------|---------------------------|--------------------|
| Flow meter                              | Promass 80F               | Promass 80F               | Promass 80F               |                    |
| Flow Principle                          | Coriolis (Promass)        | Coriolis (Promass)        | Coriolis (Promass)        |                    |
| Meter Size                              | 3/8"                      | 1/2"                      | 1"                        |                    |
| Process connection*                     | CI 150 ANSI / 316L/1.4404 | CI 150 ANSI / 316L/1.4404 | CI 150 ANSI / 316L/1.4404 |                    |
| Minimum Flow                            | 0                         | 0                         | 0                         | Nm <sup>3</sup> /h |
| Maximum Flow                            | 152.145                   | 370.853                   | 912.869                   | Nm <sup>3</sup> /h |
| Pressure loss at req. Flow min.         | 0.012                     | 0.001                     | 4.085E-4                  | MPa                |
| Pressure loss at req. Flow nom.         | 0.012                     | 0.001                     | 4.085E-4                  | MPa                |
| Pressure loss at req. Flow max.         | 0.012                     | 0.001                     | 4.085E-4                  | MPa                |
| Velocity (meas. tube) at req. Flow min. | 54.14                     | 22.5                      | 10.76                     | m/s                |
| Velocity (meas. tube) at req. Flow nom. | 54.14                     | 22.5                      | 10.76                     | m/s                |
| Velocity (meas. tube) at req. Flow max. | 54.14                     | 22.5                      | 10.76                     | m/s                |
| Meas. error Mass at req. Flow min.***   | 0.35                      | 0.65                      | 1.75                      | %                  |
| Meas. error Mass at req. Flow nom.***   | 0.35                      | 0.65                      | 1.75                      | %                  |
| Meas. error Mass at req. Flow max.***   | 0.35                      | 0.65                      | 1.75                      | %                  |
| Reynolds No.                            | 90,817                    | 58,539                    | 40,489                    |                    |

\*The user is responsible for the selection of process-wetted materials in view of their corrosion resistance. Endress+Hauser makes no guarantees and assumes no liability for the corrosion resistance of the materials selected here for the application described above.

\*\*\*For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.



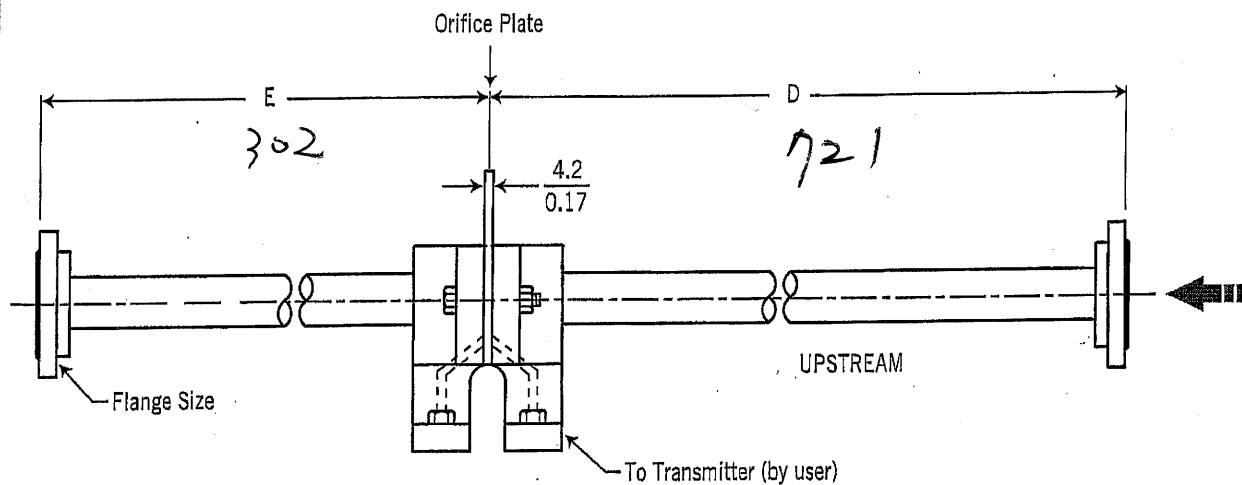
| digitalYEWFLO Sizing Sheet                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                               |                       |            |            |             |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|-----------------------|------------|------------|-------------|------------------------------------------------------------------------------------------------------------|-----------------------|------------|-------------|---------------------------------------------------------------------------------------------------------------|---------------------|-----------|------------|------------------------------------------------------------------------------------------------------------|------------|-------------|------------|------------------------------------------------------------------------------------------------------------|------|---------|-------------|------------------------------------------------------------------------------------------------------------|--------------|---------|---|----|----|-----------|------------------------------|---------|----------------|---------|---------|---------|----------------------------------|--------|--------|--------|--------|---------|----------------------------------|-------|-------|-------|-------|-------|----------------------------------------|---------|--------|--------|--------|--------|---------------------------------------|-------|-------|-------|-------|-------|---------------------------------------------|-------|-------|-------|-------|-------|----------------------------------------------------|-----|-----|-----|-----|-----|
| Shop Order No.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                               |                       |            | Item No.   |             |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| Order No.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                               |                       |            | Tag No.    |             |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| Job Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 蒸汽流量計                                                                                                         |                       |            |            |             |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| Agency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                               |                       |            |            |             |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| End User                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                               |                       |            | Rgst. No.  |             |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| Plant Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                               |                       |            | Quantity   |             |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| Model&Suf.Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                               |                       |            | 1          |             |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| <div style="display: flex; justify-content: space-between;"> <div>           Reduced bore type<br/>           Detector Inner dia. :E10<br/>           Kind of Fluid :C20,F10<br/>           Maximum Flow Rate :C45,B10,F40<br/>           Minimum Flow Rate<br/>           Operating Temperature :C31,D21<br/>           Maximum Temperature<br/>           Operating Pressure<br/>           Minimum Operating Pressure<br/>           Density at Oper. Condition :C26,D26,F27<br/>           Viscosity<br/>           Total Rate :B45<br/>           Pulse Rate :B21<br/>           Low Cut Value :D10         </div> <div style="text-align: right;">           not select<br/>           200mm 8in<br/> <u>Saturated Steam</u><br/>           32.05 t/h<br/>           5.000 t/h<br/>           184.1 degC<br/>           190.0 degC<br/>           1.0000 MPa gauge<br/>           0.8000 MPa gauge<br/>           5.644 kg/m<sup>3</sup><br/>           0.015 mPa.s(cP)<br/>           1.0000 t/pulse<br/>           1.0000 t/pulse<br/>           1.6491 t/h         </div> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                               |                       |            |            |             |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| <div style="display: flex; justify-content: space-between;"> <div> <b>Detector Size Selection</b><br/> <table style="width: 100%;"> <tr> <td>150mm 6in</td> <td><div style="width: 80%; height: 10px; background: linear-gradient(to right, black 80%, white 80%);"></div></td> <td>26.7</td> <td>66.1 kPa</td> </tr> <tr> <td>→ 200mm 8in</td> <td><div style="width: 100%; height: 10px; background: linear-gradient(to right, black 100%, white 100%);"></div></td> <td>26.7</td> <td>20.7 kPa</td> </tr> <tr> <td>250mm 10in</td> <td><div style="width: 90%; height: 10px; background: linear-gradient(to right, black 90%, white 90%);"></div></td> <td>24.3</td> <td>8.6 kPa</td> </tr> <tr> <td>300mm 12in</td> <td><div style="width: 80%; height: 10px; background: linear-gradient(to right, black 80%, white 80%);"></div></td> <td>24.3</td> <td>4.2 kPa</td> </tr> <tr> <td>400 Tokuchu</td> <td><div style="width: 30%; height: 10px; background: linear-gradient(to right, black 30%, white 30%);"></div></td> <td>17.0</td> <td>1.6 kPa</td> </tr> </table> </div> <div> <table style="width: 100%;"> <tr> <td>0</td><td>20</td><td>40</td><td>60</td><td>80</td><td>100%</td> </tr> </table> </div> <div> <table style="width: 100%;"> <tr> <td>Max.=32.05 t/h</td> </tr> </table> </div> </div> <div style="margin-top: 10px;"> <div style="display: flex; justify-content: space-between;"> <div> <div style="width: 20px; height: 10px; background-color: gray; border: 1px solid black;"></div> Measurable Zone<br/> <div style="width: 20px; height: 10px; background-color: black; border: 1px solid black;"></div> Accuracy Zone (*)<br/> <div style="width: 20px; height: 10px; border: 1px solid black; border-style: dashed;"></div> Min. Flow Rate<br/> <div style="width: 20px; height: 10px; border: 1px solid black; border-style: dashed;"></div> Accuracy dividing point(35m/s)         </div> <div> <div style="width: 20px; height: 10px; background-color: lightgray; border: 1px solid black;"></div> High Velocity Zone (out of accuracy)         </div> </div> <p>(* Refer to GS01F06A00-01E)</p> </div> |                                                                                                               |                       |            |            | 150mm 6in   | <div style="width: 80%; height: 10px; background: linear-gradient(to right, black 80%, white 80%);"></div> | 26.7                  | 66.1 kPa   | → 200mm 8in | <div style="width: 100%; height: 10px; background: linear-gradient(to right, black 100%, white 100%);"></div> | 26.7                | 20.7 kPa  | 250mm 10in | <div style="width: 90%; height: 10px; background: linear-gradient(to right, black 90%, white 90%);"></div> | 24.3       | 8.6 kPa     | 300mm 12in | <div style="width: 80%; height: 10px; background: linear-gradient(to right, black 80%, white 80%);"></div> | 24.3 | 4.2 kPa | 400 Tokuchu | <div style="width: 30%; height: 10px; background: linear-gradient(to right, black 30%, white 30%);"></div> | 17.0         | 1.6 kPa | 0 | 20 | 40 | 60        | 80                           | 100%    | Max.=32.05 t/h |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| 150mm 6in                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <div style="width: 80%; height: 10px; background: linear-gradient(to right, black 80%, white 80%);"></div>    | 26.7                  | 66.1 kPa   |            |             |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| → 200mm 8in                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <div style="width: 100%; height: 10px; background: linear-gradient(to right, black 100%, white 100%);"></div> | 26.7                  | 20.7 kPa   |            |             |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| 250mm 10in                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <div style="width: 90%; height: 10px; background: linear-gradient(to right, black 90%, white 90%);"></div>    | 24.3                  | 8.6 kPa    |            |             |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| 300mm 12in                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <div style="width: 80%; height: 10px; background: linear-gradient(to right, black 80%, white 80%);"></div>    | 24.3                  | 4.2 kPa    |            |             |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| 400 Tokuchu                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <div style="width: 30%; height: 10px; background: linear-gradient(to right, black 30%, white 30%);"></div>    | 17.0                  | 1.6 kPa    |            |             |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 20                                                                                                            | 40                    | 60         | 80         | 100%        |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| Max.=32.05 t/h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                               |                       |            |            |             |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>150mm 6in</th> <th style="border: 1px solid black;">Selected<br/>200mm 8in</th> <th>250mm 10in</th> <th>300mm 12in</th> <th>400 Tokuchu</th> </tr> </thead> <tbody> <tr> <td>Detector Inner dia.</td> <td>150mm 6in</td> <td style="border: 1px solid black;">200mm 8in</td> <td>250mm 10in</td> <td>300mm 12in</td> <td>400 Tokuchu</td> </tr> <tr> <td>Result</td> <td>Caution</td> <td style="border: 1px solid black;">Good</td> <td>Good</td> <td>Good</td> <td>No Good</td> </tr> <tr> <td>Reason of NG</td> <td>Caution</td> <td style="border: 1px solid black;"></td> <td></td> <td></td> <td>Over Size</td> </tr> <tr> <td>Reynolds Number at Max. Flow</td> <td>5444805</td> <td style="border: 1px solid black;">4071870</td> <td>3274432</td> <td>2736202</td> <td>2133650</td> </tr> <tr> <td>Measurable Maximum Flowrate(t/h)</td> <td>24.595</td> <td style="border: 1px solid black;">43.977</td> <td>68.005</td> <td>97.391</td> <td>160.165</td> </tr> <tr> <td>Measurable Minimum Flowrate(t/h)</td> <td>0.922</td> <td style="border: 1px solid black;">1.649</td> <td>2.801</td> <td>4.012</td> <td>9.422</td> </tr> <tr> <td>Flow Velocity at Maximum Flowrate(m/s)</td> <td>104.248</td> <td style="border: 1px solid black;">58.303</td> <td>37.703</td> <td>26.327</td> <td>16.008</td> </tr> <tr> <td>Measurable Minimum Flow Velocity(m/s)</td> <td>3.000</td> <td style="border: 1px solid black;">3.000</td> <td>3.296</td> <td>3.296</td> <td>4.706</td> </tr> <tr> <td>Min. Flow for Specified Accuracy(1.0%)(t/h)</td> <td>0.922</td> <td style="border: 1px solid black;">1.649</td> <td>2.801</td> <td>4.012</td> <td>9.422</td> </tr> <tr> <td>Predicted Error at Low Reynolds Number(of reading)</td> <td>---</td> <td style="border: 1px solid black;">---</td> <td>---</td> <td>---</td> <td>---</td> </tr> </tbody> </table>                                                                                                                                                                                          |                                                                                                               |                       |            |            |             | 150mm 6in                                                                                                  | Selected<br>200mm 8in | 250mm 10in | 300mm 12in  | 400 Tokuchu                                                                                                   | Detector Inner dia. | 150mm 6in | 200mm 8in  | 250mm 10in                                                                                                 | 300mm 12in | 400 Tokuchu | Result     | Caution                                                                                                    | Good | Good    | Good        | No Good                                                                                                    | Reason of NG | Caution |   |    |    | Over Size | Reynolds Number at Max. Flow | 5444805 | 4071870        | 3274432 | 2736202 | 2133650 | Measurable Maximum Flowrate(t/h) | 24.595 | 43.977 | 68.005 | 97.391 | 160.165 | Measurable Minimum Flowrate(t/h) | 0.922 | 1.649 | 2.801 | 4.012 | 9.422 | Flow Velocity at Maximum Flowrate(m/s) | 104.248 | 58.303 | 37.703 | 26.327 | 16.008 | Measurable Minimum Flow Velocity(m/s) | 3.000 | 3.000 | 3.296 | 3.296 | 4.706 | Min. Flow for Specified Accuracy(1.0%)(t/h) | 0.922 | 1.649 | 2.801 | 4.012 | 9.422 | Predicted Error at Low Reynolds Number(of reading) | --- | --- | --- | --- | --- |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 150mm 6in                                                                                                     | Selected<br>200mm 8in | 250mm 10in | 300mm 12in | 400 Tokuchu |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| Detector Inner dia.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 150mm 6in                                                                                                     | 200mm 8in             | 250mm 10in | 300mm 12in | 400 Tokuchu |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| Result                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Caution                                                                                                       | Good                  | Good       | Good       | No Good     |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| Reason of NG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Caution                                                                                                       |                       |            |            | Over Size   |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| Reynolds Number at Max. Flow                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 5444805                                                                                                       | 4071870               | 3274432    | 2736202    | 2133650     |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| Measurable Maximum Flowrate(t/h)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 24.595                                                                                                        | 43.977                | 68.005     | 97.391     | 160.165     |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| Measurable Minimum Flowrate(t/h)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0.922                                                                                                         | 1.649                 | 2.801      | 4.012      | 9.422       |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| Flow Velocity at Maximum Flowrate(m/s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 104.248                                                                                                       | 58.303                | 37.703     | 26.327     | 16.008      |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| Measurable Minimum Flow Velocity(m/s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 3.000                                                                                                         | 3.000                 | 3.296      | 3.296      | 4.706       |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| Min. Flow for Specified Accuracy(1.0%)(t/h)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0.922                                                                                                         | 1.649                 | 2.801      | 4.012      | 9.422       |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| Predicted Error at Low Reynolds Number(of reading)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ---                                                                                                           | ---                   | ---        | ---        | ---         |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| CHECKED.BY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                               |                       |            |            |             |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |
| RE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | n                                                                                                             | REMARKS               | DATE       | REV.BY     |             |                                                                                                            |                       |            |             |                                                                                                               |                     |           |            |                                                                                                            |            |             |            |                                                                                                            |      |         |             |                                                                                                            |              |         |   |    |    |           |                              |         |                |         |         |         |                                  |        |        |        |        |         |                                  |       |       |       |       |       |                                        |         |        |        |        |        |                                       |       |       |       |       |       |                                             |       |       |       |       |       |                                                    |     |     |     |     |     |

YOKOGAWA ◆

Software Ver. Eng. 5.00

WS 1F6A0-01E

## PROVAL DRAWING

**Specification****Integral Orifice Assembly**

Model: IOA Series

Wetted Parts Material: SS316

Gasket Material: Teflon

**3-Way Manifold**

Model: 3VM-SS-8-R

Connection Size: 1/2" NPT(F)

Material: SS316

unit=mm

| Tag No.  | Differential (max.)     | Size      | Bore  | Flow Rate  |
|----------|-------------------------|-----------|-------|------------|
| FI6-8321 | 1000 mmH <sub>2</sub> O | 3" X 150# | 19.53 | 0-218 kg/h |

**Dimensions**

| Assembly Line Size | Pipe Schedule | Straight Length Of Piping |      |     |      |                |      |       |      |
|--------------------|---------------|---------------------------|------|-----|------|----------------|------|-------|------|
|                    |               | With Flange               |      |     |      | Without Flange |      |       |      |
|                    |               | D                         |      | E   |      | D              |      | E     |      |
|                    |               | mm                        | in   | mm  | in   | mm             | in   | mm    | in   |
| 3/8"               | 40S 80S       | 254                       | 10.0 | 115 | 4.5  | 242            | 9.5  | 112   | 4.4  |
| 1/2"               | 40S 80S       | 318                       | 12.5 | 145 | 5.7  | 315            | 12.4 | 142   | 5.6  |
| 1"                 | 40S 80S       | 513                       | 20.2 | 221 | 8.7  | 510            | 20.1 | 218   | 8.6  |
| 1 1/2"             | 40S 80S       | 721                       | 28.4 | 302 | 11.9 | 716            | 28.2 | 297.2 | 11.7 |



NEW-FLOW TECHNOLOGIES, INC.

DWG. TITLE

INTEGRAL ORIFICE ASSEMBLY

Project No.: 大連公司 大發廠

REQ/P.O. No.:

SPEC. No.:

DWG. NO.

DATE: 2014/06/05 REV.

PAGE: 1/3

Golden Mountain Enterprise Co., Ltd.

升陽企業股份有限公司 高雄市前鎮區新街路 296 巷 3 號

No. 3 Lane 296, Hsin-Ya Road, Chien Chen Dist, Kaohsiung 806, Taiwan ROC Tel: 886-7-8135500/Fax: 886-7-8225588

ORIFICE?Program Flow Element Calculation

Page 1 of 1

Tag.....: FE6-8321

Date.....: 3/9/2015 10:58

Service.: N2

EFD(P&ID):

Spec No.:

Equip No.:

Line No.:

Shop Ord.:

Customer:

Calc. By.: NF/O

Project#:

Pgm. Vers: 1.16g

Revision:

FluidType: Gas

CalcType: Beta Ratio (Bore)

Equ. Ref: ISO 5167-1:1991

OK

---

Fluid.....  
 Element....., Type Conc Orifice, Flange Tap  
 , Material 316 SS  
 , Beta Ratio @ 68.00 Deg F 0.4775 d/D  
 , Bore @ 68.00 Deg F 19.5258 d, Millimeters  
 , Drain size (ISA RP3.2) 0.0000 Dh, Millimeters  
 , Drain correction factor 1.0000 Fdh  
 Pipe....., Schedule 40S and Size ☒ 1.5000 Inches  
 , Material 304 SS  
 , Inside Dia @ 68.00 Deg F 40.8940 D, Millimeters  
 Base....., Pressure at Std Cond 14.6959 Pb, Pounds/Sq In Absolute  
 , Temperature at Std Cond 60.0000 Tb, Deg Fahrenheit  
 Local....., Atmospheric Pressure 14.6959 Pg, Pounds/Sq In Absolute  
 Pressure..., Flowing at Upstream 4.0000 Pf, Kilograms/Sq Cm Gauge  
 , Maximum Differential 1,000.0000 Hm, Mm Water Col  
 , Normal Differential 637.0676 Hn, Mm Water Col  
 , Permanent Loss @Max Flow 749.4389 Lm, Mm Water Col  
 , Permanent Loss @Norm Flow 477.4432 Ln, Mm Water Col  
 , Drop For Critical Flow 2.6922 Hc, Kilograms/Sq Cm  
 Temperature, Flowing 30.0000 Tf, Deg Celsius  
 Flow....., Maximum, Mass Conditions 218.0000 Qm, Mass Kilograms/Hour  
 , Normal, Mass Conditions 174.0000 Qn, Mass Kilograms/Hour  
 , Ratio (Norm/Max Flow) 79.8165 %, Percent  
 , Reynolds Nmbr @Max Flow 104,727.0356 RDm  
 , Reynolds Nmbr @Norm Flow 83,589.4688 RDn  
 Fluid Prop., Molecular Weight 28.0000 MW  
 , Viscosity @ Flowing 0.0180 Centipoise  
 , Ratio of Specific Heats 1.4000 Cp/Cv  
 , Compress Calc Method Entered  
 , Compressibility @ Base 1.0000 Zb  
 , Compressibility @ Flowing 1.0000 Zf  
 , Calculated Base Density 1.1821 Rhob, Kg/Cu Mtr  
 , Calculated Flow Density 5.4840 Rhof, Kg/Cu Mtr  
 Factors...., Calculated at Maximum Flow  
 , Discharge Coefficient 0.6044 C  
 , Sizing Coefficient 0.1407 Sc  
 , Gas Expansion Factor 0.9939 Y1  
 , Comb Thermal Expan Factor 1.0003 Fa

---

ORIFICE?is a registered trademark of FlowSoft Inc., St. Charles, MO 63303  
 All rights reserved, 1979 - 1997

---

Notes: None



ORIFICE?Program Flow Element Calculation

Page 1 of 1

Tag.....: FE6-8321

Date.....: 3/9/2015 10:38

Service.: N2

Spec No.:

EFD(P&ID):

Line No.:

Equip No.:

Customer:

Project#:

Shop Ord.:

Revision:

Calc. By.: NF/O

CalcType: Beta Ratio (Bore)

Pgm. Vers: 1.16g

Equ. Ref: ISO 5167-1:1991

FluidType: Gas

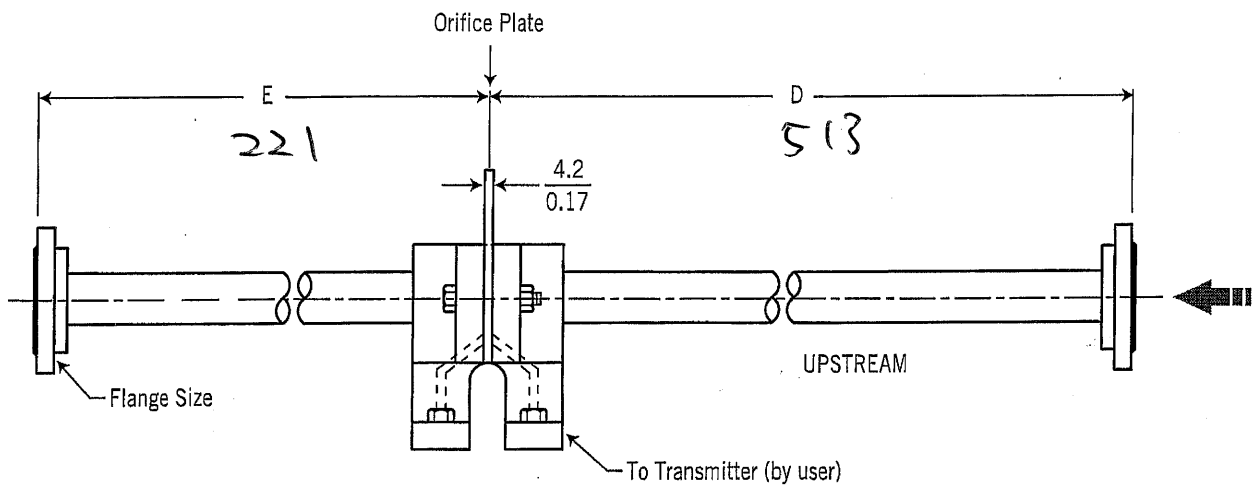
Fluid.....

|              |                              |                                   |
|--------------|------------------------------|-----------------------------------|
| Element..... | Type                         | Conc Orifice, Flange Tap          |
|              | , Material                   | 316 SS                            |
|              | , Beta Ratio @ 68.00 Deg F   | 0.2549 d/D                        |
|              | , Bore @ 68.00 Deg F         | 19.8628 d, Millimeters            |
|              | , Drain size (ISA RP3.2)     | 0.0000 Dh, Millimeters            |
|              | , Drain correction factor    | 1.0000 Fdh                        |
| Pipe.....    | , Schedule 40S and Size      | 3.0000 Inches                     |
|              | , Material                   | 304 SS                            |
|              | , Inside Dia @ 68.00 Deg F   | 77.9272 D, Millimeters            |
| Base.....    | , Pressure at Std Cond       | 14.6959 Pb, Pounds/Sq In Absolute |
|              | , Temperature at Std Cond    | 60.0000 Tb, Deg Fahrenheit        |
| Local.....   | , Atmospheric Pressure       | 14.6959 Pg, Pounds/Sq In Absolute |
| Pressure.... | , Flowing at Upstream        | 4.0000 Pf, Kilograms/Sq Cm Gauge  |
|              | , Maximum Differential       | 1,000.0000 Hm, Mm Water Col       |
|              | , Normal Differential        | 637.0676 Hn, Mm Water Col         |
|              | , Permanent Loss @Max Flow   | 902.3933 Lm, Mm Water Col         |
|              | , Permanent Loss @Norm Flow  | 574.8855 Ln, Mm Water Col         |
|              | , Drop For Critical Flow     | 2.6616 Hc, Kilograms/Sq Cm        |
| Temperature, | Flowing                      | 30.0000 Tf, Deg Celsius           |
| Flow.....    | , Maximum, Mass Conditions   | 218.0000 Qm, Mass Kilograms/Hour  |
|              | , Normal, Mass Conditions    | 174.0000 Qn, Mass Kilograms/Hour  |
|              | , Ratio (Norm/Max Flow)      | 79.8165 %, Percent                |
|              | , Reynolds Nmbr @Max Flow    | 54,957.7981 RDm                   |
|              | , Reynolds Nmbr @Norm Flow   | 43,865.3985 RDn                   |
| Fluid Prop., | Molecular Weight             | 28.0000 MW                        |
|              | , Viscosity @ Flowing        | 0.0180 Centipoise                 |
|              | , Ratio of Specific Heats    | 1.4000 Cp/Cv                      |
|              | , Compress Calc Method       | Entered                           |
|              | , Compressibility @ Base     | 1.0000 Zb                         |
|              | , Compressibility @ Flowing  | 1.0000 Zf                         |
|              | , Calculated Base Density    | 1.1821 Rhob, Kg/Cu Mtr            |
|              | , Calculated Flow Density    | 5.4840 Rhof, Kg/Cu Mtr            |
| Factors..... | , Calculated at Maximum Flow |                                   |
|              | , Discharge Coefficient      | 0.5984 C                          |
|              | , Sizing Coefficient         | 0.0387 Sc                         |
|              | , Gas Expansion Factor       | 0.9942 Y1                         |
|              | , Comb Thermal Expan Factor  | 1.0003 Fa                         |

一般  
三孔三行

ORIFICE?is a registered trademark of FlowSoft Inc., St. Charles, MO 63303  
All rights reserved, 1979 - 1997

Notes: None



## Specification

### Integral Orifice Assembly

Model: IOA Series

Wetted Parts Material: SS316

Gasket Material: Teflon

### 3-Way Manifold

Model: 3VM-SS-8-R

Connection Size: 1/2" NPT(F)

Material: SS316

unit=mm

| Tag No. | Differential (max.)    | Size      | Bore  | Flow Rate |
|---------|------------------------|-----------|-------|-----------|
| FI6-501 | 500 mmH <sub>2</sub> O | 2" X ISO# | 11.06 | 0-50 kg/h |

## Dimensions

| Assembly Line Size | Pipe Schedule | Straight Length Of Piping |      |     |      |                |      |       |      |
|--------------------|---------------|---------------------------|------|-----|------|----------------|------|-------|------|
|                    |               | With Flange               |      |     |      | Without Flange |      |       |      |
|                    |               | D                         |      | E   |      | D              |      | E     |      |
|                    |               | mm                        | in   | mm  | in   | mm             | in   | mm    | in   |
| 3/8"               | 40S 80S       | 254                       | 10.0 | 115 | 4.5  | 242            | 9.5  | 112   | 4.4  |
| 1/2"               | 40S 80S       | 318                       | 12.5 | 145 | 5.7  | 315            | 12.4 | 142   | 5.6  |
| 1"                 | 40S 80S       | 513                       | 20.2 | 221 | 8.7  | 510            | 20.1 | 218   | 8.6  |
| 1 1/2"             | 40S 80S       | 721                       | 28.4 | 302 | 11.9 | 716            | 28.2 | 297.2 | 11.7 |



NEW-FLOW TECHNOLOGIES, INC.

DWG. TITLE

INTEGRAL ORIFICE ASSEMBLY

Project No.: 大連公司 大發廠

REQ/P.O. No.:

SPEC. No.:

DWG. NO.

DATE: 2014/06/05 REV.

PAGE: 1/3

Golden Mountain Enterprise Co., Ltd.

升陽企業股份有限公司 高雄市前鎮區新街路 296 巷 3 號

No. 3 Lane 296, Hsin-Ya Road, Chien Chen Dist, Kaohsiung 806, Taiwan ROC Tel: 886-7-8135500/Fax: 886-7-8225588

ORIFICE?Program Flow Element Calculation

Page 1 of 1

Tag.....: FE6-5017 Date.....: 1/21/2015 14:26  
 Service.: N2  
 Spec No.: EFD(P&ID):  
 Line No.: Equip No.:  
 Customer:  
 Project#: Shop Ord.:  
 Revision: Calc. By.: NF/O  
 CalcType: Beta Ratio (Bore) Pgm. Vers: 1.16g  
 Equ. Ref: Flow Meas. Engr. Handbook FluidType: Gas

---

Fluid..... N2  
 Element...., Type Honed Section, Corner Tap  
               , Material 316 SS  
               , Beta Ratio @ 68.00 Deg F 0.4153 d/D  
               , Bore @ 68.00 Deg F 11.0646 d, Millimeters  
 Pipe....., Schedule 40S and Size 1.0000 Inches  
               , Material 304 SS  
               , Inside Dia @ 68.00 Deg F 26.6446 D, Millimeters  
 Base....., Pressure at Std Cond 14.6959 Pb, Pounds/Sq In Absolute  
               , Temperature at Std Cond 60.0000 Tb, Deg Fahrenheit  
 Cal....., Atmospheric Pressure 14.6959 Pg, Pounds/Sq In Absolute  
 Pressure..., Flowing at Upstream 4.0000 Pf, Kilograms/Sq Cm Gauge  
               , Maximum Differential 500.0000 Hm, Mm Water Col  
               , Normal Differential 168.2000 Hn, Mm Water Col  
               , Permanent Loss @Max Flow 399.6030 Lm, Mm Water Col  
               , Permanent Loss @Norm Flow 134.4264 Ln, Mm Water Col  
               , Drop For Critical Flow 2.6778 Hc, Kilograms/Sq Cm  
 Temperature, Flowing 30.0000 Tf, Deg Celsius  
 Flow....., Maximum, Mass Conditions 50.0000 Qm, Mass Kilograms/Hour  
               , Normal, Mass Conditions 29.0000 Qn, Mass Kilograms/Hour  
               , Ratio (Norm/Max Flow) 58.0000 %, Percent  
               , Reynolds Nmbr @Max Flow 36,865.8064 RDm  
               , Reynolds Nmbr @Norm Flow 21,382.1677 RDn  
 Fluid Prop., Density @Flow Conditions 5.5710 Rhof, Kg/Cu Mtr  
               , Viscosity @ Flowing 0.0180 Centipoise  
               , Ratio of Specific Heats 1.4000 Cp/Cv  
               , Compress Calc Method Entered  
               , Compressibility @ Base 1.0000 Zb  
               , Compressibility @ Flowing 1.0000 Zf  
 Factors...., Calculated at Normal Flow  
               , Discharge Coefficient 0.6097 C  
               , Sizing Coefficient 0.1066 Sm  
               , Gas Expansion Factor 0.9990 Y1  
               , Comb Thermal Expan Factor 1.0003 Fa

---

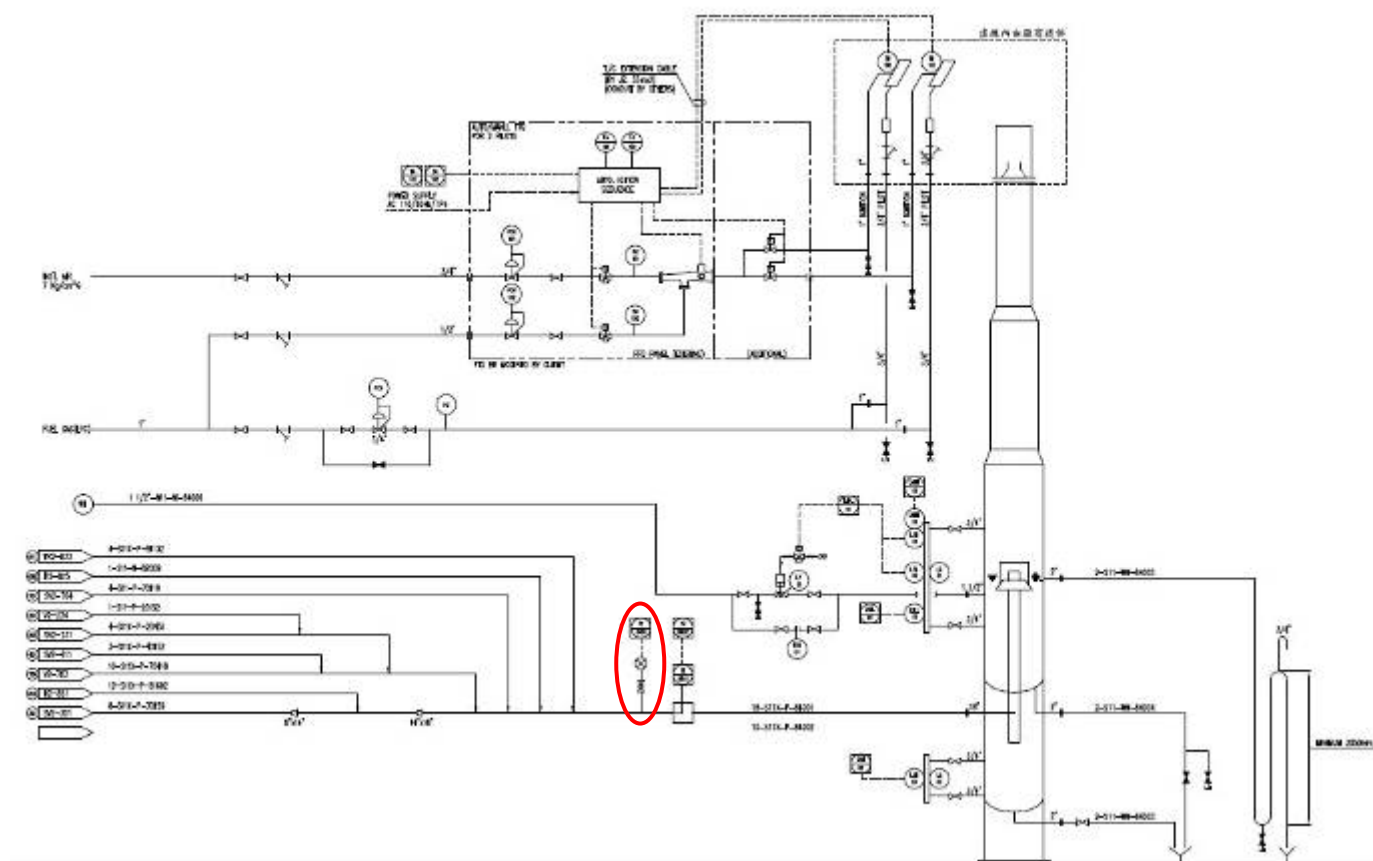
ORIFICE?is a registered trademark of FlowSoft Inc., St. Charles, MO 63303  
 All rights reserved, 1979 - 1997

---

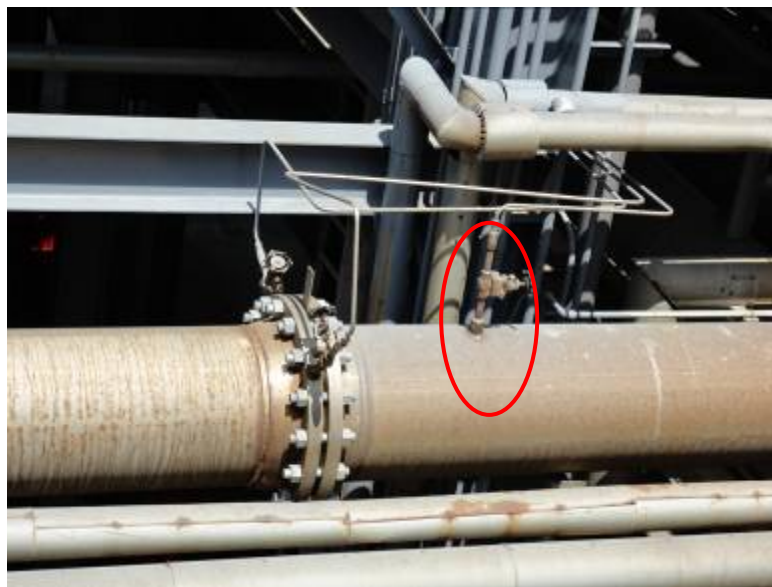
Notes: None

## 附件十七、廢氣自行採樣位置說明

### 一、A404 進廢氣採樣位置



說明：A404 進廢氣採樣位置如上 P&ID 圖圈畫處，對照之現場實際位置如照片 1 所示，現場採樣口如照片 2 所示。

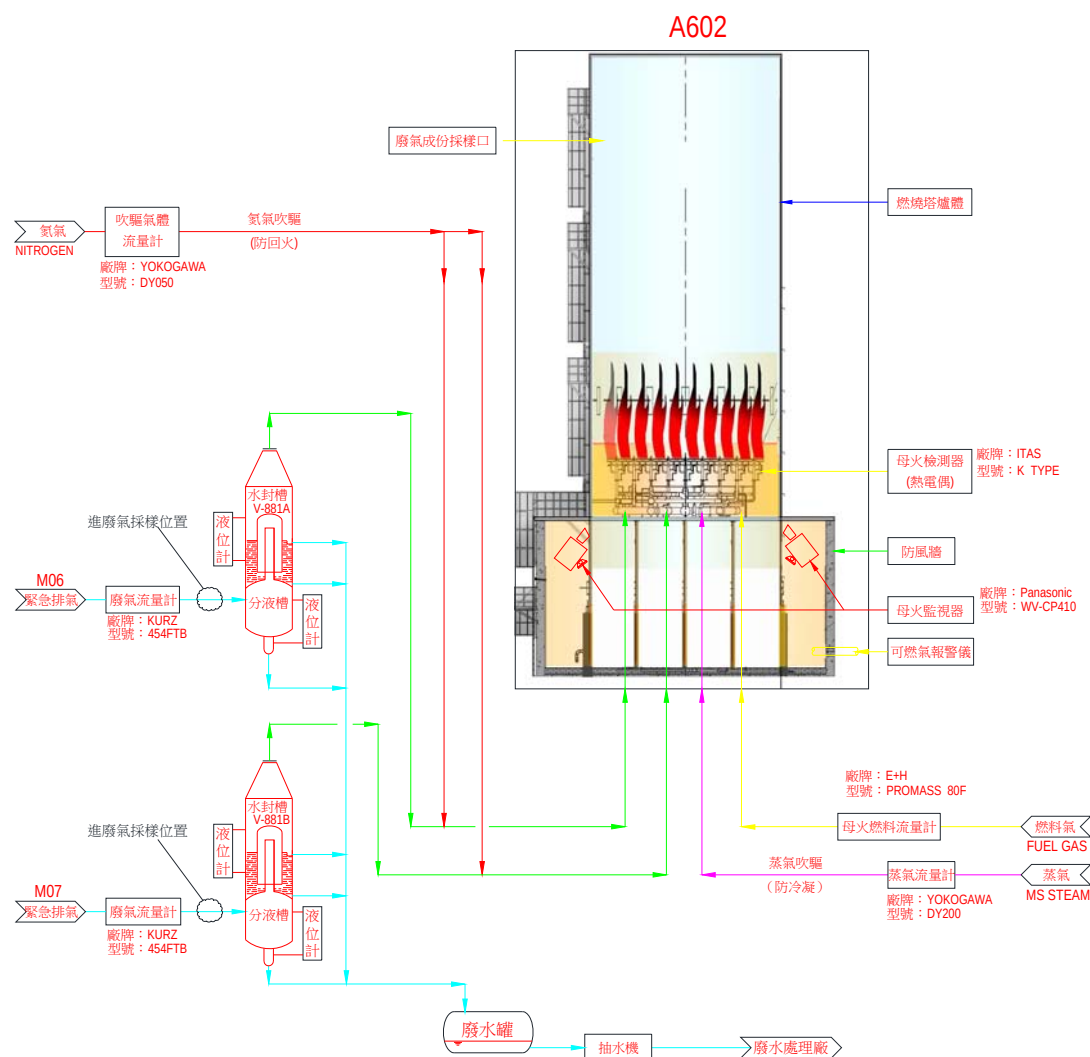


照片 1



照片 2

## 二、A602 進廢氣採樣位置



說明：A602 進廢氣採樣位置如上標註處，對照之現場實際位置如照片 1 所示，現場採樣口如照片 2 所示。



照片 1



照片 2

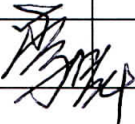


出席簽到單

[illegible]

# 出席簽到單

|                      |     |      |     |     |     |  |                                                                           |  |  |  |  |  |  |
|----------------------|-----|------|-----|-----|-----|--|---------------------------------------------------------------------------|--|--|--|--|--|--|
| 課程名稱：廢氣燃燒塔進廢氣採樣教育訓練  |     |      |     |     |     |  | 講師：沈明宗                                                                    |  |  |  |  |  |  |
| 上課日期：103年11月26日      |     |      |     |     |     |  | 訓練教材： <input type="checkbox"/> 有（份） <input checked="" type="checkbox"/> 無 |  |  |  |  |  |  |
| 上課時間：14:00~15:00     |     |      |     |     |     |  | 試卷： <input type="checkbox"/> 有（份） <input checked="" type="checkbox"/> 無   |  |  |  |  |  |  |
| 上課地點：控制室及A602進廢氣採樣位置 |     |      |     |     |     |  | 製表：沈明宗（簽名）                                                                |  |  |  |  |  |  |
|                      |     |      |     |     |     |  | 主管：周鴻奇（簽認）                                                                |  |  |  |  |  |  |
| 部門                   |     | 上課人員 |     |     |     |  |                                                                           |  |  |  |  |  |  |
| 生三部                  | 薛仁和 | 陳明宗  | 陳明宗 | 吳金川 | 張明宗 |  |                                                                           |  |  |  |  |  |  |
|                      |     |      |     |     |     |  |                                                                           |  |  |  |  |  |  |
|                      |     |      |     |     |     |  |                                                                           |  |  |  |  |  |  |
|                      |     |      |     |     |     |  |                                                                           |  |  |  |  |  |  |
|                      |     |      |     |     |     |  |                                                                           |  |  |  |  |  |  |
|                      |     |      |     |     |     |  |                                                                           |  |  |  |  |  |  |
|                      |     |      |     |     |     |  |                                                                           |  |  |  |  |  |  |
|                      |     |      |     |     |     |  |                                                                           |  |  |  |  |  |  |
|                      |     |      |     |     |     |  |                                                                           |  |  |  |  |  |  |
|                      |     |      |     |     |     |  |                                                                           |  |  |  |  |  |  |

|        |            |  |  |  |    |                                                                                   |     |    |    |                                                                                     |       |                 |  |  |
|--------|------------|--|--|--|----|-----------------------------------------------------------------------------------|-----|----|----|-------------------------------------------------------------------------------------|-------|-----------------|--|--|
| 呈      |            |  |  |  | 複印 |                                                                                   |     |    |    |                                                                                     | 共 2 頁 | 103 年 12 月 11 日 |  |  |
| 主<br>題 | 品保部 103 年度 |  |  |  |    | 廠 長                                                                               | 副廠長 | 會辦 | 會辦 | 主 管                                                                                 | 承辦人   | 承辦部門            |  |  |
|        | 檢驗人員本職能力評鑑 |  |  |  |    |  |     |    |    |  | 吳尚臻   | 品保部             |  |  |

1. 說明

1.1. 品保部 103 年度檢驗人員(BDO 化驗室)本職能力評鑑如下表：

| 人 員         | 吳尚臻                                                                                                                                                                                                                                                                                  | 郭永欽    | 曾文度   | 簡錦堂          | 劉源和          | 顏廉聖  | 吳孟芳  | 簡照恩  | 陳穎記    | 張景裕      | 李旭昇    | 吳俊威    | 孫鵬智  | 林格名  |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------|--------------|--------------|------|------|------|--------|----------|--------|--------|------|------|
| 職 稱         | 副課長                                                                                                                                                                                                                                                                                  | 副工程師   | 助理工程師 | 領班           | 副領班          | 副領班  | 技術員  | 技術員  | 技術員    | 技術員      | 技術員    | 技術員    | 技術員  | 技術員  |
| 學 歷         | 台大化研所                                                                                                                                                                                                                                                                                | 台師大化研所 | 中正化研所 | 輔英工專         | 南台工專         | 高苑工專 | 吳鳳工專 | 屏東高中 | 正修科技大學 | 高雄應用科技大學 | 正修科技大學 | 台南師範學院 | 義守大學 | 成功大學 |
| 年資(年)       | 6.2                                                                                                                                                                                                                                                                                  | 8.9    | 2     | 14.6         | 16.6         | 15.2 | 17.2 | 15.2 | 6.7    | 1.7      | 1.7    | 1.7    | 1.7  | 1.7  |
| 工作性質        | 普通班                                                                                                                                                                                                                                                                                  | 普通班    | 普通班   | 普通班          | 普通班          | 輪班   | 普通班  | 輪班   | 輪班     | 輪班       | 輪班     | 輪班     | 輪班   | 輪班   |
| 項 目         | 判 定                                                                                                                                                                                                                                                                                  |        |       |              |              |      |      |      |        |          |        |        |      |      |
| BDO 工場原物料檢驗 | 合格                                                                                                                                                                                                                                                                                   | 備註 1   | 合格    | 合格           | 合格           | 合格   | 合格   | 合格   | 合格     | 合格       | 合格     | 合格     | 合格   | 合格   |
| BDO 製程及成品檢驗 | 合格                                                                                                                                                                                                                                                                                   | 備註 1   | 合格    | 合格           | 合格           | 合格   | 合格   | 合格   | 合格     | 合格       | 合格     | 合格     | 合格   | 合格   |
| AAL 製程及成品檢驗 | 合格                                                                                                                                                                                                                                                                                   | 備註 1   | 合格    | 合格           | 合格           | 合格   | 合格   | 合格   | 合格     | 合格       | 合格     | 合格     | 合格   | 合格   |
| AAL 工場原物料檢驗 | 合格                                                                                                                                                                                                                                                                                   | 備註 1   | 合格    | 合格           | 合格           | 合格   | 合格   | 合格   | 合格     | 合格       | 合格     | 合格     | 合格   | 合格   |
| 分析檢驗設備檢量校正  | 合格                                                                                                                                                                                                                                                                                   | 備註 1   | 合格    | 備註 2<br>備註 4 | 備註 3<br>備註 4 | 備註 4 | 備註 4 | 備註 4 | 註 4    | 備註 4     | 備註 4   | 備註 4   | 備註 4 | 備註 4 |
| 公用區檢驗       | 備註 5                                                                                                                                                                                                                                                                                 | 備註 5   | 備註 5  | 備註 5         | 備註 5         | 備註 5 | 備註 5 | 備註 5 | 備註 5   | 備註 5     | 備註 5   | 備註 5   | 備註 5 | 備註 5 |
| 備註          | 1. 郭永欽副工程師於今年 4 月份自原 EVA 事業部轉調至大發廠，已完成各項教育訓練且判定合格。<br>2. 簡錦堂領班負責各項氣體檢驗方法、UV/可見光分光光譜儀及 B 級計量容器檢量校正工作。<br>3. 劉源和副領班負責 BDO 及 MPO 純度檢驗方法、溫度檢驗設備及比重計檢量校正工作。<br>4. 具有原子吸收光譜儀檢量及 Karl Fischer 水份分析儀滴定液標定資格。<br>5. 因 BDO 化驗室同仁僅負責公用區之廢液鍋爐爐水、冷凝水水質及廢氣燃燒塔氣體組成檢驗，故僅針對上述取樣點監控項目實施教育訓練，所有同仁均判定合格。 |        |       |              |              |      |      |      |        |          |        |        |      |      |

2. 結論

目前本部門檢驗人員之檢驗能力均符合其所擔任工作需求。





## D 3588 – 98 (2003)

However, some calorimetric methods for measuring heating values are based upon the gas being saturated with water at the specified conditions.

5.2 The relative density (specific gravity) of a gas quantifies the density of the gas as compared with that of air under the same conditions.

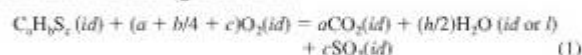
## 6. Methods of Analysis

6.1 Determine the molar composition of the gas in accordance with any ASTM or GPA method that yields the complete composition, exclusive of water, but including all other components present in amounts of 0.1 % or more, in terms of components or groups of components listed in Table 1. At least 98 % of the sample must be reported as individual components (that is, not more than a total of 2 % reported as groups of components such as butanes, pentanes, hexanes, butenes, and

so forth). Any group used must be one of those listed in Table 1 for which average values appear. The following test methods are applicable to this practice when appropriate for the sample under test: Test Methods D 1717, D 1945, D 2163, and D 2650.

## 7. Calculation—Ideal Gas Values; Ideal Heating Value

7.1 An ideal combustion reaction in general terms for fuel and air in the ideal gas state is:



where *id* denotes the ideal gas state and *l* denotes liquid phase. The ideal net heating value results when all the water remains in the ideal gas state. The ideal gross heating value results when all the water formed by the reaction condenses to liquid. For water, the reduction from  $H_2O(id)$  to  $H_2O(l)$  is  $H_w^{id}$ .

TABLE 1 Properties of Natural Gas Components at 60°F and 14.696 psia<sup>A</sup>

| Compound            | Formula                         | Molar Mass,<br>lb·lbmol <sup>-1B</sup> | Molar Mass,<br>Ratio, G <sup>mol</sup> | Ideal Gross Heating Value <sup>D</sup>  |                                          |                                         | Ideal Net Heating Value                 |                                          |                                         | Summation<br>Factor, b,<br>psia <sup>-1</sup> |
|---------------------|---------------------------------|----------------------------------------|----------------------------------------|-----------------------------------------|------------------------------------------|-----------------------------------------|-----------------------------------------|------------------------------------------|-----------------------------------------|-----------------------------------------------|
|                     |                                 |                                        |                                        | $H_{hi}^{id}$ ,<br>kJ·mol <sup>-1</sup> | $H_{hi}^{id}$ ,<br>Btu·lbm <sup>-1</sup> | $H_{hi}^{id}$ ,<br>Btu·ft <sup>-3</sup> | $h_{hi}^{id}$ ,<br>kJ·mol <sup>-1</sup> | $h_{hi}^{id}$ ,<br>Btu·lbm <sup>-1</sup> | $h_{hi}^{id}$ ,<br>Btu·ft <sup>-3</sup> |                                               |
| Hydrogen            | H <sub>2</sub>                  | 2.0159                                 | 0.069 60                               | 286.20                                  | 6 1022                                   | 324.2                                   | 241.79                                  | 51 566                                   | 273.93                                  | 0                                             |
| Helium              | He                              | 4.0026                                 | 0.138 20                               | 0                                       | 0                                        | 0                                       | 0                                       | 0                                        | 0                                       | 0                                             |
| Water               | H <sub>2</sub> O                | 18.0153                                | 0.622 02                               | 44 409                                  | 1059.8                                   | 50 312                                  | 0                                       | 0                                        | 0                                       | 0.0623                                        |
| Carbon monoxide     | CO                              | 28.0134                                | 0.967 11                               | 282.9                                   | 4342                                     | 320.5                                   | 282.9                                   | 4 342                                    | 320.5                                   | 0.0053                                        |
| Nitrogen            | N <sub>2</sub>                  | 28.0134                                | 0.967 23                               | 0                                       | 0                                        | 0                                       | 0                                       | 0                                        | 0                                       | 0.0044                                        |
| Oxygen              | O <sub>2</sub>                  | 31.9988                                | 1.104 8                                | 0                                       | 0                                        | 0                                       | 0                                       | 0                                        | 0                                       | 0.0073                                        |
| Hydrogen sulfide    | H <sub>2</sub> S                | 34.08                                  | 1.176 7                                | 562.4                                   | 7 094.2                                  | 637.1                                   | 517.99                                  | 6 534                                    | 586.8                                   | 0.0253                                        |
| Argon               | Ar                              | 39.948                                 | 1.379 3                                | 0                                       | 0                                        | 0                                       | 0                                       | 0                                        | 0                                       | 0.0071                                        |
| Carbon dioxide      | CO <sub>2</sub>                 | 44.010                                 | 1.519 6                                | 0                                       | 0                                        | 0                                       | 0                                       | 0                                        | 0                                       | 0.0197                                        |
| Air                 | <sup>E</sup>                    | 28.9625                                | 1.000 0                                | 0                                       | 0                                        | 0                                       | 0                                       | 0                                        | 0                                       | 0.0050                                        |
| Methane             | CH <sub>4</sub>                 | 16.043                                 | 0.553 92                               | 891.63                                  | 23 891                                   | 1010.0                                  | 802.71                                  | 21 511                                   | 909.4                                   | 0.0116                                        |
| Ethane              | C <sub>2</sub> H <sub>6</sub>   | 30.070                                 | 1.038 2                                | 1562.06                                 | 22 333                                   | 1769.7                                  | 1428.83                                 | 20 429                                   | 1618.7                                  | 0.0239                                        |
| Propane             | C <sub>3</sub> H <sub>8</sub>   | 44.097                                 | 1.522 6                                | 2220.99                                 | 21 653                                   | 2516.1                                  | 2043.3                                  | 19 922                                   | 2314.9                                  | 0.0344                                        |
| <i>i</i> -Butane    | C <sub>4</sub> H <sub>10</sub>  | 58.123                                 | 2.006 8                                | 2870.45                                 | 21 232                                   | 3251.9                                  | 2648.4                                  | 19 590                                   | 3000.4                                  | 0.0458                                        |
| <i>n</i> -Butane    | C <sub>4</sub> H <sub>10</sub>  | 58.123                                 | 2.006 8                                | 2879.63                                 | 21 300                                   | 3262.3                                  | 2657.6                                  | 19 658                                   | 3010.8                                  | 0.0478                                        |
| <i>i</i> -Pentane   | C <sub>5</sub> H <sub>12</sub>  | 72.150                                 | 2.491 2                                | 3531.5                                  | 21 043                                   | 4000.9                                  | 3265.0                                  | 19 456                                   | 3699.0                                  | 0.0581                                        |
| <i>n</i> -Pentane   | C <sub>5</sub> H <sub>12</sub>  | 72.150                                 | 2.491 2                                | 3535.8                                  | 21 085                                   | 4008.9                                  | 3269.3                                  | 19 481                                   | 3703.9                                  | 0.0631                                        |
| <i>n</i> -Hexane    | C <sub>6</sub> H <sub>14</sub>  | 86.177                                 | 2.975 5                                | 4198.1                                  | 20 943                                   | 4755.9                                  | 3887.2                                  | 19 393                                   | 4403.9                                  | 0.0802                                        |
| <i>n</i> -Heptane   | C <sub>7</sub> H <sub>16</sub>  | 100.204                                | 3.459 8                                | 4857.2                                  | 20 839                                   | 5502.5                                  | 4501.9                                  | 19 315                                   | 5100.3                                  | 0.0944                                        |
| <i>n</i> -Octane    | C <sub>8</sub> H <sub>18</sub>  | 114.231                                | 3.944 1                                | 5515.9                                  | 20 759                                   | 6248.9                                  | 5116.2                                  | 19 256                                   | 5796.2                                  | 0.1137                                        |
| <i>n</i> -Nonane    | C <sub>9</sub> H <sub>20</sub>  | 128.258                                | 4.428 4                                | 6175.9                                  | 20 701                                   | 6996.5                                  | 5731.8                                  | 19 213                                   | 6493.6                                  | 0.1331                                        |
| <i>n</i> -Decane    | C <sub>10</sub> H <sub>22</sub> | 142.285                                | 4.912 7                                | 6834.9                                  | 20 651                                   | 7742.9                                  | 6346.4                                  | 19 176                                   | 7189.9                                  | 0.1538                                        |
| Neopentane          | C <sub>5</sub> H <sub>12</sub>  | 72.015                                 | 2.491 2                                | 3517.27                                 | 20 958                                   | 3985                                    | 3250.8                                  | 19 371                                   | 3683                                    | 0.080                                         |
| 2-Methylpentane     | C <sub>6</sub> H <sub>14</sub>  | 86.177                                 | 2.975 5                                | 4190.43                                 | 20 905                                   | 4747                                    | 3879.6                                  | 19 355                                   | 4395                                    | 0.080                                         |
| 3-Methylpentane     | C <sub>6</sub> H <sub>14</sub>  | 86.177                                 | 2.975 5                                | 4193.03                                 | 20 918                                   | 4750                                    | 3882.2                                  | 19 367                                   | 4398                                    | 0.080                                         |
| 2,2-Dimethylbutane  | C <sub>6</sub> H <sub>14</sub>  | 86.177                                 | 2.975 5                                | 4180.63                                 | 20 856                                   | 4736                                    | 3869.8                                  | 19 306                                   | 4384                                    | 0.080                                         |
| 2,3-Dimethylbutane  | C <sub>6</sub> H <sub>14</sub>  | 86.177                                 | 2.975 5                                | 4188.41                                 | 20 895                                   | 4745                                    | 3877.5                                  | 19 344                                   | 4393                                    | 0.080                                         |
| Cyclopropane        | C <sub>3</sub> H <sub>6</sub>   | 42.081                                 | 1.452 9                                | 2092.78                                 | 21 381                                   | 2371                                    | 1959.6                                  | 20 020                                   | 2220                                    | 0.021                                         |
| Cyclobutane         | C <sub>4</sub> H <sub>8</sub>   | 56.108                                 | 1.937 3                                | 2747.08                                 | 21 049                                   | 2747                                    | 2569.4                                  | 19 688                                   | 2911                                    | 0.020                                         |
| Cyclopentane        | C <sub>5</sub> H <sub>10</sub>  | 70.134                                 | 2.421 5                                | 3322.04                                 | 20 364                                   | 3764                                    | 3100.0                                  | 19 003                                   | 3512                                    | 0.020                                         |
| Cyclohexane         | C <sub>6</sub> H <sub>12</sub>  | 84.161                                 | 2.905 9                                | 3955.84                                 | 20 208                                   | 4482                                    | 3689.4                                  | 18 847                                   | 4180                                    | 0.020                                         |
| Ethynes (acetylene) | C <sub>2</sub> H <sub>2</sub>   | 26.038                                 | 0.899 0                                | 1301.32                                 | 21 487                                   | 1474                                    | 1256.9                                  | 20 753                                   | 1424                                    | 0.021                                         |
| Ethene (ethylene)   | C <sub>2</sub> H <sub>4</sub>   | 28.054                                 | 0.968 6                                | 1412.06                                 | 21 640                                   | 1600                                    | 1323.2                                  | 20 278                                   | 1499                                    | 0.020                                         |
| Propene (propylene) | C <sub>3</sub> H <sub>6</sub>   | 42.081                                 | 1.452 9                                | 2059.35                                 | 21 039                                   | 2333                                    | 1926.1                                  | 19 678                                   | 2182                                    | 0.033                                         |
| Benzene             | C <sub>6</sub> H <sub>6</sub>   | 78.114                                 | 2.697 1                                | 3202.74                                 | 18 177                                   | 3742                                    | 3169.5                                  | 17 444                                   | 3591                                    | 0.069                                         |
| Butanes (ave)       | C <sub>4</sub> H <sub>10</sub>  | 58.123                                 | 2.006 8                                | 2875                                    | 21 266                                   | 3257                                    | 2653                                    | 19 623                                   | 3006                                    | 0.046                                         |
| Pentanes (ave)      | C <sub>5</sub> H <sub>12</sub>  | 72.150                                 | 2.491 2                                | 3534                                    | 21 056                                   | 4003                                    | 3267                                    | 19 469                                   | 3702                                    | 0.062                                         |
| Hexanes (ave)       | C <sub>6</sub> H <sub>14</sub>  | 86.177                                 | 2.975 5                                | 4190                                    | 20 904                                   | 4747                                    | 3879                                    | 19 353                                   | 4395                                    | 0.080                                         |
| Butenes (ave)       | C <sub>4</sub> H <sub>8</sub>   | 56.108                                 | 1.937 2                                | 2716                                    | 20 811                                   | 3077                                    | 2538                                    | 19 450                                   | 2876                                    | 0.046                                         |
| Pentenes (ave)      | C <sub>5</sub> H <sub>10</sub>  | 70.134                                 | 2.421 5                                | 3375                                    | 20 691                                   | 3824                                    | 3153                                    | 19 328                                   | 3572                                    | 0.060                                         |

<sup>A</sup> This table is consistent with GPA 2145-89, but it is necessary to use the values from the most recent edition of GPA 2145 for custody transfer calculations.

<sup>B</sup> 1984 Atomic Weights: C = 12.011, H = 1.00794, O = 15.9994, N = 14.0067, S = 32.06.

<sup>C</sup> Molar mass ratio is the ratio of the molar mass of the gas to that of air.

<sup>D</sup> Based upon ideal reaction; the entry for water represents the total enthalpy of vaporization.

<sup>E</sup> Composition from: F. E. Jones, *J. Res. Nat. Bur. Stand.*, Vol. 83, 419, 1978.

# 附件二十一、本廠 Flare 進廢氣檢驗紀錄登載管理系統

品檢系統2.0 - 檢驗查詢

egen-run.ccp.com.tw/QA/QAQuery?\_guid=AF15E72B-1772-45F6-833D-942AAB7CE356

檢驗查詢

公司 3 廠別 4 部門 34P1 規格大類 公用區 規格 Flare進廢氣(AAL5) (I) 內規格 - 超出管制 (O) 外規格 - 不合格

取樣編號 開始日期 2017/01 結束日期 2017/02 查詢

取樣編號快搜 至少輸入前五碼 僅顯示異常紀錄

匯出Excel 動態查詢 顯示 最後一頁 簽字資料 判定

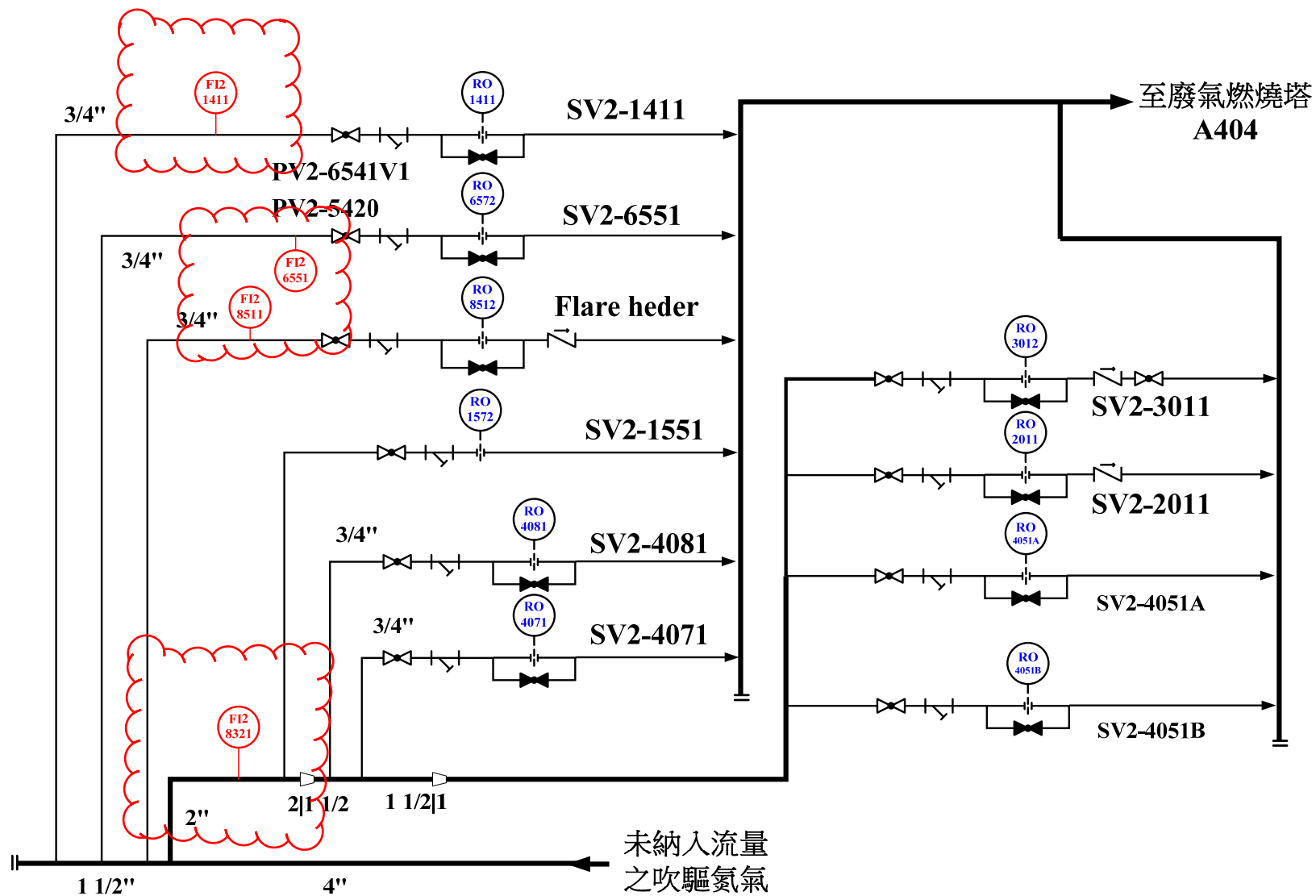
| SAMPTIME   | SAMPNO       | O2                           | N2                           | CO2<br>CO2                   | CH4<br>Methane               | C2H6<br>Ethane               | C2H4<br>Ethylene             | C3H8<br>Propane              | C3H6<br>Propylene            | AAC<br>Allyl acetate<br>醋酸丙稀 |
|------------|--------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| 取樣日期       | 取樣編號         | (I) -- mole%<br>(O) -- mole% | (I) -- mole%<br>(O) -- mole% | (I) -- mole%<br>(O) -- mole% | (I) -- mole%<br>(O) -- mole% | (I) -- mole%<br>(O) -- mole% | (I) -- mole%<br>(O) -- mole% | (I) -- mole%<br>(O) -- mole% | (I) -- mole%<br>(O) -- mole% | (I) -- mole%<br>(O) -- mole% |
| 2017/01/25 | 201701252231 | 0.521                        | 98.26                        | 0                            | 0.006                        | 0.024                        | 0.003                        | 0.122                        | 1.063                        | 0                            |
| 2017/01/26 | 201701262240 | 1.993                        | 97.25                        | 0                            | 0.001                        | 0.006                        | 0.001                        | 0.041                        | 0.707                        | 0                            |
| 2017/01/27 | 201701272237 | 0.609                        | 98.67                        | 0                            | 0.001                        | 0.002                        | 0                            | 0.026                        | 0.692                        | 0                            |
| 2017/01/28 | 201701282231 | 1.047                        | 98.30                        | 0.008                        | 0.003                        | 0.002                        | 0                            | 0                            | 0.644                        | 0                            |
| 2017/01/29 | 201701292137 | 2.174                        | 97.22                        | 0.004                        | 0                            | 0.001                        | 0                            | 0                            | 0.600                        | 0                            |
| 2017/01/30 | 201701302244 | 1.231                        | 98.12                        | 0                            | 0.003                        | 0.001                        | 0                            | 0                            | 0.649                        | 0                            |
| 2017/01/31 | 201701312235 | 1.238                        | 98.07                        | 0                            | 0.001                        | 0.003                        | 0                            | 0                            | 0.685                        | 0                            |
| 2017/02/01 | 201702012231 | 0.772                        | 98.01                        | 0.006                        | 0                            | 0                            | 0                            | 0                            | 1.215                        | 0                            |
| 2017/02/02 | 201702022167 | 1.107                        | 98.17                        | 0.004                        | 0                            | 0.002                        | 0                            | 0                            | 0.720                        | 0                            |
| 2017/02/03 | 201702032242 | 1.070                        | 98.21                        | 0                            | 0.001                        | 0.003                        | 0                            | 0                            | 0.718                        | 0                            |
| 2017/02/04 | 201702042232 | 0.568                        | 98.74                        | 0.003                        | 0.003                        | 0.002                        | 0                            | 0                            | 0.680                        | 0                            |
| 2017/02/05 | 201702052234 | 0.865                        | 98.48                        | 0.005                        | 0.001                        | 0.001                        | 0                            | 0                            | 0.650                        | 0                            |
| 2017/02/06 | 201702062233 | 0.712                        | 98.62                        | 0.001                        | 0                            | 0.001                        | 0                            | 0                            | 0.663                        | 0                            |
| 2017/02/07 | 201702072232 | 0.626                        | 98.69                        | 0.002                        | 0.001                        | 0.002                        | 0                            | 0                            | 0.682                        | 0                            |
| 2017/02/08 | 201702082101 | 1.346                        | 97.41                        | 0.003                        | 0.001                        | 0.001                        | 0                            | 0                            | 1.242                        | 0                            |



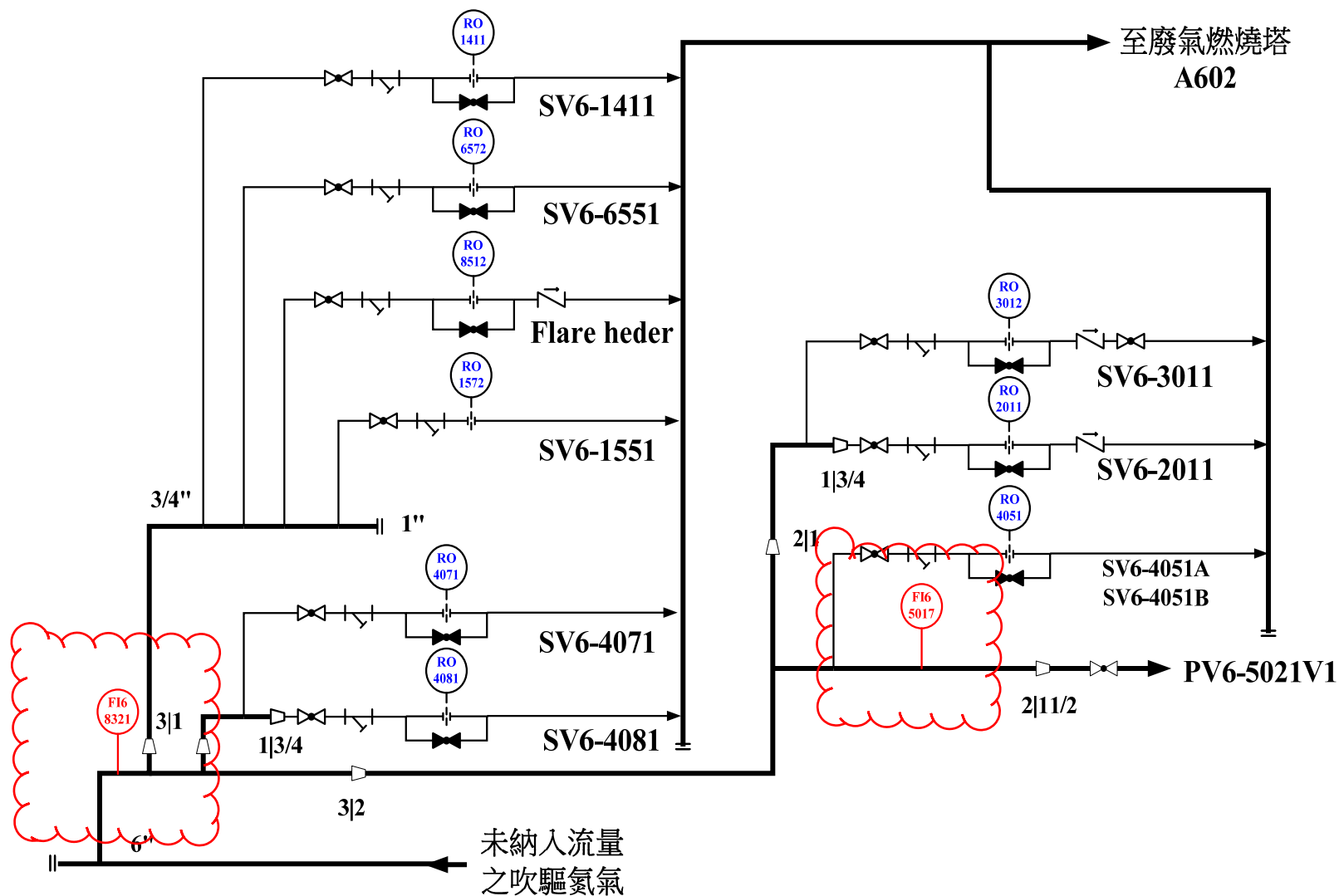
附件二十二、廢氣燃燒塔最近一季6天採樣乙次分析結果

| 採樣日期     | 氫氣<br>mole% | 氧氣<br>mole% | 氮氣<br>mole% | 甲烷<br>mole% | 一氧化<br>碳 mole% | 乙烷<br>mole% | 丙烷<br>mole% | 丙烯<br>mole% | 異丁烷<br>mole% | 正丁烷<br>mole% | 環己烷<br>mole% | 正丙醛<br>mole% | 二甲基環<br>己烷mole% | 四氫呋<br>喃mole% | 正丙醇<br>mole% | 合計<br>mole% |
|----------|-------------|-------------|-------------|-------------|----------------|-------------|-------------|-------------|--------------|--------------|--------------|--------------|-----------------|---------------|--------------|-------------|
| 104/3/15 | 0.4         | 1.62        | 97.95       | 0           | 0              | 0           | 0.009       | 0.021       | 0            | 0            | 0            | 0.004        | 0.0008          | 0.0092        | 0            | 100         |
| 104/3/21 | 0.1         | 0.81        | 99.1        | 0           | 0              | 0           | 0           | 0           | 0            | 0            | 0            | 0.007        | 0               | 0             | 0            | 100         |
| 104/3/27 | 0           | 0.25        | 99.52       | 0           | 0              | 0           | 0           | 0           | 0            | 0            | 0            | 0.001        | 0.0026          | 0.2006        | 0.003        | 100         |
| 104/4/2  | 0.5         | 0.2         | 99.25       | 0           | 0              | 0           | 0.01        | 0.019       | 0            | 0            | 0            | 0.001        | 0               | 0.0007        | 0            | 100         |
| 104/4/8  | 0           | 0.62        | 99.37       | 0           | 0              | 0           | 0           | 0.002       | 0            | 0            | 0            | 0            | 0               | 0             | 0            | 100         |
| 104/4/14 | 1.3         | 0.56        | 97.99       | 0           | 0.1            | 0           | 0.001       | 0.004       | 0            | 0            | 0.002        | 0.028        | 0.0024          | 0.0016        | 0            | 100         |
| 104/4/20 | 2.1         | 0.71        | 96.86       | 0           | 0.2            | 0.007       | 0.013       | 0.006       | 0.02         | 0.001        | 0.004        | 0.053        | 0.0091          | 0.006         | 0.025        | 100         |
| 104/4/26 | 0.1         | 0.65        | 99.2        | 0           | 0              | 0           | 0.003       | 0.007       | 0            | 0            | 0            | 0.007        | 0.0029          | 0.001         | 0.021        | 100         |
| 104/5/2  | 0.2         | 0.68        | 99.08       | 0           | 0              | 0           | 0           | 0           | 0            | 0            | 0.001        | 0.005        | 0.001           | 0             | 0            | 100         |
| 104/5/8  | 0.2         | 0.23        | 98.17       | 1.35        | 0              | 0           | 0           | 0.003       | 0            | 0            | 0.001        | 0.002        | 0.0007          | 0             | 0            | 100         |
| 104/5/14 | 0.1         | 0.29        | 99.55       | 0           | 0              | 0           | 0           | 0.003       | 0            | 0            | 0.001        | 0.001        | 0.0009          | 0             | 0            | 100         |
| 104/5/20 | 0           | 1.59        | 98.38       | 0           | 0              | 0           | 0           | 0.001       | 0            | 0            | 0            | 0            | 0.0006          | 0             | 0            | 100         |
| 104/5/26 | 0           | 0.38        | 99.61       | 0           | 0              | 0           | 0           | 0           | 0            | 0            | 0            | 0            | 0               | 0             | 0            | 100         |
| 104/6/1  | 0.1         | 1.13        | 98.78       | 0           | 0              | 0           | 0           | 0.003       | 0            | 0            | 0.001        | 0.002        | 0.0008          | 0             | 0            | 100         |
| 104/6/7  | 0.2         | 2.2         | 97.52       | 0           | 0              | 0           | 0           | 0           | 0            | 0            | 0.002        | 0.007        | 0.0029          | 0             | 0            | 100         |
| 104/6/13 | 0.15        | 0.32        | 99.51       | 0.0018      | 0.02           | 0.0004      | 0.0057      | 0.0053      | 0            | 0            | 0.001        | 0.005        | 0.0018          | 0             | 0            | 100         |
| 104/6/19 | 0.24        | 0.74        | 98.98       | 0.0024      | 0              | 0.0006      | 0.0063      | 0.0191      | 0.0065       | 0.0003       | 0            | 0            | 0.0006          | 0             | 0            | 100         |
| 104/6/25 | 0.16        | 0.42        | 99.41       | 0.0014      | 0              | 0.0003      | 0.0013      | 0.0005      | 0.0032       | 0.0001       | 0.001        | 0.005        | 0.0016          | 0             | 0            | 100         |

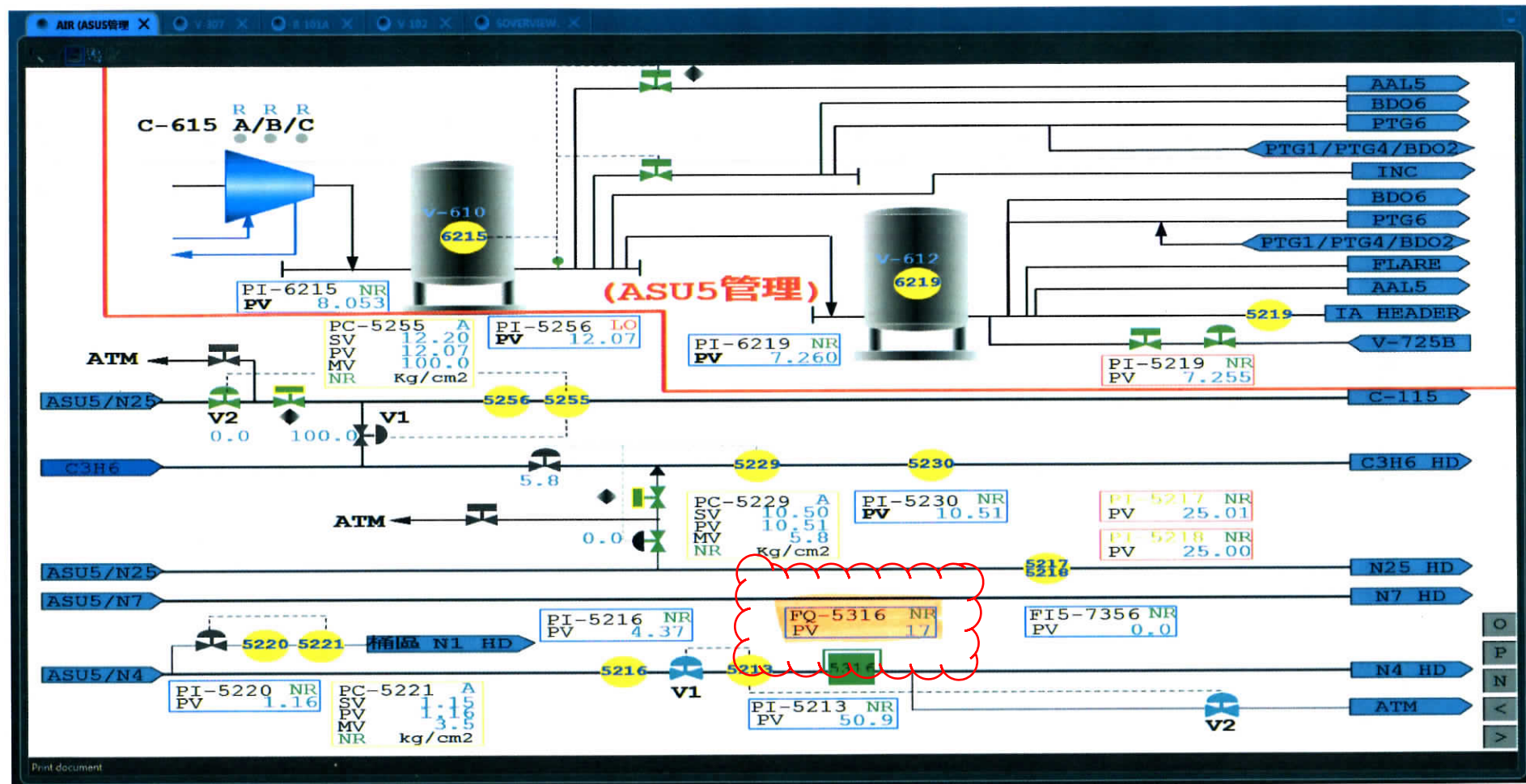
# 廢氣燃燒塔A404吹驅氮氣流量計配置示意圖



# 廢氣燃燒塔A602-M06吹驅氮氣流量計配置示意圖



# 廢氣燃燒塔A602-M07吹驅氮氣流量計配置示意圖



## 安全資料表

## 一、化學品與廠商資料

|                                                                      |
|----------------------------------------------------------------------|
| 化學品名稱：天然氣(2) 【NATURAL GAS (2)】                                       |
| 其他名稱：天然瓦斯、自來瓦斯、瓦斯。                                                   |
| 建議用途及限制使用：燃料(發電用、工業用、家庭用、交通工具用)及工業用原料。                               |
| 製造者、輸入者或供應者名稱：欣雄天然氣股份有限公司<br>地址：高雄市鳳山區國泰路一段 99 號<br>電話：(07) 741-6101 |
| 緊急聯絡電話：(07)748-1100<br>傳真：(07)710-0350                               |

## 二、危害辨識資料

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 化學品危害分類：<br>易燃氣體第 1 級、加壓氣體。                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 標示內容：<br><div style="display: flex; justify-content: space-around; align-items: center;">   </div> <ol style="list-style-type: none"> <li>象徵符號：火焰、高壓鋼瓶。</li> <li>警示語：危險。</li> <li>危害警告訊息： <ol style="list-style-type: none"> <li>極度易燃氣體。</li> <li>內含加壓氣體；遇熱可能爆炸。</li> </ol> </li> <li>危害防範措施： <ol style="list-style-type: none"> <li>操作時，需採取電氣防爆及接地措施，並使用測爆器偵測濃度。</li> <li>密閉或高濃度環境，使用防爆機械強制抽送風。</li> <li>火災時，使用乾粉、泡沫、二氧化碳或水霧等控制火勢。</li> <li>空氣不流通之處需戴上合適的呼吸器防護。</li> <li>安全許可下，移除所有引火源。</li> <li>容器出口應緊閉，並置放於通風良好的處所。</li> </ol> </li> </ol> |
| 其他危害：-。                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

## 三、成分辨識資料

## 混合物：

| 化學性質：烷類                              |                    |
|--------------------------------------|--------------------|
| 危害成分之中英文名稱                           | 濃度或濃度範圍(成分百分比)     |
| 甲烷<br>(Methane)<br>CAS No. : 74-82-8 | Mole% > 85%        |
| 乙烷<br>(Ethane)<br>CAS No. : 74-84-00 | Mole% : 3.02~11.6% |
| 丙烷<br>(Propane)<br>CAS No. : 74-98-6 | Mole% : 0.05~3.85% |



#### 四、急救措施

不同暴露途徑之急救方法：

- 吸入：

1. 援助時需穿戴適合的保護裝備，以確保安全。
2. 當能夠安全進入災區時，將人員從暴露區移到新鮮空氣處。
3. 若需要，使用呼吸袋(bag valve mask)或相同等級設備，並由受過訓練人員實施人工呼吸；若心跳停止施行心肺復甦術。
4. 保持身體溫暖及靜止休息。
5. 必要時，須在醫師指示下，由受過訓練人員施予氧氣。
6. 通知救護車立即送醫治療。

- 皮膚接觸：

1. 萬一作業過程中快速降壓導致低溫引起凍傷時，立即將患者移離污染源，並儘快用溫水緩和清洗。
2. 勿直接在患處熱敷或摩擦搓揉。
3. 若沾粘於衣物或皮膚時，則緩慢地脫除衣物，且小心地割下已沾粘之衣物。
4. 以無菌繃帶覆蓋患處。
5. 通知救護車立即送醫治療。

- 眼睛接觸：

1. 萬一作業過程中快速降壓導致低溫引起凍傷時，立即將患者移離污染源，並儘快用溫水緩和地清洗患處。
2. 勿熱敷患處。
3. 用無菌繃帶覆蓋患處。
4. 通知救護車立即送醫治療。

- 食入：不太可能食入，若有需要緊急處理，送醫治療。

最重要症狀及危害效應：缺氧、凍傷。

對急救人員之防護：

1. 視現場情況需要，穿防護衣、戴防護具及安全護目鏡，在安全區實施急救措施。
2. 避免吸入氣體，並注意是否有火災爆炸危險。

對醫師之提示：患者吸入時，視需要考慮給予氧氣處理。

#### 五、滅火措施

適用滅火劑：小型火災：使用乾粉(ABC 或 BC)、二氧化碳。

大型火災：使用泡沫或微細水霧。

滅火時可能遭遇之特殊危害：

1. 會與空氣形成爆炸性混合物，產生嚴重的火災及爆炸之危害。
2. 若暴露於熱源，塔槽、容器或管線可能破裂或爆炸。
3. 由於流動或攪動產生之靜電荷會導致燃燒或爆炸。
4. 火場中之熱能會造成塔槽或容器內壓力急速上升，可能導致爆炸性破裂。

特殊滅火程序：

1. 噴水霧冷卻暴露於火場中的容器外側以免爆炸。
2. 大火時使用需人控制的水帶控制架或自動搖擺消防水瞄，如不可行，應自火場撤退並讓火繼續燃燒。

3. 若安全閥發出聲響或火災導致容槽變色，應迅速撤離火場。
4. 甲烷本身對健康危害輕微，但會取代氧氣，因而降低可呼吸的空氣量。
5. 撤退並自安全距離或受保護的地點滅火。
6. 位於上風處以避免危險的蒸氣和有毒的分解物。
7. 滅火前阻止溢漏，如不能阻止溢漏且周圍無任何危險，應先讓火燒完，若未阻止溢漏而先行滅火，蒸氣會與空氣形成爆炸性混合物而再引燃。
8. 隔離未著火物質且保護人員。
9. 安全情況下將容器搬離火場。
10. 以水霧冷卻暴露火場的儲槽或容器。

消防人員之特殊防護設備：消防人員必須佩戴空氣呼吸器、消防衣、防護手套。

#### 六、洩漏處理方法

個人應注意事項：

1. 穿戴適當個人防護裝備。
2. 避免熱、火焰、火花、及其他著火物質。
3. 不要接觸到洩漏的氣體。

環境注意事項：

1. 若沒有危險時，關斷氣源，移除火源。
2. 噴水降低天然氣濃度。
3. 疏導非工作人員儘速離開。
4. 隔離危害區域及禁止閒雜人員進入。
5. 進入密閉空間之前，須先予以充份通風。
6. 災區附近絕對嚴禁煙火。
7. 洩漏區施行有效通風，阻斷氣體來源，注意引爆濃度。

清理方法：

1. 移除所有火源並阻斷氣體來源。
2. 以適當之技術如防爆排氣通風設備等，排除量小之氣體洩漏物
3. 對於大量氣體洩漏時，依「空氣污染防制法」及相關規定之程序處理。
4. 噴水降低天然氣濃度。
5. 隔離洩漏區，直至天然氣完全消散。

#### 七、安全處置與儲存方法

處置：

1. 此物質是易燃氣體，需要工程控制及防護設備，工作人員應適當受訓，並告知此物質之危險性及安全使用方法。
2. 嚴禁煙火。
3. 操作區使用不會產火花的通風系統，合格的防爆設備和安全的電器系統。
4. 保持走道和出口暢通無阻。
5. 安裝洩漏偵測與警報裝置及適當的自動消防系統。
6. 備置隨時可用於火災及洩漏的緊急處理裝備。

儲存：

1. 儲槽及作業場所要嚴禁煙火並避免靠近火焰、火花或熱源。
2. 灌裝或卸放中，嚴禁開啟車輛電源、檢查電路、修護、洗刷車身或移動。
3. 與不相容物質需分開儲存。
4. 儲存於室溫、乾燥及通風良好之處。
5. 保護容器及管線勿受撞擊或損壞；遠離易燃物。
6. 貯存於合格之安全容器內。
7. 儲存於容器應保持緊密，且不可有焊接、加熱或鑽孔之行為。
8. 將仍含有危害或爆炸性蒸氣之容器騰空。
9. 儲槽必須接地以防靜電發生。

#### 八、暴露預防措施

工程控制：

1. 提供局部排氣或整體換氣，以免曝露，確保可燃性氣體濃度在爆炸下限的 1/10 以下。
2. 通風設備應該具有防爆措施。
3. 排氣口直接連通至室外。
4. 分開使用不會產生火花且接地之通風系統。
5. 供給充分新鮮空氣，以補充排氣系統抽出的空氣。

控制參數：

| 危害物質成分      | 八小時日時量<br>平均容許濃度<br>TWA | 短時間時量<br>平均容許濃度<br>STEL | 最高容許濃<br>度 CEILING | 生物指標<br>BEIs |
|-------------|-------------------------|-------------------------|--------------------|--------------|
| 甲烷(Methane) | —                       | —                       | —                  | —            |
| 乙烷(Ethane)  | —                       | —                       | —                  | —            |
| 丙烷(Propane) | 1000ppm                 | 1000ppm                 | —                  | —            |

個人防護設備：

• 呼吸防護：

1. 濃度 2100PPM 以上：供氣式或全面型自攜式呼吸防護具。
2. 未知濃度：正壓式自攜式呼吸防護具、正壓式全面型供氣式呼吸防護具，輔以正壓式自攜式呼吸防護具。
3. 逃生：逃生型自攜式呼吸防護具。

• 手部防護：無特殊要求，穿戴適當的防護手套。

• 眼睛防護：無特殊要求，但建議使用安全護目鏡，在緊鄰工作區域提供緊急洗眼設備。

• 皮膚及身體防護：穿戴適當防護衣物。

衛生措施：

1. 檢查空氣呼吸防護設備等，是否破損。
2. 多攝食含維生素及礦物質之營養物品、定期作健康檢查。
3. 工作後儘速脫掉污染之衣物，洗淨後才可再穿戴或丟棄，且須告知洗衣人員污染之危害性。
4. 工作場所嚴禁抽煙或飲食。
5. 處理此物後須徹底洗手。
6. 維持作業場所清潔。

九、物理及化學性質

|                                  |                                           |
|----------------------------------|-------------------------------------------|
| 外觀（物質狀態、顏色等）：<br>壓縮氣體、無色         | 氣味：無味                                     |
| 嗅覺閾值：-                           | 熔點：-182°C (- 296°F)                       |
| pH 值：不適用                         | 沸點/沸點範圍：- 161~ - 88°C<br>(- 258~ - 126°F) |
| 易燃性（固體、氣體）：易燃氣體                  | 閃火點：- 180°C ( - 292°F )                   |
| 分解溫度：無相關資料                       | 測試方法：閉杯                                   |
| 自燃溫度：482~670°C<br>( 900~1238°F ) | 爆炸界限：4~16 %                               |
| 蒸氣壓：不適用                          | 蒸氣密度：0.62 (空氣=1)                          |
| 密度：~0.75 g/L@ 60°F 14.73psi      | 溶解度：3.3ml/100ml (水)                       |
| 辛醇／水分配係數 (log Kow) 1.09          | 揮發速率：不適用                                  |

十、安定性及反應性

|                                                                                              |
|----------------------------------------------------------------------------------------------|
| 安定性：常溫常壓下穩定；正常狀況下安定。                                                                         |
| 特殊狀況下可能之危害反應：<br>1. 靜電火花、明火及其他火源。<br>2. 強氧化劑（如過氧化物、過氯酸鹽）：增加火災爆炸危險。<br>3. 鹵素化合物（如氯）：有火災爆炸的危險。 |
| 應避免之狀況：<br>1. 避免熱、火焰、靜電火花及其他燃燒物質或引火源。<br>2. 若曝露於熱源，容器會破裂或爆炸。<br>3. 有害氣體會累積在密閉空間。             |
| 應避免之物質：<br>避免和強氧化劑（如過氧化物、過氯酸鹽）、鹵素化合物（如氯）、可燃物等接觸，極易發生爆炸火災反應。                                  |
| 危害分解物：碳氧化合物之有毒或有害氣體。                                                                         |

十一、毒性資料

|                                                          |
|----------------------------------------------------------|
| 暴露途徑：皮膚、吸入、眼睛                                            |
| 症狀：呼吸及脈搏速率增加，肌肉協調功能輕度障礙、情緒不安、異常疲勞、呼吸障礙、痙攣、呼吸衰竭、噁心嘔吐、虛脫等。 |

#### 急毒性：

- 皮膚：不會造成刺激，但作業過程中快速降壓導致低溫接觸皮膚時，可能引起凍瘡。輕微凍瘡的症狀包括麻痺、刺痛、發癢。輕嚴重狀況包括灼燒感、皮膚可能變蒼白或黃色。更嚴重可能引起水泡、組織壞死。
- 吸入：
  1. 天然氣濃度在 5% 以下不會造成身體危害。
  2. 天然氣屬於單純窒息劑，高濃度下，會驅離氧而造缺氧，空氣中氧濃度不可低於 18%。
  3. 缺氧之症狀為：12~16% 氧會使呼吸及脈搏速率增加，肌肉協調功能 輕度障礙；10~14% 氧會造成情緒不安、異常疲勞、呼吸障礙；6~10% 氧會引起噁心、嘔吐、虛脫甚至喪失意志；6% 以下氧會導致痙攣並可能至呼吸衰竭及死亡。
- 眼睛：不會刺激，但若容器中的氣體快速洩漏時，萬一接觸眼睛時可能引起凍傷，可能造成永久損傷或失明。

LD50(測試動物、吸收途徑)：—

LC50(測試動物、吸收途徑)：—

慢毒性或長期毒性：無資訊顯示顯著有害資料。

#### 十二、生態資料

生態毒性：LC50 (魚類)：—

EC50 (水生無脊椎動物)：—

生物濃縮係數 (BCF)：—

#### 持久性及降解性：

1. 利用土壤微生物研究顯示，天然氣具有生物分解性。
2. 當釋放至水中，揮發為最主要流佈的機制。
3. 當釋放至大氣中，最主要的退化方式為與氫氣自由基作用。
  - 半衰退期 (空氣)：21600 小時
  - 半衰退期 (水表面)：1.17~14 小時
  - 半衰退期 (地下水)：無有效資料。
  - 半衰退期 (土壤)：1680 小時。

生物蓄積性：不會蓄積於體內。

土壤中之流動性：當釋放至土壤中，揮發為最主要流佈的機制。

其他不良效應：—

#### 十三、廢棄處置方法

廢棄處置方法：允許氣體安全地逸散至大氣中或當燃料使用。

#### 十四、運送資料

聯合國編號：1971

聯合國運輸名稱：甲烷含量高的壓縮天然氣

運輸危害分類：第 2.1 類易燃氣體

包裝類別：—

海洋污染物 (是/否)：否

特殊運送方法及注意事項：—



## 十五、法規資料

### 適用法規：

1. 職業安全衛生設施規則
2. 危害性化學品標示及通識規則
3. 勞工作業場所容許暴露標準
4. 高壓氣體勞工安全規則
5. 道路交通安全規則
6. 空氣污染防制法。
7. 公共危險物品及可燃性高壓氣體標準暨安全管理辦法

## 十六、其他資料

|      |                                                                                                                                 |            |
|------|---------------------------------------------------------------------------------------------------------------------------------|------------|
| 參考文獻 | <ol style="list-style-type: none"><li>1. OHS 76881</li><li>2. OHS 14160</li><li>3. OHS 08690</li><li>4. 行政院勞動部 GHS 網站</li></ol> |            |
| 製表單位 | 名稱：台灣中油股份有限公司天然氣事業部                                                                                                             |            |
|      | 地址：台北市信義區松仁路三號十三樓                                                                                                               |            |
|      | 電話：(02) 8725-9841                                                                                                               |            |
|      | 傳真電話：(02)2723-7328                                                                                                              |            |
| 製表人  | 職稱：經理                                                                                                                           | 姓名(簽章)：楊曼青 |
| 製表日期 | 中華民國 103 年 9 月 19 日                                                                                                             |            |
| 備註   | 上述資料中符號” — ”代表目前查無相關資料。                                                                                                         |            |

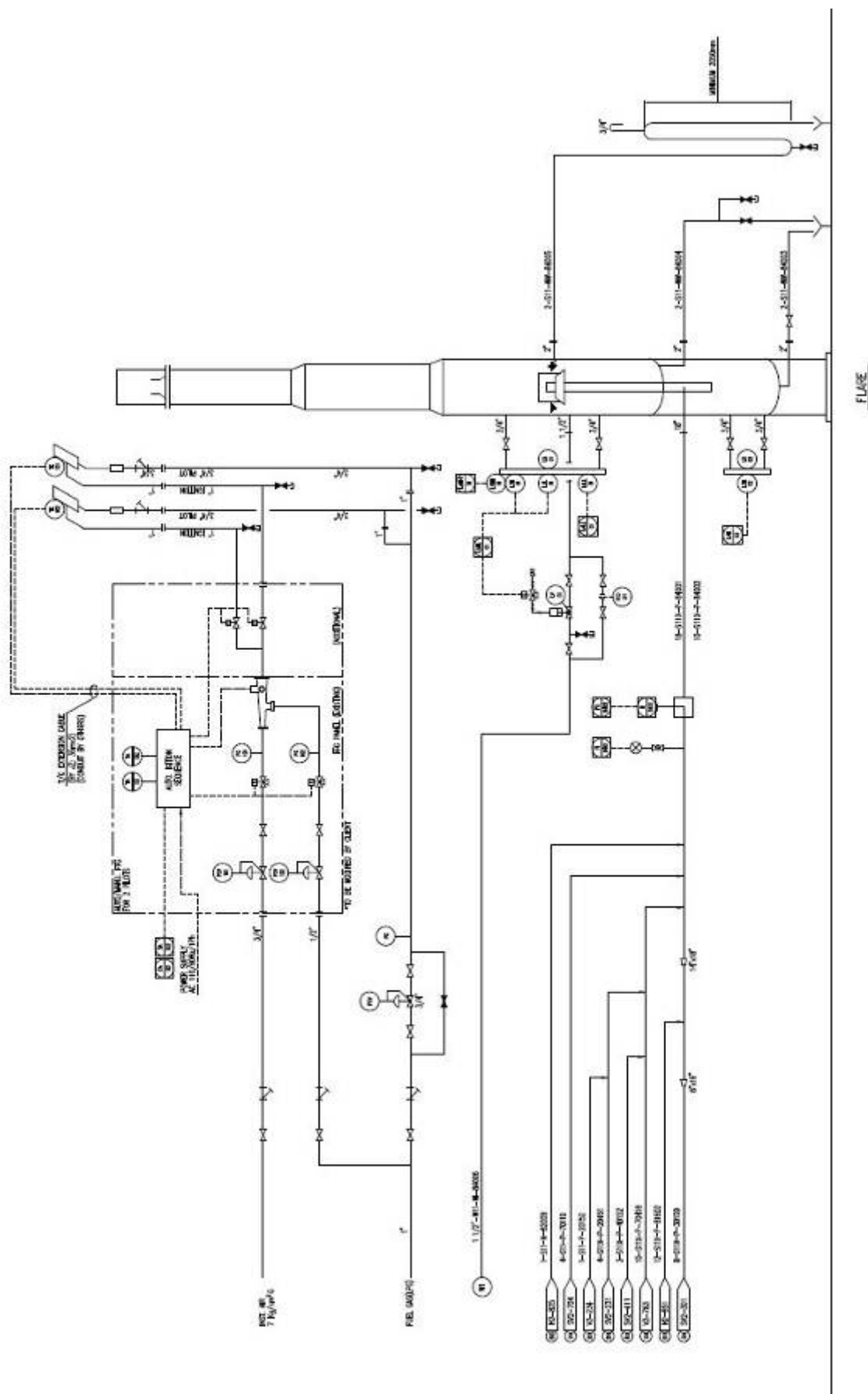
### 附註：

1. 本文為收集目前最新相關資料編寫而成，其內容僅適用於本產品。
2. 在製作時，已力求完美及正確，但錯誤恐仍難免，使用者請依應用需求，自行負責判斷其可用性，台灣中油公司不負任何責任。

| 文件修訂一覽表   |      |                                                   |
|-----------|------|---------------------------------------------------|
| 修改日期      | 修改版別 | 修訂摘要                                              |
| 97.09.09  | 1.0  | 公司審核新訂定                                           |
| 99.08.02  | 1.1  | 依據台灣中油股份有限公司 99 年 7 月 30 日油安環發字第 09910284200 號函修定 |
| 100.07.05 | 1.2  | 依據台灣中油股份有限公司天然氣事業部公告資訊修訂                          |
| 103.06.16 | 1.3  | 依據台灣中油股份有限公司天然氣事業部公告資訊修訂                          |
| 103.12.23 | 1.4  | 依據台灣中油股份有限公司天然氣事業部公告資訊修訂                          |

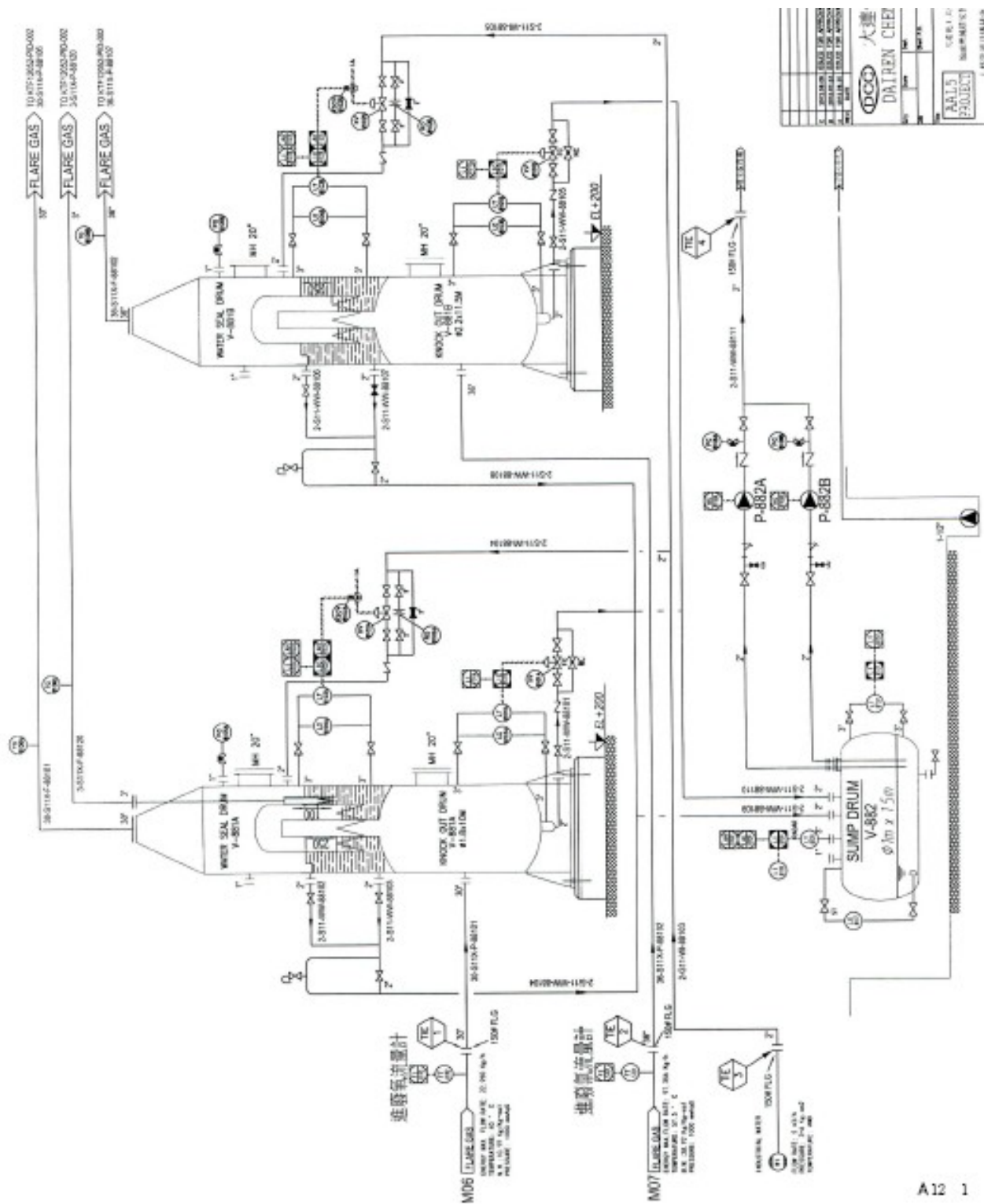
## 附件二十五、廢氣燃燒塔 PID 圖

### 一、A404 廢氣燃燒塔 PID 圖-1

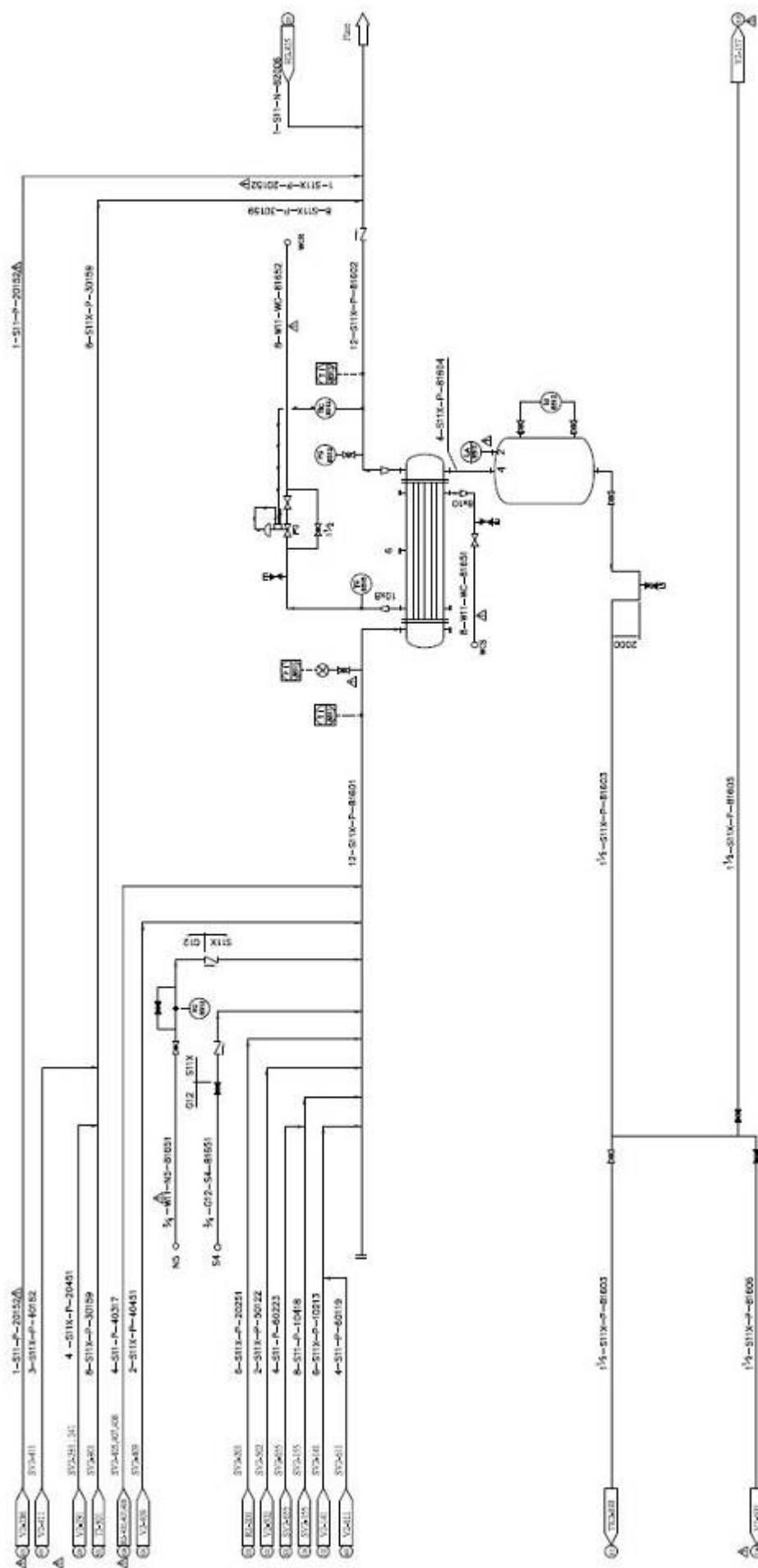




## 二、A602 廢氣燃燒塔 PID 圖-1

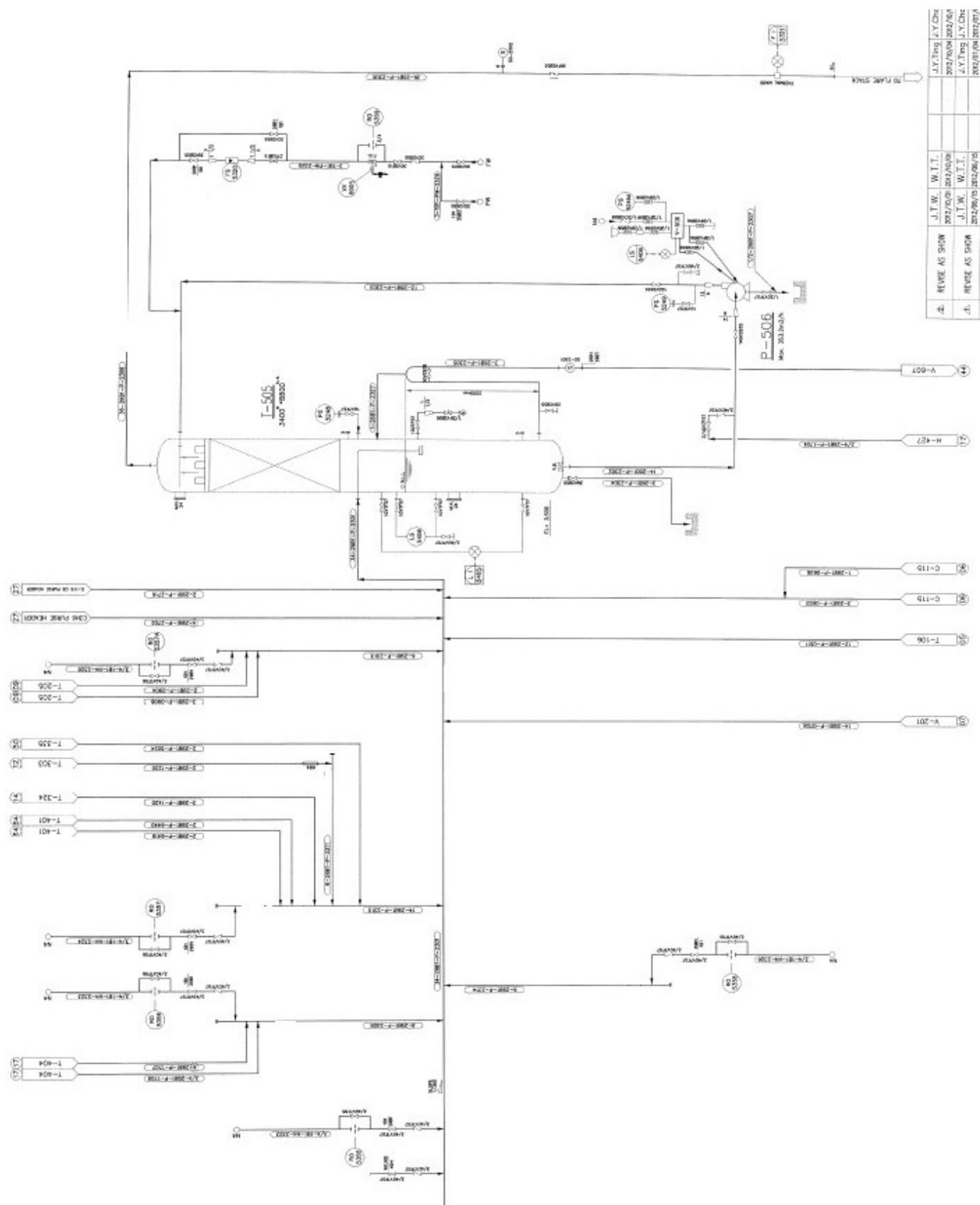


## 二、A602 廢氣燃燒塔 PID 圖-2





## 二、A602 廢氣燃燒塔 PID 圖-3



# 附件二十六、M04/M06/M07歲修期間廢氣燃燒塔排放量統計

| 108年M04歲修期間A404排放統計         |          | 107年M06/07歲修期間A602排放統計         |          |
|-----------------------------|----------|--------------------------------|----------|
| 日期                          | 廢氣量(m3)  | 日期                             | 廢氣量(m3)  |
| 108/3/15                    | 9987.34  | 107/10/2                       | 51673.88 |
| 108/3/16                    | 4072.34  | 107/10/3                       | 29006.32 |
| 108/3/17                    | 2534.34  | 107/10/4                       | 14796.14 |
| 108/3/18                    | 2366.79  | 107/10/5                       | 4597.98  |
| 108/3/19                    | 981.87   | 107/10/6                       | 10449.5  |
| 108/3/20                    | 40.95    | 107/10/7                       | 9459.4   |
| 108/3/21                    | 215.07   | 107/10/8                       | 13536.09 |
| 108/3/22                    | 30.48    | 107/10/9                       | 7045.97  |
| 108/3/23                    | 0.06     | 107/10/10                      | 2349.4   |
| 108/3/24                    | 0        | 107/10/11                      | 976.24   |
| 108/3/25                    | 48.38    | 107/10/12                      | 348.48   |
| 108/3/26                    | 0.29     | 107/10/13                      | 209.33   |
| 108/3/27                    | 15.43    | 107/10/14                      | 603.86   |
| 108/3/28                    | 1.73     | 107/10/15                      | 493.13   |
| 108/3/29                    | 0.17     | 107/10/16                      | 614.01   |
| 108/3/30                    | 0.99     | 107/10/17                      | 517.15   |
| 108/3/31                    | 0        | 107/10/18                      | 532.88   |
| 108/4/1                     | 0        | 107/10/19                      | 213.19   |
| 108/4/2                     | 0        | 107/10/20                      | 496.64   |
| 108/4/3                     | 41.37    | 107/10/21                      | 249.5    |
| 108/4/4                     | 193.41   | 107/10/22                      | 346.73   |
| 108/4/5                     | 361.08   | 107/10/23                      | 1002.5   |
| 108/4/6                     | 447.02   | 107/10/24                      | 1436.62  |
| 108/4/7                     | 571.08   | 107/10/25                      | 1459.53  |
| 108/4/8                     | 163.09   | 107/10/26                      | 1593.4   |
| 108/4/9                     | 203.13   | 107/10/27                      | 659.72   |
| 108/4/10                    | 105.31   | 107/10/28                      | 2646.9   |
| 108/4/11                    | 396.97   | 107/10/29                      | 8071.62  |
| 108/4/12                    | 452.3    | 107/10/30                      | 4113.65  |
| 108/4/13                    | 354.53   | 107/10/31                      | 2593.2   |
| 108/4/14                    | 114.5    | 107/11/1                       | 32868.35 |
| 108/4/15                    | 282.79   | 107/11/2                       | 122130.9 |
| 108/4/16                    | 294.69   | 107/11/3                       | 37749.17 |
| 108/4/17                    | 195.5    | 107/11/4                       | 4672.98  |
| 108/4/18                    | 205.18   | 107/11/5                       | 20203.7  |
| 108/4/19                    | 77.68    | 107/11/6                       | 77103.03 |
| 108/4/20                    | 45142.45 | M06/07歲修期間，A602排放量>100m3，合計36天 |          |
| 108/4/21                    | 53290.71 |                                |          |
| 108/4/22                    | 11009.36 |                                |          |
| 108/4/23                    | 10125.94 |                                |          |
| 108/4/24                    | 8770.86  |                                |          |
| 108/4/25                    | 6850.34  |                                |          |
| 108/4/26                    | 3612.71  |                                |          |
| M04歲修期間，A404排放量>100m3，合計28天 |          |                                |          |

A26-1