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# CONTINUUS PROPERZI

# Furnace Fumes Oxidation and Treatment Plant

## OPERATING MANUAL

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|---|---|
| **PROJECT NAME** | 20084 |
| PURCHASE ORDER NO. | |

DOCUMENT CODE: – – – – – – – – – – – –

| Cliente/*Customer* | Commessa/Job | CID Codice classificativo documento | Impianto Plant | Sistema System | Un. Funz. Func. Un. | Tipo doc. Doc. type |
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| Rev | Data/Date | Descrizione / *Description* | Preparato/ *Prepared* Funz. | Preparato/ *Prepared* Sign | Verificato / *Checked* Funz. | Verificato / *Checked* Sign | Approvato / *Approved* Funz. | Approvato / *Approved* Sign |
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## 1. SCOPE

This document covers minimum process requirements for operating procedure for the Furnace Fumes Oxidation and Treatment Plant in United Kingdom.

## 2. REFERENCE DOCUMENTS

The reference documents are the following:

| Ind | Description | Reference | Note |
|---|---|---|---|
| 1 | P&ID | 20084 IPMY 100 | |
| 2 | General plot plan | 20084 IPMD 001 | |
| 3 | Process Description | 20084 IPIS 100 | |
| 4 | Electric Load List | 20084 IPEL 000 | |
| 5 | I/O List | 20084 IPAL 101 | |

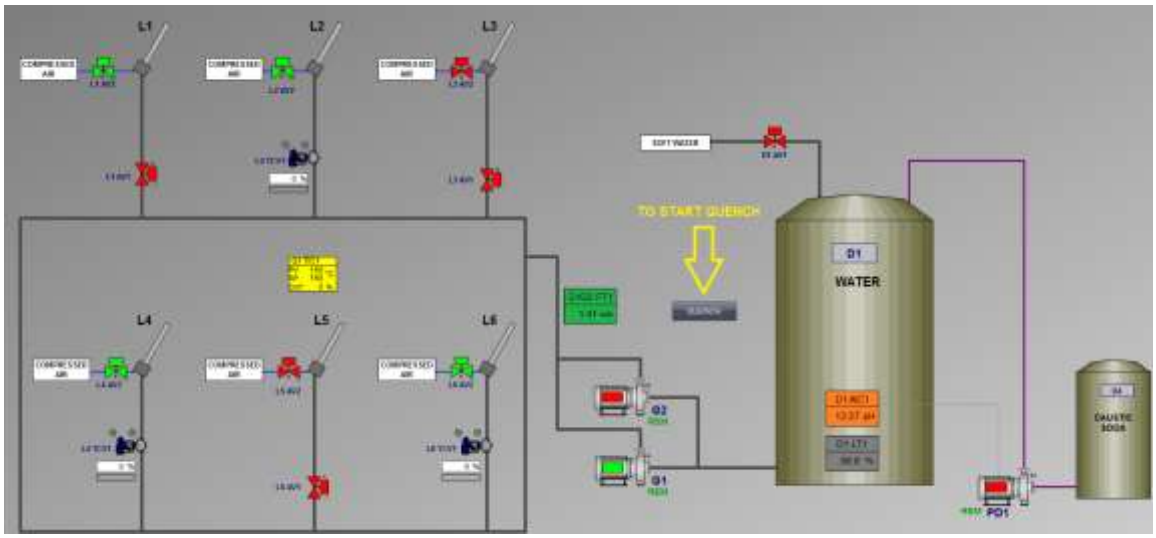
# 3. PLANT START-UP FROM SHUTDOWN CONDITION

Assure that equipment is properly installed, valves in correct position and utilities ready.

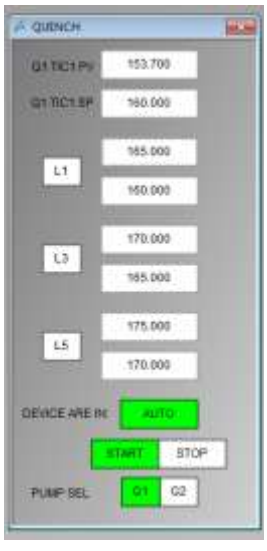
## 3.1. PRIMARY CIRCUIT

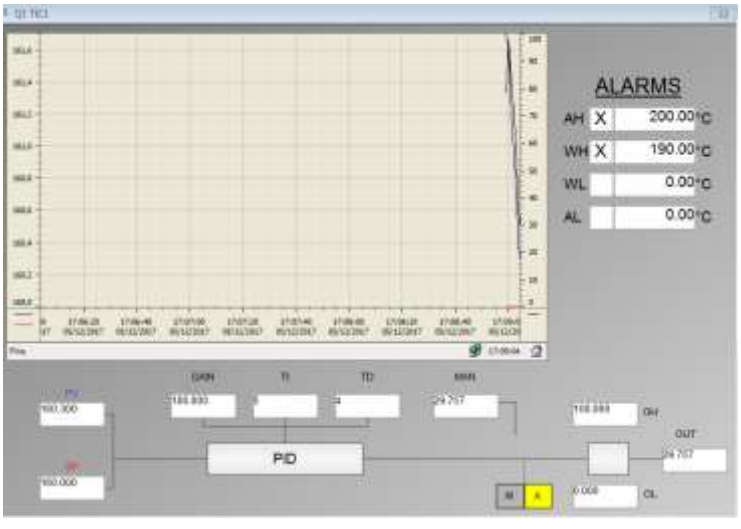
### 6.1.1 QUENCHER Q1

- **It is mandatory to start quencher Q1 before all operations and steps.**



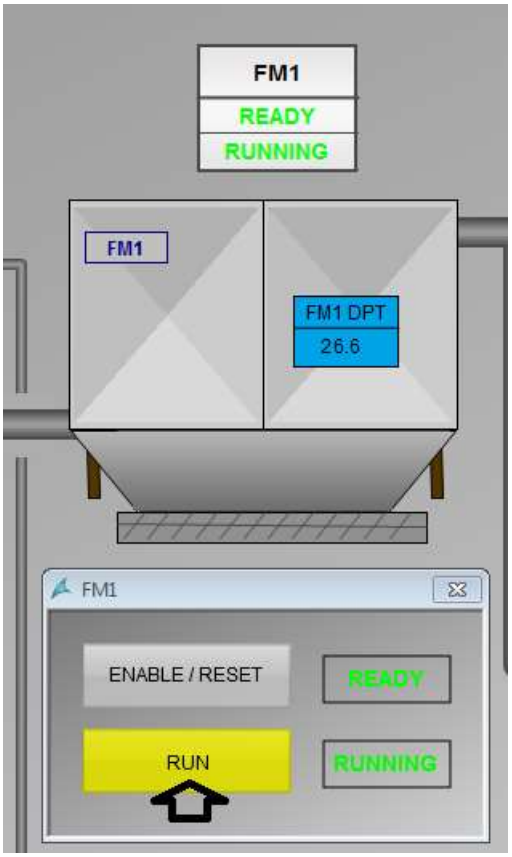

D1 is water accumulation tank to supply water for quencher lances L1, L2, L3, L4, L5 and L6 (valve must be in AUTO mode). Water refilling is controlled in automatic mode by opening and closing of D1 AV1. Low level threshold will open D1 AV1 while High level threshold will close it. There is also provision to dose caustic soda solution (25% wt. suggested) into D1 by dosing pump PD1 to increase pH level and increase acidic compounds removal in quencher Q1. pH value will start (low value 10) or stop (high value 11) the PD1 pump. By pushing START quencher is activated by starting pump G1 or G2 (stand-by). It is possible to select pump in operation. Set point is around 160°C
L1, L3, L5 are lances operated by thresholds level indicated beside.
L2, L4, L6 are lances operated by Q1 TIC1 in parallel configuration.



### 6.1.2 BAG FILTER FM1

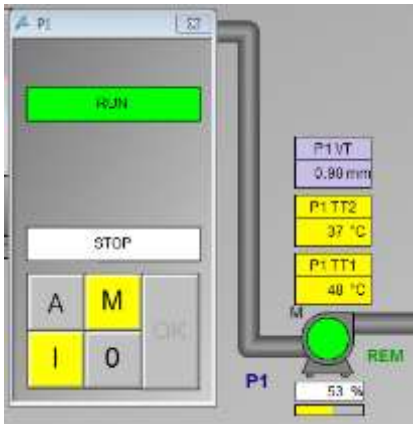
Start bag filter FM1 by pushing button indicated below:




AV1 FM1 is installed to protect filter by cooling air in case of high temperature threshold, **but it can also be opened to reduce water consumption to quencher Q1.**

### 6.1.3 ID FAN P1

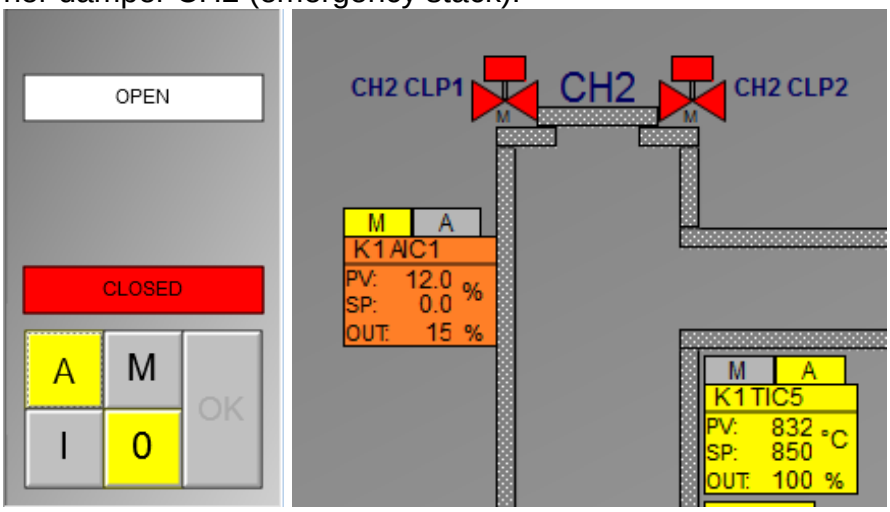
Start ID fan P1 by pushing button indicated below:



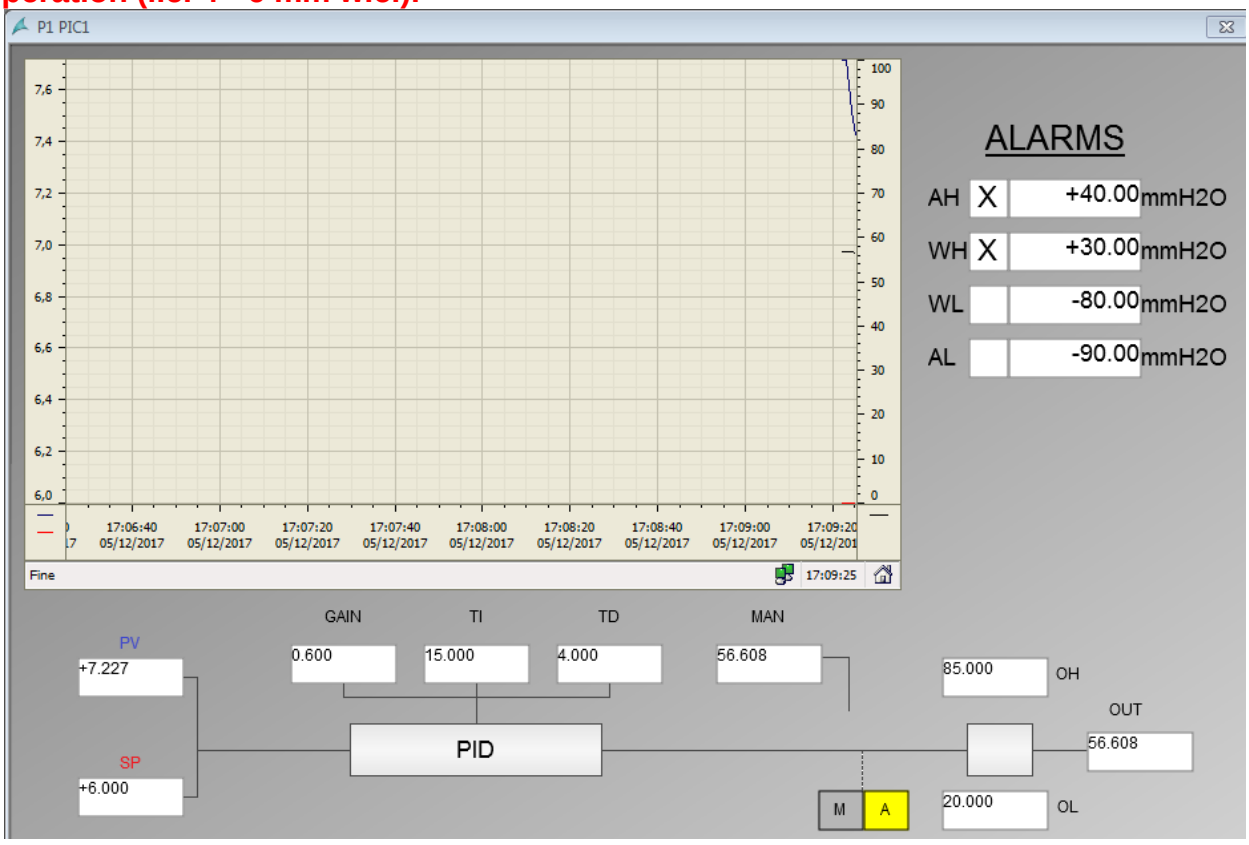

Press “M” and “OK” to confirm manual mode selected. The press “I” and “OK” to start ID fan P1 in manual at 30-40% capacity.

### 6.1.4 EMERGENCY DAMPER CH2

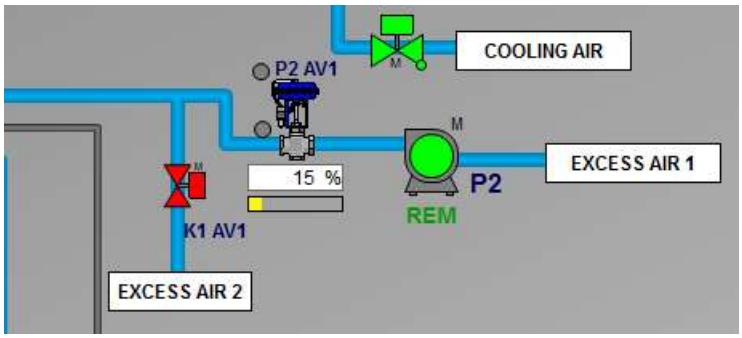
Close afterburner damper CH2 (emergency stack).



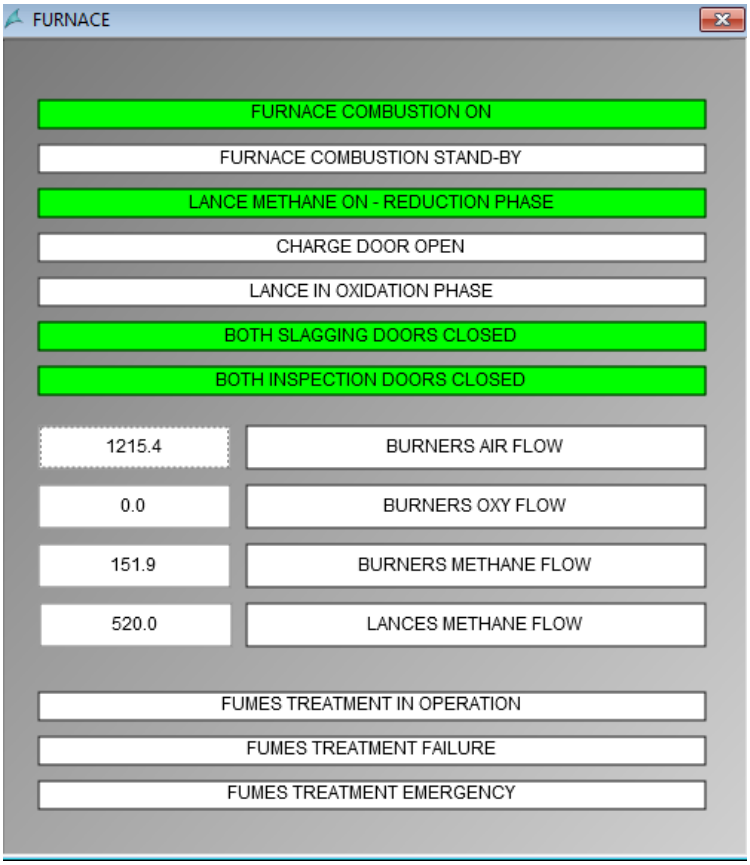

**Put P1 in automatic regulation to maintain optimal set points for refining furnace operation (i.e. 4 - 6 mm w.c.).**



### 6.1.5 EXCESS AIR FAN P2



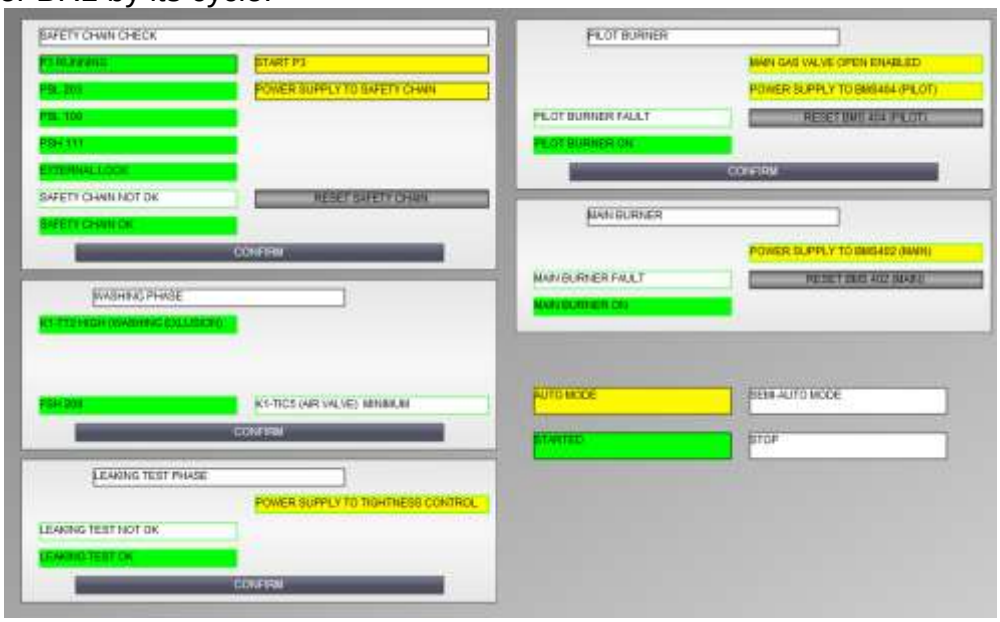

**Excess air fan P2 is very important during "REDUCTION" phase to provide combustion/excess air for methane coming from refining furnace.**
**Depending by the reaction inside the refining furnace the P2 capacity must be adjusted to maintain oxygen level higher than 6% vol (suggested 9% vol as set value) and to reduce K1 temperature below 1100°C. It is suggested to start it at 20% and increase it at around 40% during final phase of REDUCTION by adjusting control valve P2 AV1 (otherwise can be started at 40% capacity).**



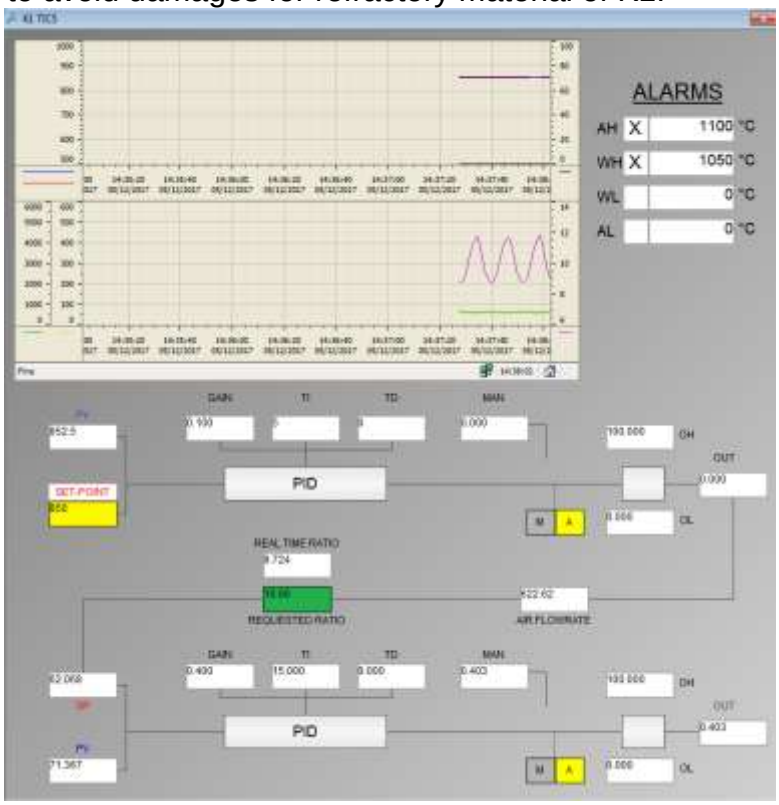

During other phases of refining furnace can be operated at 15% capacity by adjusting P2 AV1 valve.
In case of failure of P2 fan is foreseen additional air stream supplied by opening of K1 AV1 "EXCESS AIR 2".

### 6.1.6 BURNER BR1

Start burner BR1 by its cycle.

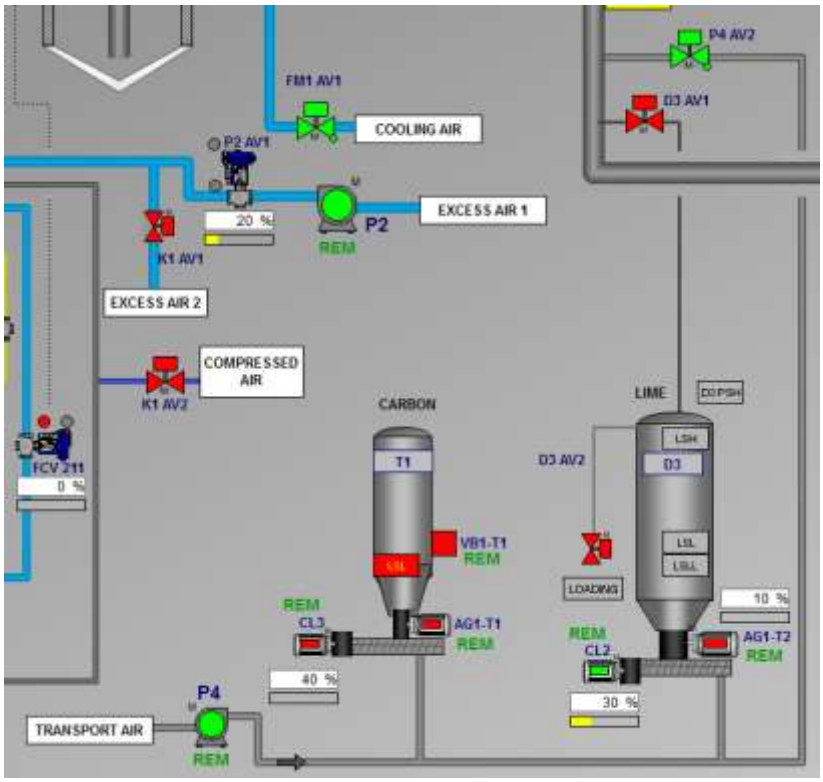



After safety chain check, washing phase (about 4 minutes) and leak test operator has to push manual “RESET BMS 404 (PILOT)” to switch on the burner (for start-up from cold condition).
When burner is sopped it will be controlled by afterburner K1 top temperature K1 TIC5 to maintain 850°C set point value. If started from cold condition is better to increase SP step by step 50°C only to avoid damages for refractory material of K1.



### 6.1.7 LIME AND CARBON DOSING SYSTEM

Lime is used for hydrochloric acid removal while carbon is used to remove dioxins and furans if any in flue gas emission.
The dosing can be started in manual if scraps have bad quality (i.e. high chloride content).




Carbon dosing cannot be started alone but always together with lime dosing.

**Lime Starting procedure (manual).**

- Open valve P4 AV2.
- Start fan P4
- Start screw CL3 at fixed speed (20%)
- Start arch breaker AG1-T2 at 10% capacity (always 3 or 5 times lower than CL2 speed)

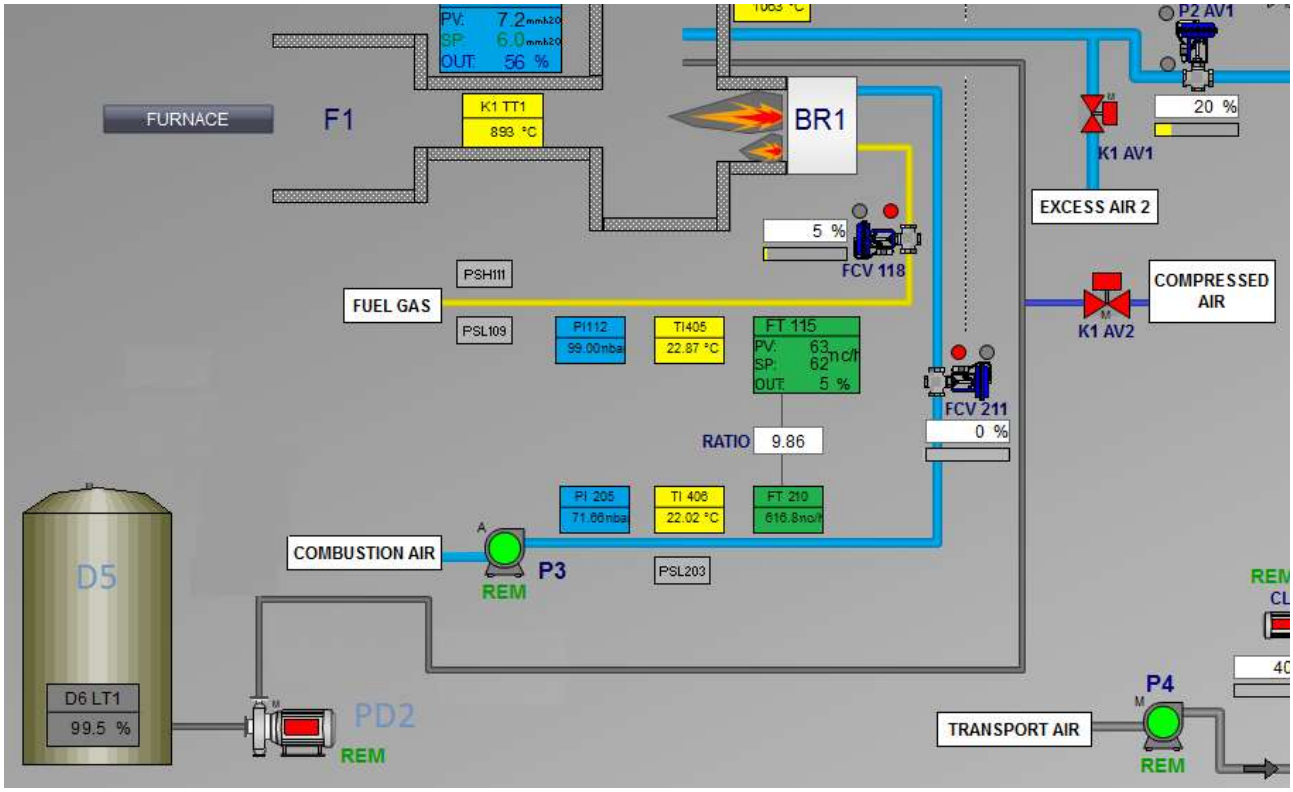
**Carbon Starting procedure (manual).**

- Start screw CL2 at fixed speed (30%)
- Start arch breaker AG1-T1
- Vibrator VB1-T1 is managed in automatic by control system.

**<u>To load lime silos D3 operator has to open first D3 AV1 and then D3 AV2.</u>**

### 6.1.8 DENOX SNCR

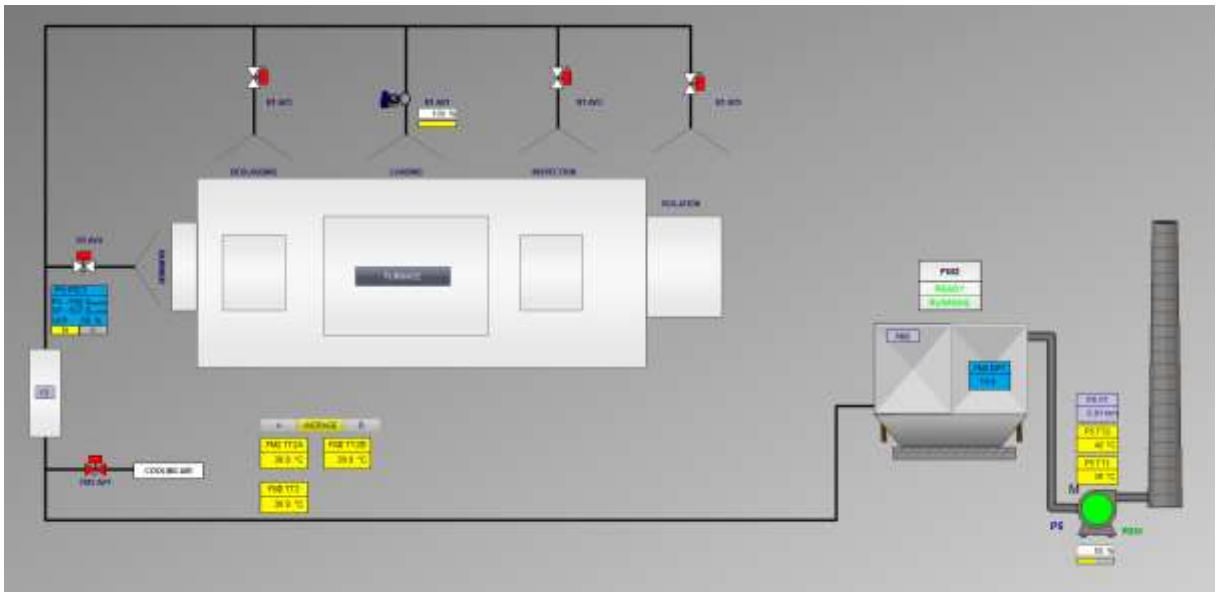
There is possibility to inject Ammonia solution inside afterburner K1 for Nitrogen Oxides removal. The procedure has to be done in manual by operator.




Install lance L7 in lower part of K1 then start pump PD2. Open the compress air to lance by valve K1 AV2.

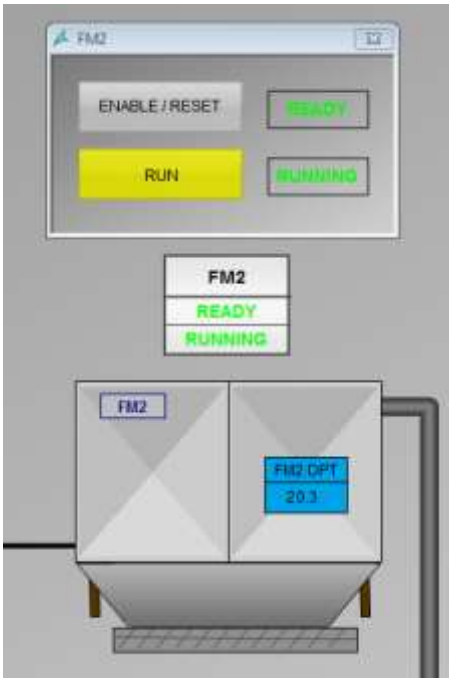
**When this system is stopped lance must be extracted.**

## 3.2. SECONDARY CIRCUIT



### 6.1.9 BAG FILTER FM2

Open valve AV1 B1 to open hood above refining furnace. Start bag filter FM2 by pushing button indicated below:




AV1 FM2 is installed to protect filter by cooling air in case of high temperature threshold.
**In case of high high temperature alarm refining furnace door must be closed.**

### 6.1.10 ID FAN P5

Start ID fan P5 at 50% capacity.

## 4. SHUTDOWN

**Fumes Treatment Shutdown procedure (manual).**

- Stop burner BR1;
- Open damper CH2;
- Stop P1;
- Stop FM1;
- Stop P3 and P2 if temperature inside K1 is below 650°C.
- Stop G3 if started;
- Stop quencher;
- Stop pump G1 or G2;

**Carbon Shutdown procedure (manual).**

- Stop arch breaker AG1-T1
- Stop screw CL2 after 1 minute from arch breaker stop.

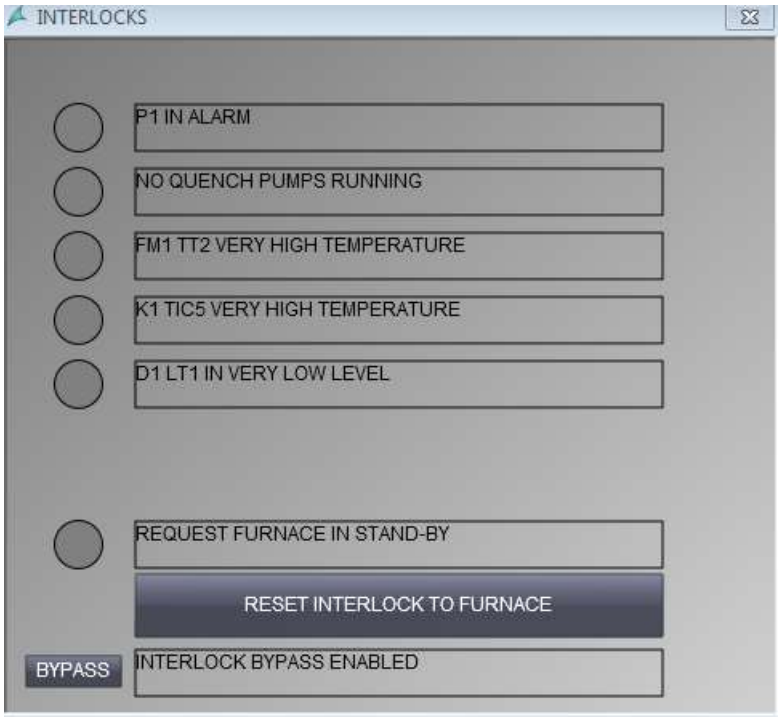
**Lime Shutdown procedure (manual).**

- Stop arch breaker AG1-T2
- Stop screw CL3 after 1 minute from arch breaker stop
- Stop fan P4 after 2 minutes from screw stop to clean all ducts
- Close valve P4 AV2.

## 5. SET POINTS

| SET POINT | DESCRIPTION | UNIT | SUGGESTED VALUE |
|---|---|---|---|
| P1 PIC1 | Inlet pressure to fumes treatment | mmH2O | 4-6 (check with furnace) |
| K1 TIC5 | Afterburner K1 top temperature | °C | 850 |
| Q1 TIC1 | Quencher Q1 outlet temperature | °C | 160 |
| FT115-FT210 | Air / Fuel ratio burner BR1 | ratio | 10 - 11 |
| K1 AIC1 | Oxygen | %vol | To be adjusted to maintain values higher than 6% vol (9% suggested) |
| P2 AV1 | Excess Air valve opening | % | 20 – 40 (reduction) |
| CL2 | Lime Screw Capacity | % | 30 |
| AG1-T2 | Lime Arch Breaker Capacity | % | 10 |
| CL3 | Carbon Screw Capacity | % | 30 |
| B1 AV1 | Hood valve opening | % | 100 (if alone) |
| P5 | ID Fan P5 capacity | % | 50 |
| P5 PIC1 | Inlet pressure to secondary | mmH2O | -150 |

# 6. INTERLOCKS




In case of test of fumes treatment and furnace is possible to disable the above interlock by using BYPASS button.

## 6.1. EMERGENCY SHUTDOWN LEVEL 1

In case of failure of emergency stack “damper” CH2 opening (discrepancy in opening limit switches) refining furnaces must be stopped.

## 6.1. EMERGENCY SHUTDOWN LEVEL 2

CAUSES:

- P1 stop or failure;
- G1 and G2 both stopped or failure;
- High high temperature K1 TIC5;
- Hardwired safety temperature high high alarm;
- High high temperature FM1 TT2;
- Low low level D1 LT1.

EFFECTS:

- BR1 stop;
- Damper CH2 open;
- Stop P1 (after that CH2 is open);
- Stop G3;
- Stop lime and carbon dosing if started;
- Alarm signal to refining furnace to reduce at minimum burner capacity.

### 6.2. BURNER BR1 FAILURE

CAUSES:
- P1 stop or failure;
- High high temperature K1 TIC5;
- Hardwired safety temperature high high alarm;
- High high temperature FM1 TT2;
- PSL 109 gas;
- PSH 111 gas;
- PSL 203 air;
- No flame for pilot and main burner.

EFFECTS:
- BR1 stop;

### 6.3. HIGH TEMPERATURE FM1 TT2

CAUSES:
- High temperature FM1 TT2;

EFFECTS:
- FM1 AV1 opened;

### 6.4. HIGH TEMPERATURE FM2 TT2

CAUSES:
- High temperature FM1 TT2;

EFFECTS:
- FM2 AV1 opened;

### 6.5. REDUCTION PHASES

CAUSES:
- Refining furnace in reduction phase;

EFFECTS:
- P2 started if stopped;
- P2 AV1 opened at fixed value 25% (settable, can be changed later by operator).