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Keep up with COVID-19 by taking the right measures for your Air Pollution Control Equipment

Bringing you knowledgeable insights and information that will keep your Air Pollution Control Equipment up and running during and post lockdown period. Kindly refer to the Standard Operation Procedures (SOP) for the equipment that is applicable to you.

THERMAX ENVIRO DIVISION

ESP Start Up Sequence

- Energise hopper heaters and insulator heaters twelve hours prior to flue gas passing through the precipitator
- Check healthiness of hopper level before plant start up
- No annunciation is persisting on the MCC
- Switch ON dust-conveying system below ESP hoppers and rapping system as well as purge air systems one hour prior with plant start up
- TR sets can be charged one by one, after consistency of ESP inlet temperature at its design value which should be always 20˚C above acid dew point of flue gas temp
- Charging & fine tuning of TR sets is preferred from last field to first field of ESP
- Set TR set mA value for steady mA parameters with min. sparks. Sparks up to 10 per min are allowed

ESP Shut OFF procedure:-

- Switch OFF all TR panels, after switching OFF ID fan
- Switch OFF Purge Air Blower system after switching OFF TR sets
- Keep rapping system ON for at least 4 hours, after switching OFF TR panels
- Switch OFF support insulator heaters and hopper heaters after 4 hours of TR sets witching OFF
- Keep dust conveying system ON till all hoppers are evacuated

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Safety Precautions Before Entering Inside ESP

- Do not open ESP's inspection door until TR sets are OFF & ID Fan is OFF
- Ensure all hoppers are empty
- Switch OFF Power Supply of all TR set. Remove fuses from electrical supply and put "MAN AT WORK TAG" on TR panel and MCC panel
- Switch OFF heater system (hopper & support insulator), Rapping System, RAV / Screw Conveyor system, Purge air blower
- TR set's earth switch must be in "GROUND" position and "D" type keys are in trapped condition with release of "G" (Ground) keys
- The "G" (Ground) keys require for key exchange box, for releasing ESP inspection doors keys ("B" Type)
- Trapping "B" type keys can unlock and respective inspection door can be opened
- Do not enter ESP as soon as man-hole doors are opened. Allow fresh Oxygen to enter in ESP, to cool down ESP inside temperature. ID fan operation at lower speed can be used for this purpose
- Temperature inside ESP should be normal and safe for human
- Using manual grounding hooks, do earthing of discharge electrode before entering ESP
- Use of 24VDC power supply is recommended during ESP inspection.
- It is recommended to have one responsible person outside man-hole while inside works are in progress
- Do not use ESP earth grid for welding earthing purpose
- In case of any welding work of discharge system, provide separate earthing nearer to welding spot. This is essential to avoid passing of high current through TR set causing damages to TR set internals.

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CONTROL & INTERLOCKS

- **Mechanical door interlock system:** The system ensures that no person can enter inside the ESP unless all the Transformer Rectifier units are de-engerised, isolated and grounding switches of TR sets GS-1 to GS-5 (For chamber-1 & chamber-2) are in ESP grounded position.
- **Thermostatically controlled Insulator Heater:** 700 W air heater is provided around each support insulator. A thermostat is provided in the pent house (TC-9) for chamber-1 & chamber- 2 to maintain the temperature at 85°C.
- **Thermostatically controlled hopper heaters:** Hopper heating pads are provided in bottom one third part of the hoppers to avoid condensation & ensure free flow of dust. The heating pads are thermostatically controlled (TC-1 to TC-10) for chamber-1 & (TC-11 to TC-20) for chamber-2. The temperature is maintained upto 110°C. Max.
- **Level switches in the hopper:** R.F. capacitance type level switches (LSH1 to LSH20) for chamber-1 & chamber-2 is provided in each hopper for "High" level measurement and "High High" level measurement. The first level switch (for High Level) operates when ash level inside the hopper rises & touches the level switch probe. The level switch gives signal to the audio visual alarm annunciator provided in the MCC to indicate high ash level in the hopper & for alarm signal for control room. The second level switch (for High High level) gives signal to the audio visual alarm annunciator provided in the MCC to indicate High High ash level in the hopper & for alarm signal for control room & trips the TR Set. Even after tripping of TR Set, an ash continues to build up in Hopper, and If the high high level alarm is persisting for 10 nos. of TR sets, it is advised to stop the ID fan immediately after 30 minutes time delay. This prevents ash building up in the hoppers, which ultimately shorts the e-Tubes & collecting plates.

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CONTROL & INTERLOCKS

- **Temperature monitoring system for hopper:** RTD (PT-100) for chamber 1 and chamber 2 are provided in each hoppers. These RTD output is connected to TIC for chamber 1 & chamber 2 mounted on Motor Control Center. There are two set points –
  First set point – Hopper temp high (Operating temp + 20 °C)
  Action – Audio visual alarm in MCC and alarm signal to control room.
  Second set point – Hopper temp high high (Operating temp + 50 °C)
  Action – Audio visual alarm in MCC and alarm signal to control room
  Trip the respective field TR set
  Trip the ID fan
- **Purge Air System (Chamber 1 & Chamber 2):** Purge air blower ensures positive air pressure inside the pent house with respect to ESP casing. The air flows along the inside surface of the support insulators thereby keeping the insulators clean. All the TR sets are wired for tripping in case the Purge Air Blower Trips. Thermostat is provided in PAH to protect from overheating. The temperature is maintained upto 110°C. Max
  Start Sequence – Purge Air Blower ON
  Purge Air heater will be start
  Stop Sequence – Purge Air heater OFF
  Purge Air Blower will be switched off after a time delay of 5 sec.

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CONTROL & INTERLOCKS

- **Hopper Vibrators:** It is recommended that Electromagnetic vibrators to be in service to ensure smooth flow ability of ash in the hoppers. The ON/OFF time of vibrators can be controlled by ON/OFF timer.
- **MTP (Micro Tapper Panel):** Rapping system shall be put ON all the time when ID Fan is running irrespective of ESP is charged or not.
- **Dust conveying system (Customer scope):** Dust conveying system shall be ON (Running) all the time. If dust conveying system tripped / stopped all TR sets, all dust discharge equipment shall trip.
- **I.D. Fan interlock (Customer scope):** If dust discharge equipment stopped or tripped, then ID fan to be stopped or tripped & signal to DCS to be provided. Provision for this interlock to be provided in customer's panel. Customer to ensure this interlock is implemented.
- **Main Fuel Valve interlock (Customer scope):** If the fuel Valve tripped / stopped all TR sets, all discharge equipment shall tripped.

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ALARMS

A) Motor Control Center: (Common for both chambers)

- High ash level in the hoppers (for chamber-1)
- High High ash level in the hoppers (for chamber-1)
- Hopper temp High (for chamber-1)
- Hopper temp High High (for chamber-1)
- Purge air blower-1 tripped (for chamber-1)
- High ash level in the hoppers (for chamber-2)
- High High ash level in the hoppers (for chamber-2)
- Hopper temp High (for chamber-2)
- Hopper temp High High (for chamber-2)
- Purge air blower-1 tripped (for chamber-2)

B) Transformer-Rectifier control panel:

- (Note: The following alarms will be indicated on the TRCC controller LCD display)
- Transformer oil temperature high alarm
- Transformer oil temperature high trip
- Transformer Buchlotz relay alarm
- Transformer Buchlotz relay trip
- SCR temperature high trip
- Over voltage trip
- Under voltage trip
- Thermal overload trip

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INDICATIONS

A) Motor Control Center: (Common for both chambers)

- Incomer feeder: R, Y, B phase indicating lamp.
- Breaker: ON, OFF and Trip lamp
- T/R sets feeder: Supply ON, OFF lamp
- MTP Panel Feeder: Supply ON, OFF lamp
- Electrical Hoist Feeder: Supply ON, OFF lamp
- Lightening Feeder: Supply ON, OFF lamp
- Insulator Heater: Supply ON, OFF & Temp. trip lamp
- Hopper Heater: Supply ON, OFF & Temp. trip lamp
- Purge Air Blower feeder: Supply ON, OFF & Over load trip lamp
- Purge Air Heater feeder: Supply ON, OFF & Over load trip lamp
- Control Transformer Feeder (Chamber 1 & 2): Supply ON lamp
- Annuciation + Level switch feeder: Level high and high high lamp for each level switches and temp high and high high lamp for each TIC

B) Transformer-Rectifier control panel:

- Mains ON lamp
- HT ON lamp
- Alarm / Trip lamp

C) MTP Panel:

- Mains ON lamp
- Rapper ON lamp
- Rapper Fault