# MM/FBC&HRSG/BHEL/TRICHY-14

REF:FBC&HRSG/PUR/TRANS/5312 Date: 12.12.2008

## Special Condition

This tender is for Translation of Documents from English to French.

- Translation of documents such as O&M manuals, Quality documents and some other critical drawing related to one of our export contract.
- The approximate quantum of Translation is Four Lakhs Words.
- The documents for translation will be provided in 5 to 6 stages with in a period of 2 years.
- The translated documents to be submitted both hard copy and soft copy.
- Your offer will be technically qualified only if your sample translation is approved by our customer. For this purpose we have enclosed eight pages of documents in English. This to be translated in French and the same has to be submitted along with the technical offer.

The offer has to be submitted in two sealed covers. One cover consisting of technical and commercial conditions another cover should have prices.

The commercial offer shall contain the following:

- Time frame for submission of translated documents from the date of receiving the English text.
- Payment Terms: BHEL std payment terms is within 45 days from the date of submission of the translated documents. English word count will be used for payment.
- LD at the rate of 0.50% per week and a maximum of 15.00 % is applicable for the delayed period.
- Any other applicable such as service tax to be indicated.

The technical offer shall have the sample translated documents along with the vendors credentials.

The offer should reach our office on or before 07.01.2009.

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## 1.0 INTRODUCTION:

1.1 The operating manual covers a functional description of the plant, information on the sequence of operations and functional logic of the individual plant components as well as separate descriptions of the individual units and their maintenance.

It is beyond the scope and intent of the operating manual to provide instructions for all the possible operations and control actions, which may be required for the operations of the boiler system. It should be noted that the present operating instructions are no substitute for the thorough instructions of the operating personnel into the details of plant operation.

The supplier does not assume any responsibility for damage resulting from faulty operation of the plant.

Proper plant operation presupposes continuous plant supervision by skilled operators and effective communication between the control room personnel and the operators in all major plant areas.

It is prohibited to deactivate or bridge safety systems such as electric interlocks and flame monitoring systems nor is it allowed to deactivate individual functions of these systems.

Moreover, the latest editions of the relevant national regulations and/or company's in-plant regulations have to be taken into account, as specific operation instructions of the respective items.

1.2 Duties Of The Operating Personnel

The duties of the operating personnel comprise the checks and preparatory work for plant startup, actual plant startup as well as supervision of plant operations, shutdown and maintenance.

When changing shifts, care has to be taken that the personnel of the relevant shift does not leave its working place before plant operation has been taken over by the next shift, i.e. the new shift has to be properly informed of all events which occurred during the previous shift.

Shift logs should contain the following minimum information broken down by type of activity and indicating the time when this activity was performed:

1. Functional checks.
2. Startup
3. Shutdown

4. Abnormal operating conditions such as abnormal noise generations, leakages, pressures, temperatures, excessive vibrations etc.
5. Failure of major components and
6. Instrument readings.

If the plant operators identify operating upsets or other irregularities, these should, if possible, be immediately remedied and reported to the supervisor. Plant monitoring and control instruments have to be read at regular intervals during plant operation and the readings entered into the shift log.

The supplier retains the right to revise or supplement the operating instructions, if this seems to be expedient in the light of new operating experience.

The operating manuals submitted to the plant owner should be treated with due care to make sure that they are available whenever they are needed. In this connection, special care should be exercised to ensure that individual pages or chapters are not taken out of the manuals.

The plant owner is requested to inform the supplier of any new operating results so that the original operating manual can be revised and/or supplemented accordingly.

## 2.0 PLANT START-UP

2.1 Preparation:

2.1.1 CFB Firing System

The combustor is empty. All units are out of operations. The pre commissioning work should be started in due time (about 24 hours) before the scheduled startup.

Before proceeding to startup, make sure that the following pre-commissioning work is carried out and/or the following requirements are satisfied:

Check that all units, equipments, piping, ducting and adjacent areas are free from foreign mater.

Check that all openings are properly closed.

Check boiler, air and flue gas ducting for gas leakages; check expansion movement of boiler and associated piping, set pipe hangers.

Make sure that all plant components are properly insulated. Check all units for full functionability; this also includes preparing the electrical drives for starting.

Check that all valves and dampers are workable; grease spindles and adjust stuffing boxes.

Subject all remote-controlled elements (such as butterfly valves, shutoff valves, gate valves) to a cold test.

Set all relief valves.

Check and adjust the cooling water and compressed air systems.

Commission the power supply

Check oil levels, clean strainers and filters.

Test and calibrate all instruments; inspect and set limit and position indicating switches.

Calibrate rotary valves.

All oil-lubricating systems are ready for operation.

The measuring and control system has been checked, is ready to start and has been set to MANUAL.

Instrument air supply to the individual components has been checked and all valves in the instrument airlines are open.

All LOCAL switches are set to REMOTE.

Inspection doors and openings are closed and have been checked for tight sealing and that nobody is inside.

Seal air is available.

The seal air supply piping to the individual consumers has been checked and the required air rates adjusted:

Electrostatic precipitator is ready for operation.

The steam supply system is ready for operation and the requisite steam piping to the individual consumers has been drained.

The steam tracer or electrical tracing of the oil system is ready for operation and activated.

The valve positions (steam) on the oil lances and burners have to be checked to ensure that no steam condensate can enter the lances and/or the burners.

All lances and burner tips are cleaned.

Local check of startup burners/oil lances and oil station.

Clean the flame monitor nozzles.

Clean all sight glasses.

Check the valve positions in the seal airlines (all valves must be open considering the commissioning instructions).

The purge air system is ready for operation and the individual purge air rates have been adjusted.

Check purge air supply to the individual consumers especially to the oil lances operator consoles,

Introduce the cleaned oil lances into the empty CFB combustor, connect the oil and steam hosing and make sure that seal and purge air supply is established.

2.1.2 Water / Steam Section

The boiler is free from leaks (hydro test has been successfully completed).

The stuffing boxes of the water/steam valves have been leak-checked.

The system is properly insulated and the insulation is free from damage.

The locking devices on the constant and spring hangers have been removed.

Valve positions in the boiler feed water, steam and condensate system have been checked.

Drains and vents are checked and ready for operation.

Feed water is available in sufficient quantity and adequate quality.

Feed water pumps are ready for operation (see manufacturer's operating instructions).

The boiler feed water and blow-down control are ready for operation.

Blocking devices have been removed from the safety valves.

Superheater start-up vent valves are ready for operation.

Instrument air supply to the safety valves in the boiler drum and superheater section is established.

Turbine Bypass including attemperator is ready for operation.

Spray water valves are ready for operation.

All soot blowers are in REST position; operation is checked prior to start-up.

2.1.3 Fuel And Limestone Feeding Systems, Ash Discharge Systems

Oil system is ready for operation. The electrical tracing is switched on.

Lignite feed system is ready for operation.

Lignite bunker is filled above the minimum level.

The layer height on the lignite feeder has been adjusted to suit the type of lignite.

The oil filters are cleaned. The oil pumps are maintained.

Valves in the instrument air lines are open.

Valves in the purge air and seal air lines are open.

The limestone silo is filled with limestone of the specified quality.

The purge air and bin aeration systems are ready for operation and activated.

Ash discharge system ready for operation.

2.1.4 Motor Driven Equipment

The following pre-operational checks on motor driven equipment should be applied as minimum requirements:

Make sure both driving and driven equipment are correctly lubricated before start-up.

Run-in and vibration test all motors, uncoupled before first run.

Turn drive shafts for all fans and blowers by hand if size permits, to make sure impellers rotate without bumping or rubbing.

Start the following equipment a few revolutions with drives to check for correct rotation without bumping or rubbing:

a. Rotary valves for lignite, ash and limestone

b. Feeders for lignite

Check all motor operated valves for correct function and minimum possible position (open/close).

2.1.5 Startup Prerequisites

The boiler and firing system are ready for operation.

The startup prerequisites listed under are fulfilled and the requisite checks have been carried out.

Start Up Preparations

2.2 Filling Of Boiler Section

Prior to startup, the boiler has to be filled with boiler feed water up to the normal water level.

Boiler filling is carried out manually.

The boiler feed water must conform to the specified quality standards.

2.3 Filling the CFB Combustor and Fluid Bed Heat Exchanger with Bed Material

If the CFB combustor is empty, it has to be filled with bed material prior to start-up to protect

the nozzles from direct exposure to the flame during start-up operation. Moreover, the combustor has to be at least partially filled to permit controlled combustion in the ash bed. Oil and lignite firing in a combustor without sufficient ash inventory would cause uncontrollable temperature peaks resulting in damage to the nozzles, thermocouple sleeves and also possibly to the refractory. Moreover, the ash in the CFB-system could melt or sinter. For this reason, authorization for oil or lignite firing is subject to a minimum $\Delta p$ (ash inventory).

Although filling of the fluid bed heat exchanger is not absolutely required before restarting the plant, this is recommended to ensure a sufficient supply of bed material in order to attain steam generation rates over 30% full load within the shortest possible time.

Whenever possible, ash from the combustion system should be used for bed build-up, as this is best-suited material. If ash is not available, quartz sand with a size distribution of 90 – 95% between 50 and 300 $\mu$m can be used for bed buildup. Quartz sand is highly abrasion resistant and relatively insensitive to the temperature peaks occurring during startup operation. However, generally, any kind of burned-out ash will be suitable for start-up operation provided that it has the necessary size range, a very low moisture content and not too low softening point.

Filling the CFB Combustor

The bed material silo will be filled with starting material (sand or ash). Filling of the CFB combustor is accomplished gravimetrically via the bed ash rotary valve from the bed material silo into the combustor.

The inventory of the stationary bed in the combustor should be about 1 m of ash. A bed height of about 1m ensures reliable preheating operation at a sufficient heating rate. If the steam generating capacity is to be increased, it may become necessary to charge additional ash after changeover to oil firing (normal operation) in order to maintain the required $\Delta p$. Additional ash has to be charged in any way when proceeding to lignite firing.

Filling the Fluid Bed Heat Exchangers (FBHE)

Filling of the FBHEs during normal operation by feeding ash from the recycling cyclone takes a long time as the ash inventory of the FBHEs are considerably higher than that of the CFB combustor. Therefore it is recommended that the FBHEs will be filled with bed material

or with system ash prior to start-up.

In principle, bed build-up in the FBHE can be accomplished by feeding circulating combustor ash via the cyclone and spiess valve.

For feeding via the spiess valve, the FBHE blowers for the bundle, the empty champers and the primary air fan have to run during the first filling operation. The spiess valve must be open. Moreover, the bed inventory in the CFB combustor has to be complemented by charging ash until a sufficient bed has been established in the FBHE. Filling operation requires the operator attendance, as the air inlet dampers to the individual FBHE empty chambers have to be adjusted until the FBHE is filled.

Adjustment of the above air rates will ensure that the start-up material flowing into empty chambers from the sealpots is gradually moved to the bundle chambers by the air stream. At first, the air rate in the empty chamber will drop (assuming that the FBHE was completely emptied previously). This is indicative of an increasing material bed and hence an increased resistance to be overcome by the airflow. As a result, the air rates in the remaining empty chambers will increase accordingly. Therefore the airflows through these chambers have to be continually readjusted to the original levels by slightly throttling the air inlet dampers to these empty chambers. After the FBHE has been filled, repeat the same procedure for the second FBHE.

Once the maximum filling level has been attained in the last FBHE, the bed material feeding can be stopped.

**Important Note:**

When readjusting the air inlet dampers for the FBHE empty chambers during FBHE filling, care should be taken to ensure that at least one of the dampers is fully open. In principle, all dampers should be set to the maximum possible opening position as long as the air rates remain stable. Throttling of the air inlet dampers without any impermissible fluctuations in the air flow will result in an excessive pressure increase and hence cause the safety valve to respond. Once the safety valve has been activated, the airflow to the FBHEs is interrupted and the material in the empty chambers is not longer fluidized as the air is blown off via the safety valve. In such a case, the air inlet dampers have to be set to a wider opening angle to prevent the pressure relief valve from venting the air to atmosphere.

## 2.4 PLANT START-UP

### 2.4.1 GENERAL

On the one hand, the boiler should be started up as quickly as possible to save both time and money while on the other, care has to be taken to ensure gentle operating conditions to prevent damage to the refractories in the CFB combustor, cyclones, sealpots and the fluid bed heat exchangers and the water/steam circuit, in particular the superheaters in the convective pass and FBHEs.

For plant start-up, a distinction is made between

-cold start-up,

-warm restart,

-hot restart.

The criteria for this classification are the lower and middle combustor temperature. The term "hot restart" refers to temperatures above 700°C, where a restart directly with lignite is possible. The term "warm restart" refers to temperatures above 600°C, where the use of bed lances is required for restart, and the term "cold start-up" refers to temperatures below 600°C, where the use of the start-up burners is required for restart.

As a rule, the maximum permissible temperatures, temperature gradients and pressure increases stated in the following chapters shall not be exceeded.

Moreover, the manufacturer's operating instructions for the individual units have to be taken into account.

### 2.4.2 Transient Operating Conditions

Following transient operating conditions can occur:

a) Heating-up to operating temperature after long shut-down (> 60 hr),

b) Heating-up after short shut-down (<60 hr),

c) Cooling-down (by heat loss) during short operating upset (< 60 hr),

d) Controlled shut-down within 12 hr and

e) Purging after trip of bed lances (for the next attempt of heating-up).

Heating-up and cooling-down should be done with a temperature gradient of: 50 to 100 °C/hr. For detail of gradients, refer to refractory manuals.

Heating-up time for the FBHEs can be reduced according to its control characteristic.