

# Good boiler operational practices

Steam blowing



# **STEAM BLOWING OF** **BOILER & PIPING**

1. Steam blowing is done to remove the mill scales, weld bead deposits, pipe slag, loose materials that might have entered into the Superheater & steam piping system during the course of boiler fabrication, storage, erection or repair.
2. Failure to clean the superheater & steam piping would lead to turbine blade damage.

# *Principle of steam blowing*

# Principle of steam blowing

- ✓ The principle of steam blowing is to give a thermal shock and dislodge scales.
- ✓ These scales are subsequently driven by the dynamic velocity of the expanding steam.
- ✓ Pressure is built up in the boiler, and then released through the steam lines.
- ✓ The Steam carrying coils and steam piping are allowed to cool after a blow.

# Principle of steam blowing

- ✓ The cyclic heating, cooling, blowing is repeated until the steam emerging from the steam blow piping is observed clean.
- ✓ The effectiveness of the cleaning is determined by the use of a target plate placed at the outlet of blow piping.

# Principle of steam blowing

- ✓ During the steam blowing operation, the pressure drop allowed shall be limited to corresponding saturation temperature change of 40 deg C.
- ✓ It is standard practice to limit the no off blows per day to 6 to 8, at an interval of 2 hrs with overnight cooling.
- ✓ The steam blowing pressure is usually about half the rated steam pressure of the boiler.

# Principle of steam blowing

- ✓ Pressure release can be done & fire can be put off. This is called puff method.
- ✓ At the time of pressure release the steam generation can be increased to sustain the blow for a longer duration, say 10-20 minutes. This is called continuous blow method.

# *Preparation for steam blowing*

## Preparation for steam blowing

- Boiler erection should have been completed with all assemblies, valves and fittings.
- Boiler auxiliaries such as fans, feed pumps should have been trial run and the Deaerator made ready for operation.
- Boiler instrumentation and control panel should be made ready for regular operation.
- Supply of adequate fuel and Dematerialized water prior to starting the operation.

## Preparation for steam blowing

- It is preferable to mass flush the major pipelines before commencing the operation. Refractory & Insulation work should be completed.
- All scaffolding, temporary supports, Debris arising out of refractory work (such as bricks, Slag wool, stubs, wire mesh) should be cleared off
- Provision should be made for permanent lighting facilities at all operating floor levels.

## Preparation for steam blowing

- Availability of adequate trained personnel shall be ensured.
- Suitable fire fighting Equipment (such as CO2 or foam type fire extinguishers, sand buckets etc) shall be made available at suitable convenient locations and Persons working in the area shall be conversant with their usage.

## Preparation for steam blowing

- The thermowells, desuperheater spray nozzle and the orifice plates in the superheater and main steam line shall be removed prior to steam blowing operation.
- If flanged type NRV is used the same shall be removed from the line. Or else the internals shall be removed from the NRV.
- If any welded flow nozzle is provided the same shall be removed prior to steam blowing.

## Preparation for steam blowing

- The temporary piping to blow off the steam shall be erected with provision for thermal expansion and at the same time the support shall withstand the reaction force that would develop during steam blowing.

## Preparation for steam blowing

- Target plates shall be made ready. The target plates shall be polished MS/ Brass / copper or aluminum strips properly fitted on MS supports.
- Provision shall be made available at the end of the temporary piping for hanging the target plates in the steam blow path.

## Preparation for steam blowing

- The drum level instrumentation shall be available. In addition remote -indicating facility if available shall be made operable.
- The Boiler feed pumps (Including the stand by) shall be made available. The water requirement during the steam blowing operation would be high.

## Preparation for steam blowing

- During the steam blowing operation the Condensate return is not available. Hence sufficient quantity of DM water shall be made available.
- The steam piping right up to turbine inlet shall be included in the steam blowing operation.
- Proper communication shall be made available between the control room operating personnel and the field operating personnel.

## Preparation for steam blowing

- The drain piping in steam line shall be left unconnected to any drain vessel. This may be required in order to ensure free discharge of steam in the drain piping during the steam blow operation.
- The diameter of the temporary piping shall not be less than the diameter of the permanent piping. The design pressure of the temporary piping shall be equal to the design pressure of the main steam piping.

# *Steam Blowing Procedure*



## Steam blowing procedure

- ✓ Boiler is lighted up and steam pressure is gradually raised at first to 5 kg/cm<sup>2</sup>g as per the standard boiler operating pressure.
- ✓ The steam is vented through the startup vent during the pressurization process. The pressure-rising is done with minimum load.
- ✓ The boiler pressure shall be raised as per the recommended rate. Normally 55 deg C /hr can be taken as safe guideline for the saturation temperature rise.

## Steam blowing procedure

- ✓ During the pressure-raising process the boiler expansion shall be monitored and recorded, as this would be the first time the boiler is fired to high rate of firing. Also this would be first occasion during which the boiler pressure is being raised to higher operating pressure.

## Steam blowing procedure

- ✓ Once the prescribed steam blowing pressure is reached the main steam line valve is opened and the start up vent is closed.
- ✓ Simultaneously the steam generation is increased by raising the fuel-firing rate. This helps in attaining good blowing velocity and thus effective removal of the debris in steam circuit.

## Steam blowing procedure

- ✓ During the steam blowing time, the drum level would instantly go up and come down immediately.
- ✓ There are chances of water carry over in to the steam circuits. This can be minimized by keeping the water level at the lowest visible point of the gauge glass just before the blow.
- ✓ During the blow the water level swells up for a brief period and then the water level would come down rapidly. The stand by feed water pump may also be brought into operation if required.

## Steam blowing procedure

- ✓ All the drains in the steam piping should be left open to ensure that the drain lines are free from blocks.
- ✓ In a day, 6 to 8 blows shall be completed. With overnight cooling, the boiler shall be restarted the next day to repeat the blows.

## Steam blowing procedure

- ✓ Initially, the colour of the steam discharged to atmosphere can be used as an indication of the debris being removed.
- ✓ Further, the abrasions on the polished MS / brass / Aluminum target plates attached to the end of the exhaust piping will be used to indicate the effectiveness of the steam blowing.
- ✓ When the number of abrasive marks is two or three between two successive blows, the steam blowing operation is complete.

## Steam blowing procedure

- ✓ If the steam blowing operation cannot be concluded in 4 days, then it is desirable to inspect the headers by removing the hand hole doors.
- ✓ Debris accumulated in the header shall be manually removed. After refitting the handhole doors, the boiler shall be hydraulically tested.
- ✓ Steam blowing process shall be continued till satisfactory cleanliness is obtained as inferred from the target plates.

end

