**WORK INSTRUCTIONS FOR STARTUP OF BLAST FURNACE - II**

Responsibility: Shift superintendent

**Identified Hazards:**

1. Fall, slip of a person
2. Mechanical impact
3. Contact with graphite dust
4. Fire & Explosion in the gas line
5. Electric shock
6. BF Gas leakages
7. Contact with flame
8. Contact with hot metal/slag
9. Contact with hot water
10. PPE’s noncompliance
11. Improper house keeping
12. Inadequate local lighting
13. Not using CO detector
14. Working in a hurry and getting hurt
15. Dust inhalation
16. Flare stack drip pot failure
17. Contact with Pulverised coal
18. Contact with hot surface
19. Contact with hot coke
20. Contact with compressed air
21. Gas leakage due to improper sitting of tuyere/cooler/cooler holder
22. SOP violation
23. Not concentrating while operating machine
24. Ignorance, casual approach

Significant Aspect:

1. Emission of BFG
2. Usage of water
3. Generation of dust
4. Use of pulverized coal powder

CHECK THE FOLLOWING BEFORE STARTUP:

Responsibility: Furnace In charge/Control room Engineer

1. Ensure that all work permits relevant to startup of the furnace are cleared including shutdown of all equipment.
2. Ensure that the dust catcher bottom gate is filled with sand and all inspection doors on gas line are closed, drip pots are filled with water, overflow of water is maintained in all water seals.
3. Ensure that the furnace top hatch is closed and removed all the people from the furnace top.
4. Ensure EV2 blanking is removed.
5. Ensure that the furnace top relief valve is closed and opened all the water spray valves on furnace top.
6. Ensure that the furnace top entrance gates on both side of CB-5 walkway are locked, and keys are kept in the keyboard of BF control room.
7. Ensure trials of all equipment’s are taken after clearance by service department for smooth working.
8. Belts and bins to be physically checked for any service material/scrap prior to starting.
9. Ensure both bells are kept full of material.
10. Ensure IVC close Limit switch is set for approx. for 8000-10. 12000 Nm3/hr wind volume and blast pressure of 0.20-0.30kg/cm2.

References: Shutdown & Start-up checklists----Responsibility: Shift Superintendent.

PROCEDURE FOR STARTUP OF BLAST FURNACE –II

RESPONSIBILITY: / Furnace In charge

1. Unauthorized operation or repair of any equipment is a punishable offence.
2. After clearance for start-up is obtained and work permits are cleared, check and inspect all equipment for their smooth working.
3. Ensure both bells are kept full of material, preferably lower bell with ore and upper bell with coke.
4. Seal the dust catcher bottom gate with sand and ensure all inspection doors on gas lines are closed.
5. Ensure all drip pots are filled with water.
6. Open steam in uptakes, between bells and dust catcher.
7. Water seal the saturator and steam purge the gas line before closing the all relief valves.
8. Ensure CO monitor is used while water sealing gas line.
9. If the top firing was done for some work on the furnace top ensure that the top hatch is closed.
10. Ensure that the furnace top relief valve on EV2 pipe is closed and top water sprays valves are open. Ensure that the furnace top entrance gates on both side of CB-5 walkway are locked.
11. Close dust catcher bell pneumatic operated and sliding gate to be sealed with river sand
12. Inform electrical and start blowers.
13. Normalize water flow to cooling plates by adjusting the individual valves and lock the gate for bosh platform entry.
14. Open all the tuyeres by removing the clay. Insert PCI lances and check center position of lances. After closing the flanges keep the PCI lances on nitrogen/air. Insert tuyere sleeve if required, ensure person caring out the activity wear safety screen helmets, hand gloves.
15. Close and tighten all peephole flanges. Ensure IVC is full close, and snort is full open to atmosphere, then only take blowers in line. Cancel/de-select back draught mode as follows: -

1. Select SEMI AUTO MODE

2. Close coffee pot cap

3. Close latch

4. Deselect back draught mode

5. Open furnace isolation valve

6. Open MMSV

16. Take stove online which has high dome temperature.

17. Ensure that the steam is available at dust catcher, uptakes and between the bells.

Incorporate continuous supply of steam between bells till wind and furnace is normalized.

18. Keep 13000 NM3/Hr wind volume at snort by opening the Inlet damper of the blowers.

19. Open shell cooling and maintain the water pressure (3.30 Kg/cm2) at the inlet header.

20. Normalize cooling water flow in copper cooling members (If throttled). Normalize bosh, hearth level water cooling.

21. Close snort gradually and keep approx. 8000-14000 NM3/HR of wind (Blast pressure approx. 0.20-0.35 Kg /cm2) after the snort valve is fully closed. After snort valve is closed, check for any blast, gas leakages at cast house, GCS and HBS area.

22. Inspect all tuyeres for movement.

23. As the top temperature rises to 250 OC start charging and maintain the stock level in the furnace. Care to be taken when filling the furnace so that the furnace does not hang.

24. Ensure that all the relief valves on gas lines are closed after steam purging before connecting gas line.

25. Open the flare stack valve completely in manual mode.

26. Close one bleeder.

27. Drain saturator water seal in such a way that the drain doesn’t overflow when saturator is about to get empty start GCS pump and check for water. As the saturator water seal is emptied close the second bleeder and ensure that the gas is coming out through the flare stack.

28. Remove the lock out pad and drain the main line water seal.

29. Regulate gas flow by adjusting the flare stack valve, ensure gas flow to GEPL is continuous and uninterrupted while connecting the gas line.

30. Start the venturi pump as soon as the recirculation tank overflows

31. Stop steam to uptakes and dust catcher.

32. Purge the stove gas line with steam.

33. Inform GEL to reduce steam pressure in the header to 2 Kg.

34. Regulate the venturi dampers to get the required top pressure.

35. Start ID and CA fans.

36. Put the other two stoves which were on isolation mode to ON-GAS mode, after removing the lock out pad drop the water seal.

37. Increase the WV gradually to normal

38. Open the cast after 1.30min -2.0 hours if the main runner is drained or as soon as possible after wind ON if the main runner is not drained, force check to be given if the furnace is hanging after wind is on.

39. Ignite all the gas leak points such as furnace bottom, Tuyere & Tuyere cooler, bosh cooling plates etc. immediately after furnace start-up.

40. Ensure all gate in GCS, Hearth and HBS area are locked.

41. Any leakage in steam line is to be attended on priority as after stopping steam entering gas line, steam line become gas line.

42. Ensure full closing of steam valves at header when not in use.

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| Prepared By:  Head – Production PID I | Reviewed & Issued By:  Management Representative | Approved By:  Head – Pig Iron Division |
| Signature: | Signature: | Signature: |
| Date: **10.07.2023** | Date: **10.07.2023** | Date: **10.07.2023** |

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