**WORK INSTRUCTIONS FOR\_BLOWING IN OPERATION**

Responsibility:SS/Deputy Head Production/HOD

Criteria: Safe & Smooth Blowing in Operation

Identified Hazards:

1. Contact with hot material
2. BF Gas leakage
3. Fire & explosion the furnace area & in the oxygen line
4. Contact with hot water
5. Contact with hot pieces of coke
6. Fall of person
7. Impact by mechanical machineries
8. Entanglement/trapping/slipping
9. Human Behavior -Not shifting people from the PCM platform or PCM tail end before starting the activity.
10. Human Behavior -Nonuse of PPE
11. Human Behavior - Improper house keeping
12. Inadequate local lighting
13. Human Behavior -Running in hurry to attend to the problem soon but getting hurt
14. Dust
15. Noise
16. heat
17. Furnace chilling leading to flame and hot water coming out of blow pipe
18. Mild eruption in E.L due to metal entry
19. Mild explosion in main runner due to insufficient heating.

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| **Significant Aspects:**  Generation of Hot Metal |
| Generation of Slag |
| Generation of BFG |
| Emission of BF gas |
| Emission of dust |
| Usage of water |
| Energy consumption |
| Emission of heat |
| Fire & Explosion in gas line |
| BF Gas leakage |
| Spillage of water  Spillage of Oil / lubricant |

**Procedure:**

TRIALS & CHECKS BEFORE START UP

1. Unauthorized operation or repair of any equipment is a punishable offence
2. Trials of all RMHS. All belts, interlocks and all safety devices in RMHS.
3. Calibration of all weighing bins & waiting bins.
4. Checking of hand railings, belt guarding & platforms in RMHS area.
5. Checking of upper & lower bells. Check for opening / closing timings & limit switches signals.
6. Trial of EV-2 / EV-1 opening ***/*** closing signals.
7. Checking the oil leakages if any, during the top charging equipment trials.
8. Trial of top sprays (top gas temp. Control) /top spray valve position & alarm checking in control room
9. Trial of auto actuator of top spray & bell cylinder platform.
10. Trial of steam lines.
11. Trial of bleeder winches /valves
12. Trial of shell cooling.
13. Trial of cooling plate flow & pressure.
14. Trial of tuyere/ tuyere cooler pressure check and back flushing arrangement.
15. Trial of drill M/C. check for Centre and gauge for taphole Centre
16. Trial of M/GUN on load
17. Trial of slag granulation system
18. Trial of both stock rods. Putting of spark arrestor plate for pneumatic stock rod
19. Trial of all audio /video of safety */* alarms in control room tuyere water pressure signal.
20. Trial of hot blast valves.
21. Trial of coffee pot.
22. Trial of snort valve & snort valve silencer check manual system.
23. Trial of anti-surge valve operation.
24. Trial of IVC limit switches.
25. Trial of all HBS valves for all cycle of each stove
26. Trial of CA fan & HBS ID
27. Checking of GPH & APH cleaning.
28. Checking of all flow meter & transmitter in HBS area.
29. Trails/indications of all thermocouples at different levels.
30. Control logic trails for CT pumps, RW pumps, Fire hydrant valves for cast house and HBS.
31. Blower’s trail & blower automation.
32. Pump trial and pump automation trails.
33. Trial of R/W pumps make up valve.
34. Trail of cooling tower basin auto actuator.
35. Trial of pressure in steam header and leakages.
36. Check for leakages in blower house / snort and hot blast lines.
37. Trial of dust catcher gate & bell.
38. Trail saturator water seal & leakages in GCS system.
39. Trial of water sprays in saturator and cyclone / venturi,
40. Check all drip pots and water seal.
41. Trial and check of venturi pumps flow.
42. Trial and check of venturi operation DP-1 & DP-2.
43. Trial of all flow transmitter & pressure transmitter in GCS system.
44. Check taphole water jacket /flushing arrangement.
45. .
46. Check for main runner, slag runner, E.L Siphon plate, bypass runner and metal spouts.
47. Check for relief valves in F/C top Ev-2, D/C, saturator, main line, HBS.
48. Gap in top platform to be eliminated
49. Refractory work in flare stack in BF #2.to be attended.
50. .
51. Check for pressure gauge venturi to cyclone duct.
52. Check / calibration of wind volume /Blast pressure
53. Checking of fire hydrant line.
54. Check for cooling system of hot blast valve.
55. Trial and check for PCM lime spray, runner, mould & pig cooling system etc.
56. Check for leakage in incoming and return lines as well as O/H tank.
57. Trials of weighing bins, WTBbins gates opening */* closing duration
58. Trials of HBS gas valves opening /closing including gas control valve.
59. Inspection of humidity controller in the cold blast line.
60. Pressure testing of the flanges of all the Bosh and Belly Cu cooling plates
61. Ensure availability of emergency relief equipment like fire extinguishers/ Fire hydrant hoses and nozzles, first aid boxes.
62. Check healthiness of online CO monitor.
63. **DRYING PROCEDURE**

Unauthorized operation or repair of any equipment is a punishable offence

The drying of the MBF Refractory brick work is done on blast blown into the blast furnace with the Hot Blast Stoves   on blast ducts and the tuyeres.

1.1   PREPARATION OF THE FACILITIES FOR DRYING

 The preparation shall be as follows:

1. The “Cross –Pipes” to be mounted on 200 mm I Beam pieces on the hearth bottom of the MBF after cleaning up the bottom
2. Insert the outside pipe to connected “Cross –Pipes” through Iron taphole.
3. At least one, better two or more blowers are ready for blowing.
4. All tuyeres and blow pipes are fixed and closed.
5. The blind flange on top of the dust catcher shall be inserted.
6. The lower bell closed.
7. The equalizer valve closed
8. The relief valve open to atmosphere.
9. The Upper bell open.
10. The bleeder valves on the uptake opens.
11. Tuyeres and tuyere cooler filled with water & maintain the minimum flow.
12. Insure minimum water flow from cooling plates.

1.2   OPERATIONAL PRACTICE OF DRYING

Hot blast to be blown through hot blast pipes and tuyeres into the MBF. The blast pressures must be kept constant, by gradually reducing the opening of the two bleeder valves on the uptakes till the required pressure is reached; this pressure is to be maintained constant.

1.3     CHARGING OF THE MBF

Once the drying operations and leak proving has been concluded, the filling of the mind blast furnace may proceed by applying the following procedure:

1. Turn the hot blast off.
2. Open all blow pipes cover
3. Open fully the bleeder valves at the uptakes.

The MBF is now charged upto the stock line with charges as specified below

1.4    BASIC ASSUMPTIONS

1.      Coke Base                              : 1500kg (6% H 2 O)

Corresponding to 471 mm throat layer thickness.

2.      All burden calculations performed on Dry Basis

3.      Specific Bulk Weights assumed   :

Coke (6% H 2 O) = 0.580 t / m3

Iron Ore = 2.210 t / m3

Limestone = 1.650 t / m3

Dolomite = 1.89 t/m3

B.F. Slag = 1.200 t / m3

1. Compression factor :

Hearth + 45 % working volume = 6%

From 45 % to 90 % working volume = 4 %

Last 10 % of working volume = 1%

1. Coke size + 30mm

1.5   START UP CHARGING SCHEDULE

I.       Hearth volume plus 20% working volume (W.V) to be filled with coke.

Hearth volume (upto tuyere level) = 18.75m3

 Working volume of Furnace = 173 m3

20% working volume 173 \*20 % = 34.60m3

Total = (18.75+0.20\*173)=53.35 m3

This volume corresponds to:

53.35 \* 0.58 m3 = 30.943 DMT

= 30/0.94 =32 T (WMT)

   That means 32000 /2000 kg Coke Base = 16~18 Charges

Consider 20 charges

  20\*2000 = 68.96 m3 \* 0.94 = 64.82 m3

  580

Note:         H.V =Hearth Volume;      W.V = Working Volume

II.    Another 15% of working volume to be filled with B. F. Slag + Limestone aiming at binary basicity primary slag (melting zone slag) ,< 1.40

And binary basicity, tapping slag =0.85

**Burden “B”**

15% working volume   : 25.95 m3

Charge composition   : 1500 kg coke

: 300 kg B.F Slag

: 160 kg Limestone

Charge volume : Coke 1500 = 2.586 m3

580

: B. F. Slag 300 = 0.250 m3

 1200

: Limestone 160 = 0.096 m3

1650

   Total = 2.932 m3

No. of Charges    25.95 = 9.42

                                                              2.932\*0.94

This corresponds to:

                            10\*2.93\*0.94 =: 27.54 m3

III. Another 10% of working volume to be filled with : B.F. Slag 650 kg + 160 kg Limestone, Same binary basicity

Burden “C ”

10 % working volume : 17.30 m3

Charge composition  : 1500 kg coke

: 650 kg B.F Slag

: 160 kg Limestone

Charge volume   = (1500/580+650/1200+160/1650)

= (2.58+0.54+0.096) = 3.216= 3.216 m3

No. of Charges 17.30 = 5.71 Charges

3.216 \* 0.94

This corresponds to:

         6\*3.216\*0.94 :18.13 m3

  Total working volume (W. V) filled so far

: 64.82 m3

: 27.54 m3

: 18.13 m3

  110.49 m3

This corresponds to (110.49-18.75)=91.74/173=53.06 % of working volume.

Filling rest of furnace, upto 173 m3

Keep the binary basicity at 0.85

Increase Fe /C ratio from 0.50 to 0.80 by equal steps

 

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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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| **Amendment Record** | | | |
| **Revision date** | **Manual Section ref. and para** | **Brief details of revision** | **New Revision No.** |
| 15.07.2022 | Procedure for blowing in operation | Hazard identified  Point 50,62 revised | 05 |
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