**WORK INSTRUCTIONS FOR EMERGENCY SHUTDOWN AND FURNACE TOP INSPECTION - I & II**

Responsibility: Shift Superintendent

PROCEDURE FOR SHUTDOWN OF FURNACE NO. I

**Identified Hazards:**

1. BF Gas leakage (gas poisoning)
2. Contact with hot Fumes
3. Fall of a person from height
4. Fall of material from top
5. Human Behavior -Nonuse of PPE
6. Human Behavior -Improper house keeping
7. Inadequate local lighting
8. Human Behavior -Looking inside the furnace by standing in front of top hatch

Significant Aspect:

1. Emission of BFG
2. Usage of water
3. Generation of dust

Procedure:

1. Unauthorized operation or repair of any equipment is a punishable offence.
2. Before opening the cast inform GEL regarding the shutdown. Before opening the cast, inform PCI control room to stop PCI injection.
3. Open the dust catcher and blow hard.
4. Open the cast. When the furnace starts blowing, reduce wind gradually to 15000 Nm3/hr (0.50 Kg/cm2 pressure). Blow the furnace for 5 min. so that all the metal and slag is drained out and close the cast. Ensure that furnace is not hanging while taking shutdown. If hanging give a check and ensure the furnace has slipped before the shutdown.
5. Inform GEL regarding the gas availability and shutdown
6. Reduce wind volume to 6000 Nm3/hr. (0.30 Kg/cm2 pressure) by opening snort valve and keep 2 blowers on run. Ask GEL to charge the steam header so as to get 5 kg pressure
7. Open steam in uptakes and dust catcher
8. Put venturi-2 in manual mode and open both the venturies fully
9. Open relief valve and close the equalizing valve
10. Ensure that EV-1 is disabled by removing the fuses.
11. Start water sealing the main gas line, open one bleeder
12. After the main gas line gets water sealed open second bleeder
13. Water seal the furnace#1 isolation seal(new)
14. Water seal HBS gas line.
15. Box-up the other two stoves which are not on blast
16. Reduce the furnace pressure gradually to 0.05 Kg/cm2
17. Back draught the furnace after opening two peep hole flanges and removing all the people from in front of the blow pipes to avoid gas poisoning and burn injuries in case of backfire.
18. Stop Upper/Lower stack cooling water and keep all water sprays on for tuyere, tuyere coolers & below the tuyere level.
19. Do not stop or reduce the water of tuyeres, tuyere coolers and copper cooling plates in the bosh region in emergency shutdown for short duration.
20. Stop all blowers.
21. Give permission to people going on furnace top for furnace top inspection. People going on furnace top should move in the anti-direction of gas coming out from the coffee-pot.
22. Open all peephole flanges
23. Check all tuyeres and tuyere coolers for water leakage by inserting a cold rod inside the blowpipe and checking for dampness
24. Care to be taken that the same rod is not used more than once.
25. Plug all tuyeres with hydrous clay.
26. After saturator is water sealed, stop the GCS and venturi pumps.
27. Keep the flare stack valve closed after water sealing the flare stack before sending the people on top. (Flare stack)
28. Open and replug all the tuyeres one by one after 01 hour of shutdown for rechecking of water leakage also ensure that no body is working on bleeders, bells and other confined areas at furnace top

**PROCEDURE FOR EMERGENCY SHUTDOWN AND FURNACE TOP INSPECTION FURNACE II**

OVERALL RESPONSIBILITY: Shift Superintendent

Procedure:

1. Unauthorized operation or repair of any equipment is a punishable offence.
2. Before opening the cast inform GEL regarding the shutdown. Before opening the cast inform PCI control room to stop PCI injection.
3. Open the dust catcher and blow hard.
4. Open the cast. When the furnace starts blowing, reduce wind gradually to 15000 Nm3/hr. With 0.5Kg/cm2 pressure, blow the furnace for 5 min. so that all the metal and slag is drained out and then close the cast. Ensure that furnace is not hanging while taking shutdown. If hanging, give a check and ensure the furnace has slipped before the shutdown.
5. Inform GEL regarding the gas availability and shutdown.
6. Connect the furnace to the flare stack by water sealing the gas main line. Control the gas line pressure by opening the flare stack valve.
7. Water seal HBS gas line.
8. Box-up the other two stoves which are not on blast.
9. Reduce the wind volume to 6000 Nm3/hr (0.30 Kg/cm2 pressure) by opening the snort valve and

keep 2 blowers running. Ask GEL to charge the steam header so as to get 5 kg pressure.

1. Open steam in uptakes and dust catcher.
2. Put venturi-2 in manual mode and open both the venturies fully.
3. Open relief valve and close the equalizing valve.
4. Ensure that EV- 1 is disabled by removing the fuses.
5. Start water sealing the main gas line, open one bleeder.
6. After the ~~saturator~~ main gas line gets water sealed open second bleeder.
7. Reduce the furnace pressure gradually to 0.05 Kg/cm2.
8. Back draught the furnace after opening two peep hole flanges and removing all the people from in front of the blow pipes to avoid gas poisoning & burn injuries in case of backfire.
9. Stop Upper /Lower stack cooling half an hour and bosh cooling one hour after reducing wind volume to zero and keep all water sprays on for tuyeres, Tuyere coolers and below tuyere level.
10. Stop all blowers.
11. Give permission to people for going to the furnace top for inspection. People going to the furnace top should move in the opposite direction of the gas coming out from the coffee-pot.
12. Open all the peephole flanges.
13. Check all the tuyeres and tuyere coolers for water leakage, by inserting a rod inside the blowpipe and checking for dampness. Care to be taken that the same rod is not used more than once.
14. Plug all the tuyeres with hydrous clay.
15. After the saturator is water sealed, stop the GCS and venturi pumps.
16. Ensure that cooling water is available to the hot blast and coffeepot valve.
17. Before handing over the flare stack for maintenance, water seal the flare stack and then close its inlet valve.
18. Open and replug all the tuyeres one by one after shutdown for checking any water leakage. While checking ensure that no body is working on the bleeders.

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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 emergency shutdown and furnace top inspection BF1 & BFII | Point no 2, 5 10, 15,18 27 | 02 |