**WORK INSTRUCTIONS FOR** **LOADING PIG IRON, SLAG, DEBRIS AND TRANSPORTATION**

**Responsibility: Pig shifting In charge**

**Identified Hazards:**

1. Contact with Hot particle
2. Fall of truck or Wheel loader
3. Bursting of tyre
4. Contact with graphite dust
5. Mechanical: impact on light pole
6. Electric shock
7. Fall of a person from the truck
8. Fire
9. Impact of moving machineries to static structures
10. Hitting by metal chips / small sized pigs
11. Impact of moving machinery (Truck & wheel loaders)
12. Contact with Hot water
13. Fall of a person in the pit
14. Impact by grab bucket
15. Contact with graphite dust
16. Nonuse of PPE
17. Improper house keeping
18. Inadequate local lighting
19. Improper handling of slag and debris which could lead to spillage
20. Tripping of truck due to overloading
21. contact with Hot particle/ Hot water
22. Inhalation of dust
23. Break failure of truck
24. Fire due to contact of dry grass with hot un granulated slag boulder
25. Impact of truck to the gate
26. Nonstandard barrication at the site
27. Contact with metal chip/hot debris

**Significant Aspect:**

1. Vehicle emission

2. Dust emission

**Procedure**

1. Unauthorized operation or repair of any equipment is a punishable offence.
2. Bag House staff or Pig shifting Incharge should check Trucks, Wheel loader brakes, tyre locks, lights, stopper, first aid box, driver license at the start of shift. Hand brakes to be checked monthly and enter the status in checklist maintained by pig shifting register.
3. Ensure that the people are wearing safety spectacle along with the other PPE viz, shoes, helmets, ear plugs.
4. When the PCM is discharging hot pigs, nobody should stand or walk in front of the PCM, this is to avoid hot metal, metal chips, hot water falling on the person.
5. It should be ensured that the truck does not get loaded on one side**.** Max 15 MT pigs will be loaded on the truck with allowable variation of 20% in load. This could be maintained after checking of pigs’ receipt of the previous trip.
6. Pig shifting in charge should properly write the cast no. on pig dispatch slip of each trip. In case of mixing of metal from other furnace or previous cast having variation in chemical composition pig shifting in charge should identify such casts and indicate them as **MIXED metal** on pig dispatch slip carried by the truck driver. In case of desulphurization/dephosphorization of metal same to be mentioned on slips.
7. Spilled out pigs should be removed from below the truck tyre if any before releasing the truck.
8. Be aware of the moving machineries in the area.
9. Truck should not come on its own for loading pig iron unless guided by operator or area charge with the help of Whistle.
10. Trucks when not in operation to be parked at safe place to protect truck glass from flying chips and avoid obstruction to the movement of traffic.

**Debris Loading:**

**Responsibility: Pig shifting Engineer**

**Identified Hazards:**

1. Contact with graphite dust
2. Contact with Hot debris

**Significant Aspect:**

1. Generation of graphite dust

2. Vehicle emission

**Procedure:**

1. Unauthorized operation or repair of any equipment is a punishable offence.
2. All personnel performing this activity and also moving around the area should wear dust mask
3. Wheel loader operators should be trained in safe loading of debris without spillage.
4. Cool the debris properly by spraying water so that the emission of graphite flake can be minimized.
5. Wheel loader operators are to be instructed to maintain minimum height, while loading the debris.
6. The people performing the activity and also moving around the area should wear dust mask.
7. Whenever both PCM-2 & PCM-3 are in operation stop loading as there is a chance of hitting of metal chips to the personnel performing the job.
8. Water should not be sprayed on slag / debris at the time of loading into the truck.
9. All the wheel loader and truck operators / drivers in the furnace area should wear Cotton shirts with full sleeve.

**Slag loading with the help of wheel loader/grab**

**Responsibility: Pig shifting Engineer**

**Identified Hazards:**

1. Impact by grab bucket
2. Contact with hot water

**Aspect**

Spillage of water

**Generation of slag powder**

1. The truck should not be overloaded only three buckets of slag should be loaded in trucks at a time to avoid spillage while transportation.
2. Supervisor should monitor the activity and ensure no spillage.
3. Ensure that there is no hot slag & granulation pumps are put off.
4. While loading the slag by grab ensure that there are no personnel around & the grab should not be traveled over the truck cabin, to avoid accidental fall of slag in case of power failure.
5. Loading with the help wheel loader to be done only when there is a problem with the grab.
6. Only trained operators are allowed to operate the grab.
7. Ensure that there are no personnel/ machinery around while operating the grab.
8. Slag grab crane operators should use only the path provided to enter his cabin. He should never stand in front of the slag dam
9. Unauthorized operation or repair of any equipment is a punishable offence.

**References:**

**1. Pig shifting checklist**

**2. Slag grab checklist**

**3. Magnetic crane checklist**

**Loading flue dust**

**Responsibility: Furnace in charge**

**Identified Hazards:**

1. Contact with dust

2. BF Gas poisoning

**Significant Aspect:**

1. Emission of Dust

2. Emission of BFG

**Procedure**

1. Furnace in charge should check for CO presence before and after performing this activity
2. Furnace in charge should inform the Raw material Dept for loading the flue dust
3. Place the truck below the dust catcher and ensure that the driver of the truck is away from the area.
4. Open the bell of dust catcher with bottom gate closed; open the bottom gate after closing the bell.
5. Close the bottom gate after dumping the dust, sample to be taken out from the truck only and sent to the laboratory.
6. Arrest dust catcher leakage if any by opening the bleeder after informing power plant
7. Unauthorized operation or repair of any equipment is a punishable offence.

**Loading of Ore & Coke fines**

**Responsibility: Engineer Raw material**

**Procedure:**

1. Unauthorized operation or repair of any equipment is a punishable offence.
2. Ensure that all the personnel wearing dust mask and other PPE viz helmets, shoes and safety goggle
3. Inform Raw material dept. regarding the unloading of fines bunkers
4. Place the truck below the bunker
5. Open the gate of the bunker, ensure that the driver is not there in the truck before opening the gate.
6. Do not unload the fines on to the ground as it causes land contamination
7. Close the bottom gate after completing the activity
8. Ensure that all the personnel wearing dust mask and other PPE.

**Cleaning of Inspection chamber**

**Responsibility: Engineer-Gen. Shift**

**Identified Hazards**

1. Contact with hot water
2. Chemical: suffocation
3. Fall of a Person in the pit

**Procedure:**

1. Unauthorized operation or repair of any equipment is a punishable offence.
2. Whenever a manhole of any drain such as slag granulation tunnel, gas cleaning, water tunnel or any other drain or tunnel is to be opened, proper work permit should be obtained from the concerned engineer and it has to be ensured that the manhole is properly closed after the work is completed.
3. When the work is in progress also, proper barricading of the area is to be done
4. Shift in charge should mention in the SS logbook at the end of the shift in case any of the manhole are kept open.
5. Take a work permit from the concerned engineer.
6. Cordon the area
7. Ensure slag granulation pit is drained of water
8. Take shut down of the slag granulation pump
9. Before entering the inspection chamber of BF1 CO level has to be checked (for the inspection chamber near return water pump) as the GCS water drain also passing the same chamber.
10. The above cleaning has to be done only in general shift.
11. Close the inspection chamber cover after the job is completed.
12. Shift in-charge should mention in the SS logbook at the end of the shift in case any of the manhole are kept open.
13. Inspection chamber should be covered after the job is completed

**Documentation procedure for Pigs dispatch from Hot metal Area to Dispatch Yard**

* At the start of the shift Pig shifting in-charge should verify the cast number in register with the control room in charge.
* Cast being poured /to be poured should be verified from control room in charge as well as PCM in charge indicating BF1 or BF2 and the respective PCM in use.
* Baghouse In-charge should countercheck the register at the start of the shift and again at the end of the shift for correctness of the cast numbers.
* Correct cast number should be written on each slip sent with the pig iron trip to dispatch.
* Cast number should be written in the format
  + 16B1/cast number/L1 for ladle 1 BF1
  + 16B1/cast number/L2 for ladle 2 BF1
  + 15B2/cast number/L1 for ladle 1 BF2
  + 15B2/cast number/L2 for ladle 2 BF2

Where

* + first two digits (12, 08) stands for relining year
  + B1 & B2 stands for BF1 an BF2 respectively
  + L1 and L2 stands for ladle number.
* All first ladles of the particular cast should be sent as L1 irrespective of single ladle or double ladle. Second ladle successively should be sent as L2.
* Cast number should be counterchecked with the register before handing over the slip to truck driver.
* Once weighbridge slip is received weight should be entered in the register against cast number.
* Any discrepancy in the weight, cast number should be immediately brought to the notice of the Baghouse/PCM in charge as well as shift in-charge.
* Such discrepancies should be brought to the notice of manager hot metal handling during briefing.
* No person should be deputed as Pig shifting In-charge unless the person is given training for one week.
* Relieving during Lunch time or changeover should be done by trained person or the Baghouse In charge.
* After dispatch of each lot of casts the bag house staff should sign the register and ensure correctness of the weighment and cast numbers and other relevant details before sending the next lost. In his absence the PCM in charge will officiate.
* Mentioning (LAST TRIP) on the slip whenever last trip is being dispatched of the particular cast so that dispatch clerk also take note of same.

Note: Any error in writing cast number can lead to Pig iron mix up of different grades hence may result into serious customer complains.

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| **Prepared By:**  Head – Production PID I | **Reviewed & Issued By:**  Management Representative | **Approved By:**  Head – Pig Iron Division |
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| **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 | Work instructions for loading of Pig Iron, Slag, Debris and transportation | Pig loading procedure revised | 09 |
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