ACTIVITY: Flare stack jobs \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* Objective : - Flare stack jobs
* Scope : - Blast furnace accessories
* Ref. : -
* Responsibility : - Engineer In charge & Workmen on the job

PPE –s to be used : safety Helmet, Safety shoes, Co monitor, Hand gloves, safety belt, dust mask, safety goggle etc.

**Aspect** - **impact**

|  |  |
| --- | --- |
| Scrap generation | Resource Depletion |

|  |  |
| --- | --- |
| Draining of water | Resource Depletion |

|  |  |
| --- | --- |
| Fire | Air pollution SP42 |
| Explosion | Air pollution SP42 |

Usage of LPG / oxygen Resource Depletion

Fumes of welding Air pollution & health

# Hazards identified

Physical Hazard

1. Pressure of air line hose, gas line.
2. Co gas/flame of BF1 flare stack while working on GEPL flare stack.
3. Burn injury due to contact with hot burner.
4. Inhalation of dust
5. Temperature
6. congestion

Mechanical Hazard

1. Fall of person from height
2. Fall of material like tools, tackles, hardware, burner, distance piece, etc from height.
3. Failure of pulley, manila rope while lifting the burner.
4. Fall of person from platform cut out for monkey ladder while walking on the top/landing platforms.
5. Impact of moving/ slinged items

Chemical Hazard

1. Co gas poisoning at top of the flare stack due to breaking of water seal, gas from adjacent flare stack or furnace top.
2. Fire and explosion during gas cutting on gas line & welding.

Electrical Hazard

1. Lightning.
2. Electric shock from welding.
3. Electric shock from burner electrical coil.

**Biological hazard**:

Bee sting/ bee hife

**Human Behavior aspect of operators**:

# Operator nature, alcoholism, casual approach, horse play, use of mobile at workplace, back pain & non usage of PPE?s

**Significant Aspect**:

1. Emission of BFG
2. Usage of water

Flare stack isolation procedure of production department should be refferred in addition to maintenance procedure

# ISOLATION OF FURNACE 1 FLARE STACK (REF: WI/PROD/06 – I)

Responsibility: Shift Superintendent. To be counterchecked by Mechanical engineer incharge

# 1. Ensure water sealing of gas line at following

i). BF1 flare stack both water seal of by pass gas line.

ii). BF1 flare stack main water seal.

iii) Additional water seal to GEPL gas line. Put padlock with lock on all water seal valves

1. Ensure overflow of water is maintained from all waterseals.
2. Ensure 80 NB gas line to burner is kept closed.
3. Ensure BF1 flare stack is steam purged till conspicuous steam is noticed from top of the flare stack.
4. Ensure steam purging valve to flare stack gas line is kept close.

# ISOLATION OF GEPL FLARE STACK (REF: WI/PROD/06 – J)

**Responsibility: Shift Superintendent. To be counterchecked by Mechanical engineer in charge**

# 1. Ensure water sealing of gas line at following

i). BF1 flare stack main water seal,

ii). Both the seals of bypass gas line to bf1 flare stack iii) Additional water seal to GEPL gas line

iv) GEPL flare stack main water seal Put padlock with LOTO lock on all water seal valves

1. Ensure overflow of water is maintained from all water seals.
2. Total four water seals connecting to both flare stack as mentioned above to be ensured are water sealed and over flowing.
3. Ensure 80 NB gas line to burner is kept closed
4. Ensure BF1 flare stack is steam purged till conspicuous steam is noticed from top of the flare stack and GEPL flare stack is air purged for minimum 30 min before handing over.
5. Ensure steam purging valve to flare stack gas line is kept close.

# ISOLATION OF FURNACE 2 FLARE STACK (REF: WI/PROD/06 – K)

**Responsibility: Shift Superintendent. To be counterchecked by Mechanical engineer in charge**

Ensure BF2 flare stack main water sealed and over flow is maintained. Put padlock with lock on all water seal valves

1. Steam purge the flare stack gas line till conspicuous steam is noticed from top of the flare stack.
2. Ensure steam purging valve to flare stack gas line is kept close.
3. Ensure 80 NB gas line to burner is kept closed

# Activity 1: Flare stack burner gas line cleaning

1. Ensure that the flare stack on which work is to be carried out is water sealed as per the above procedure of production department. Mechanical engineer in charge to countercheck the water sealing and valve closing prior to taking the permit. Put padlock with lock on all water seal valves
2. Take work permit from shift superintendent/production engineer in charge.
3. Take the shutdown of the coil of burner on which the work is to be carried out as per electrical shutdown procedure.
4. Carry 2 nos. Co monitors while going on flare stack.
5. For cleaning of the gas line, remove the distance piece of the gas line and clear the line of choking by inserting MS rod.
6. Fix back the distance piece. If required, change the gasket.
7. Remove the pilot gas line hose and check for any chocking. Inspect the hose for its condition and replace if required.

1. Remove the air line hose and check for any chocking. Inspect the hose for its condition and replace if required.
2. Ensure that the hot burner is not touched with bare hands as it may lead to burn injury.
3. Give clearance to production to break the water seal after completion of the job and after ensuring that all the people have come down from the flare stack.

# Activity 2: Flare stack burner assembly changing

1. Ensure that the flare stack on which work is to be carried out is water sealed as per the above procedure of production department. Mechanical engineer in charge to countercheck the water sealing and valve closing prior to taking the permit.
2. Take work permit from shift superintendent/production engineer in charge.
3. Take the burner shutdown on which the work is to be carried out as per electrical shutdown procedure.
4. Carry 2 nos. Co monitors while going on flare stack.
5. Ensure that the burner coil connections are removed by electrical and the thermo-well is removed by instrumentation.
6. Remove the main gas line distance piece, pilot gas line hose and air line hose.
7. Tie a manila rope to the burner assembly hook and load the burner. Gas cut the side angle supports and slowly lowers the burner assembly on the flare stack top platform. Use good quality manila rope of minimum 1 inch dia.
8. Remove the 50 mm flat of the hand railing by loosening the bolts.
9. For lowering the burner assembly on ground, put a pulley on the support channel hook provided for lifting/lowering of the burner assembly. Tie one end of the manila rope to the burner assembly hook, pass it through the pulley, lower the manila rope on the ground and wind the other end around a rigid structure. Keep minimum 6 people on the ground and lower the burner by slowly releasing the manila rope. Ensure that the bottom area is barricaded with “Work in progress” tape.
10. Follow the same procedure while hoisting new burner assembly on flare stack top. Manila rope to be wound around a rigid support on the ground and rope to be pulled by minimum 6 people to raise burner from the ground to flare stack top.
11. Fix back the hand railing 50 mm flat by bolting once the burner assembly is placed on top platform.
12. Fix back the burner assembly by placing it at 45 deg position and weld it with supporting angles. If required, modify the distance piece pipe orientation to match the burner pipe setting.
13. Fix back the pilot gas line hose and air line hose and inform electrical to do burner coil connections and instrumentation to fix back the thermo well.

1. Give clearance to production to break the water seal after completion of the job and after ensuring that all the people have come down from the flare stack.
2. **Activity 3: Flare stack burner electric coil changing**

1. Ensure that the flare stack on which work is to be carried out is water sealed as per the above procedure of production department. Mechanical engineer in charge to countercheck the water sealing and valve closing prior to taking the permit.
2. Take work permit from shift superintendent/production engineer in charge.
3. Take the burner shutdown on which the work is to be carried out as per electrical shutdown procedure.
4. Carry 2 nos. Co monitors while going on flare stack.
5. Ensure that the burner coil connections are removed by electrical and the thermo-well is removed by instrumentation.
6. Remove the main gas line distance piece, pilot gas line hose and air line hose.
7. Remove all the bolts of the burner assembly flange and remove out the electric coil of the burner.
8. Inform electrical to replace the damaged coil with a new coil.
9. After clearance from electrical, fix back the coil inside the burner and tighten all the bolts of the burner assembly flange.
10. Fix back the main gas line distance piece, pilot gas line hose and air line hose and inform electrical to do burner coil connections and instrumentation to fix back the thermo well.
11. Give clearance to production to break the water seal after completion of the job and after ensuring that all the people have come down from the flare stack.

# Activity 4: Flare stack structural/pipeline jobs and painting

1. Ensure that the flare stack on which work is to be carried out is water sealed as per the above procedure of production department. Mechanical engineer incharge to countercheck the water sealing and valve closing prior to taking the permit.
2. Take work permit from shift superintendent/production engineer in charge.
3. Carry 2 nos. Co monitors while going on flare stack.
4. Ensure that the ground area below the flare stack is fully barricaded with “Work in Progress” tape.
5. Carry out the structural/pipeline jobs as per WI/MAINT/94 and painting jobs as per WI/MAINT/92.
6. Proper /pipe scaffolding to be made for carrying out structural/pipeline/ painting jobs.
7. Give clearance to production to break the water seal after completion of the job and after ensuring that all the people have come down from the flare stack.

# Activity 5: Flare stack spare burner assembly trials at slag dryer plant

1. Place the burner assembly at 45 deg angle on a rigid support.
2. Connect the air line hose of SDP to the burner.
3. Inform production engineer to break the SDP water seal. Slightly open the gas line ball valve to flush the bottom 40 NB gas line hose to drain out water from the hose. This activity to be done in presence of production engineer with a Co monitor to avoid water entering inside the coil. **Resp: Production engineer.**
4. Once the gas line is flushed, close the ball valve and connect the hose flange to the burner and give clearance to electrical for the trials.
5. Disconnect the gas line and air line hose after the trials and place them in their respective positions.

**DO:**

* Ensure that BF1 flare stack is isolated while working on GEPL flare stack.
* Carry 2 nos. Co monitors while working on flare stack.
* Ensure that there is no person movement under the burner while dismantling and erection

**DO NOT:**

* Work if Co gas level is above 50 ppm. Wait for the gas level to come down or the wind direction to change.
* Work on flare stack when it is raining/lightning.  Work on flare stack after 6 pm.







**Amendement Record**

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| **Date** | **Manual Section Ref. & Para** | **Brief details of Revision** | **New Rev.** |
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| --- | --- | --- |
| **Prepared By:**  Area Engineer | **Reviewed & Issued By:**  Management Representative | **Approved By:**  Mechanical Head |
| **Signature** | **Signature:** | **Signature:** |
| **Review Date: 12.12.22** | **Review Date: 12.12.22** | **Review Date: 12.12.22** |