1. **PURPOSE:** Safe maintenance of hydraulic system / pipelines/ cylinders
2. **SCOPE:** Door Lifting Mechanism,, Stamping Station, Battery Machines 1& Battery Machines 2
3. **RESPONSIBILITY:** Company Engineer, maintenance Fitter and workmen at job
4. **SAFETY PRECAUTIONS:**

* Ensure all Electrical & Mechanical isolation prior to starting work on equipment. Follow documented isolation procedure as per Vedanta approved isolation standards.
* Take Electrical shutdown of respective machines/ powerpack’s & work permit, if necessary, before attending any electrically operated units. Follow *one man one lock* system and use of LOTO box.
* Operation of any equipment for the purpose of positioning to be done strictly under the guidance of Production Shift incharge.
* All hoses exposed to heat to be covered with pyro-sleeve to reduce its direct exposure.
* Safety briefing / Toolbox talk to be carried out and to be documented
* Precaution to be taken to gradually release residual pressure during loosening of fittings and components
* Check availability of valid DCP fire extinguishers, if not available then inform shift in charge.
* Check and ensure safety of man and equipment before starting operations.
* If oil-spillage occurs,.
  + clean it with accidental spill kit/cotton rags. Dispose the contaminated waste in the coke ovens as per hazardous waste disposal procedure.
  + Report the same as Environmental Incident Category-1
* All unwanted material from the area to be removed before releasing the equipment electrical isolation.
* Follow proper documented procedure for releasing the electrical isolations as per Vedanta approved isolation standards.
* *Certified lifting Tools & Tackles* to be used for the job.

1. **PPE to be used :**

* Safety Helmet
* Safety shoes
* Safety Goggles
* Hand gloves
* Dust mask
* Welding shield & welder apron
* Cutting Goggles

1. **Activities**

Activity No. 1: Replacement of hydraulic components.

Activity No 2: Replacement of hydraulic cylinder.

Activity No 3: Replacement of hoses.

Activity No 4: Welding on hydraulic pipelines joints

Activity no. 5: Power pack Oil top-up

Activity no. 6: Power pack Oil replacement/ tank cleaning/ inspection

Activity no. 7: Replacement of Compacting station hammer 2 cylinder (HCS)

Activity no. 8: Replacement of Compacting station hammer 2 cylinder (HCS) using 80T crane

Activity no. 9: Replacement of Compacting station hammer 1 cylinder (RCS)

1. **Aspect-Impact:**
2. Scrap generation Resource Depletion.
3. Dust/ Fumes Generation Air Pollution.
4. Oil Spillage Land Contamination & Resource depletion
5. Used Cotton Cloth/Handgloves Land Contamination
6. Used grease/oil Land contamination, Resource depletion
7. **Hazards** **identified**
8. Physical Hazard

* Pressure of oil
* Fall of Hot coke , flying of coke dust and fines
* Slip due to Oil
* Dripping hot water from tray
* Contact with hot structural parts
* Electrical shock
* High Temperature

1. Mechanical Hazard

* Impact, Entrapment, Entanglement, Slip , trip and fall

1. Chemical Hazard

* Fire and explosion, fumes.

1. Ergonomical Hazard

* Poor workplace design

1. Health Hazard :

* Inhalation of coal dust
* Exposure/ contact of oil to eye, ear & mouth

1. Human behaviour aspect of operators:

* Alcoholism.
* Casual approach.
* Horse play.
* Non usage of PPE’s
* Improper Housekeeping
* Height Phobia

1. **PROCEDURE:**

.

**Activity No. 1: Replacement of hydraulic components**

* If the cylinder is on load, either
  + operate the system with the permission of production department & release the load on the hydraulic cylinder, or
  + In case of lifted load and system cannot be run then load needs to be supported either with chain pulley or by providing support from bottom
* Take electrical & mechanical shutdown of hydraulic power pack with LOTO.
* Slowly loosen the fittings to release the hydraulic oil pressure and collect the oil in empty container. Care should be taken to prevent the oil from falling on the ground.
* Loosen the Allen bolts of the component and replace with spare part.
* Clean the system using cotton cloth.
* Clear the electrical shutdown & take trial.

**Activity No. 2: Replacement of hydraulic cylinder.**

* If the cylinder is on load, either
  + operate the system with the permission of production department & release the load on the hydraulic cylinder, or
  + In case of lifted load and system cannot be run then load needs to be supported either with chain pulley or by providing support from bottom
* Take electrical shutdown of hydraulic power-pack & Battery Machine with LOTO.
* Slowly loosen the fittings to release the hydraulic oil pressure and collect the oil in empty container. Care should be taken to prevent the oil from falling on the ground..
* Loop the hoses of the cylinder as well as piping. Tag the pipeline ports with proper identification.
* Follow material handling procedure for cylinder replacement.
* Connect the hoses.
* Clear the electrical shutdown & take trial.
* Clear the work Area.

**Activity no. 3: Replacement of hoses.**

* If the cylinder is on load, either
  + operate the system with the permission of production department & release the load on the hydraulic cylinder, or
  + In case of lifted load and system cannot be run then load needs to be supported either with chain pulley or by providing support from bottom
* Take electrical shutdown of hydraulic power pack & Battery Machine.
* For changing hoses of 1-42 or 43-84 side cylinders individual MCB to be put off and lock to be provided to panel.
* Operate required cylinder & check to confirm shutdown.
* Slowly loosen the fittings to release the hydraulic oil pressure and collect the oil in empty container. Care should be taken to prevent the oil from falling on the ground.
* Replace the damaged hose with new one. Replace the doughty/copper seal if required.
* Hose has to be fitted without twisting & entanglement.
* Clear the electrical shutdown & take trial.
* Perform the house keeping activity.

**Activity no. 4: Welding on Hydraulic pipelines Joints**

* Identify leakage joint.
* If the cylinder is on load, either
  + operate the system with the permission of production department & release the load on the hydraulic cylinder, or
  + In case of lifted load and system cannot be run then load needs to be supported either with chain pulley or by providing support from bottom
* Take electrical shutdown of hydraulic power pack with LOTO.
* Slowly loosen the fittings to release the hydraulic oil pressure and collect the oil in empty container. Care should be taken to prevent the oil from falling on the ground.
* Pipeline to be drained completely & opened at both ends.
* Use safety belts while working at QT area.
* Welding to be carried out as per WI-
* Clear the electrical shutdown & take trial.
* Perform the house keeping activity.

**Activity no. 5: Power pack Oil top-up**

* Oil/ Fluid must be added to the reservoir at startup, after cleanout, and to make up for losses.
* Check the fluid type (HLP 68, hydropack 68 etc.) and shift required quantity near work site
* Take electrical shutdown of hydraulic power pack with LOTO. In case power pack is installed on mobile equipment, position the equipment suitably and take electrical shutdown.
* Using spanner unbolt the filler.
* Pour oil into tank through filler using oil cans. To maintain appropriate fluid level, a fluid-level indicator is located with high and low levels marked. Level to be maintained between high & low.
* Oil can be also filled through oil filling machine:
  + Shift and install mobile oil filling machine
  + Connect suction line of machine with new oil (or barrel) and delivery line to the power pack oil tank filler and switch on the machine. Please follow up manual of this machine in case of any issue.
* To maintain appropriate fluid level, a fluid-level indicator is located with high and low levels marked. Level to be maintained between high & low.
* Clear the electrical shutdown & take trial.
* Perform the house keeping activity.

**Activity no. 6: Power pack Oil replacement/ tank cleaning/ inspection**

* Check the fluid type (HLP 68, hydropack 68 etc.) and shift required quantity near work site.
* In case of tank inspection (oil re-use) this step is not necessary, but empty barrels to be shifted at work site.
* Shift and install mobile oil filling machine
* Take electrical shutdown of hydraulic power pack with LOTO. In case power pack is installed on mobile equipment, position the equipment suitably and take electrical shutdown.
* Using spanner unbolt the filler.
* Connect suction line of machine with power pack oil tank and delivery line to the empty barrel and switch on the machine. Please follow up manual of this machine in case of any issue.
* Operate machine till oil tank is empty.
* Unbolt the manhole/ inspection window using spanner.
* Inspect the tank and ensure below:
  + Remove contaminants settled down
  + Check filters/ strainers
  + Suction & return line
  + Baffle plate (wherever applicable)
* Fit manhole/ inspection window using spanner
* Follow activity No 5 from step 6 onwards.

**Activity no. 7: Replacement of Compacting station hammer 2 cylinder (HCS)**

1. operate the system with the permission of production department & ensure following conditions:
   1. Insert plate inside compacting box and make box
   2. Position Plate handler (PH) opposite box and take electrical shutdown of PH.
   3. Move mobile hopper at extreme position at Hot coke side (HCS)
   4. Manually operate hammer down until it rests on plate handler. Provide support below with proper stability.
2. Take electrical shutdown of hydraulic power pack & Mobile hopper (MH).
3. Simultaneously position new cylinder below.
4. Dismantle hammer from cylinders by unbolting split flanges (both cylinder).
5. Clear the electrical shutdown of only hydraulic power pack and manually operate cylinder (return stroke).
6. Take electrical shutdown of hydraulic power pack.
7. Disconnect inlet and out-let oil ports of damaged cylinder after positioning oil collecting pan below. Discard this spilled oil into waste bin.
8. Position chain pulley block above and take load of cylinder.
9. Unbolt cylinder mounting flange with spanner.
10. Hoist the cylinder up with the help of chain pulley block
11. Lower the damaged cylinder to GL and hoist new cylinder to up position using chain pulley block & F-15 crane.
12. Position the cylinder and fix with mounting flange.
13. Connect inlet & out-let ports.
14. Clear electrical shutdown of hydraulic power pack.
15. Manually operate the cylinder (forward).
16. Assemble with hammer using split flanges.
17. Dismantle chain pulley block.
18. Clear Electrical shutdown of hydraulic power pack & Mobile hopper.
19. Take trial by operating cylinder up.

**Activity no. 8: Replacement of Compacting station hammer 2 cylinder (HCS) using 80T crane.**

1. Dismantle roof sheets in area above the damaged cylinder.
2. Follow steps 1,2,4,7 of activity no 7. Simultaneously position the crane and new hammer cylinder.
3. Take the load of cylinder using crane and unbolt mounting flange.
4. Hoist and lower to Ground level.
5. Hoist and position the new cylinder in position.
6. Follow steps 12, 13, 16, 17, 18, 19.

**Activity no. 9: Replacement of Compacting station hammer 2 cylinder (RCS)**

1. operate the system with the permission of production department & ensure following conditions:
   1. Insert plate inside compacting box and make box
   2. Move mobile hopper at position towards Ram Car side (RCS) so that hammer 1 position is at extreme position inside box.
   3. Manually operate hammer down until it rests on box. Provide support below with proper stability.
2. Take electrical shutdown of hydraulic power pack & Mobile hopper (MH).
3. Simultaneously position new cylinder below.
4. Dismantle hammer from cylinders by unbolting split flanges (both cylinder).
5. Clear the electrical shutdown of only hydraulic power pack and manually operate cylinder (return stroke).
6. Take electrical shutdown of hydraulic power pack.
7. Disconnect inlet and out-let oil ports of damaged cylinder after positioning oil collecting pan below. Discard this spilled oil into waste bin.
8. Position F-15 crane hook above and take load of cylinder.
9. Unbolt cylinder mounting flange with spanner.
10. Hoist the cylinder up with the help of crane.
11. Lower the damaged cylinder to GL and hoist new cylinder to up position F-15 crane.
12. Position the cylinder and fix with mounting flange.
13. Connect inlet & out-let ports.
14. Clear electrical shutdown of hydraulic power pack.
15. Manually operate the cylinder (forward).
16. Assemble with hammer using split flanges.
17. Dismantle chain pulley block.
18. Clear Electrical shutdown of hydraulic power pack & Mobile hopper.
19. Take trial by operating cylinder up.
20. **REFERENCES: OEM Manuals & reference drawings, SP44, SP45**
21. **RECORDS:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sr. No.** | **Record No.** | **Record Title** | **Maintained by** | **Soft/Hard form** | **Retention Time** |
| 1. | - | CLTI | Area in Charge | Hard | 1 Yr. |
| 2. | - | PM Checklist | Area in Charge | Hard | 1 Yr. |
| 3. | - | Notification Data | Area in charge | Soft |  |
| 4. | HI/35 | Hazard Identification | IMS | Soft | 1 Yr. |
| 5. | RA/35 | Risk Assessment | IMS | Soft | 1 Yr. |
| 6. |  |  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Date** | **Manual Section Ref. & Para** | **Brief details of Revision** | **New Rev.** |
| 22-08-2022 | Header | Company logo & Document no. | 02 |
|  |  |  |  |
|  |  |  |  |

|  |  |  |
| --- | --- | --- |
| **Prepared By:**  Head Mechanical Maintenance, Battery 1- MCD | **Reviewed & Issued By:**  Management Representative | **Approved By:**  Head Mechanical Maintenance MCD |
| **Signature:** | **Signature:** | **Signature:** |
| **Review Date: 13.08.2022** | **Review Date: 13.08.2022** | **Review Date: 13.08.2022** |