1. **PURPOSE:** Instructions for maintenance of Vibro-Compacting station
2. **SCOPE:** Battery -2
3. **RESPONSIBILITY:** Engineer in charge, 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 Vibro CST & work permit for the respective job
* Safety briefing / Toolbox talk to be carried out and to be documented
* Follow *one man one lock* system and use of LOTO box.
* 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.
* 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 : Checking of *Vibromotor Counter weight*.

Activity No 2 : Replacement of *sling of Vibrocompactors*

Activity No 3 : Maintenance of winch.

Activity No 4 : Mobile hopper C.T. Non drive *wheel bearing changing.*

Activity No 5 : *Alignment* of compacting box.

Activity No 6 : *Vibromotor replacement* for Winch assembly

Activity No 7 : *Strengthening* of 30T winch base frame

Activity No 8 : Compacting box complete *Hydraulic line replacement*

Activity No 9 : Mobile hopper - LT & CT Gear box *oil replacement*

Activity No 10 : Mobile hopper *alignment*

Activity No 11 : Compacting box-SS *U-seal replacement*

Activity No 12 : *Pulley Block* Replacement

Activity No 13 : *Air Compressor* Maintenance

Activity No 14 : *Replacement of charging plate*

Activity No 15 : *Replacement of Air bellow*

Activity No 16 : *Replacement of Compacting box Hydraulic cylinder*

Activity No 17 : *Preventive Maintenance*

1. **Aspect-Impact:**
2. Scrap generation Resource Depletion.
3. Dust 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

* Fall of Hot coke , flying of coke dust and fines
* Slip due to Oil
* Dripping hot water from tray
* Contact with hot structural parts of tray bottom
* 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. Human behaviour aspect of operators:

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

1. **PROCEDURE:**
2. **Activity No 1: Checking of Vibromotor Counter weight**

* Ensure that the Third layer of cake is completed in the compacting box with Vibro-compactors rested on the coal cake.
* Take Electrical shutdown of the 30T Winch.
* Check for coal deposition in the Vibro motors and clean the same.
* Check the position of the counter weight of the Vibro motors. It should be at 85%.
* If counter weight are shifted, rectify the same by loosening the bolts and setting the weights at 85%.
* After the job is completed clear the electrical shutdown.

1. **Activity No 2:**       **Replacement of slings of Vibro-compactors**

* Ensure that the Third layer of cake is completed in the compacting box with Vibro-compactors rested on the coal cake with sufficient gap for maintenance crew to get inside.
* Take electrical shutdown of the 30T Winch.
* Check the condition of the suspended slings of vibro-compactor.
* If belt needs to be replaced, then remove the split pin of the top support pipes and bottom D-Shackle and remove the belt.
* Replace the belt and fix the pipe again and ensure that the split pin is placed in top pipe & bottom D-shackle is firmly tightened.
* Clear Electrical shutdown after removing workmen & tools.

1. **Activity No 3:     Inspection & Maintenance of 30T winch.**

* Ensure vibrocompactors are in fully lowered condition inside the box with no load on winch rope drum before taking up the job. Wire rope should be in loose condition
* Take electrical shutdown of winch drive
* Take workpermit from Shift SS
* Remove the covers of gearbox output shaft & rope drum plummer block, inspect & lubricate both the shaft coupling & plummer block.
* Then drain out the oil-Omala 320 –approx 60 lits from winch gearbox so that the oil level is 50mm below the bottom casing.
* Open the bearing covers of gearbox & inspect for seal leakage & note the seal nos for reference. Refix the bearing end covers.
* Fix locktite sealant between top & bottom casing to prevent oil seepage.
* Tighten the bolts of top & bottom casing.
* Lubricate the wire rope fortnightly. For lubrication ensure that the winch is in the home position with wire rope wound on the rope drum. Pour *OKS 450 wire rope lubricant* on the wire rope and operate the winch 4 to 5 times.
* Clear the electrical shutdown & workpermit.
* Take trial

1. **Activity No 4 : Replacement of Mobile hopper C.T. Non drive wheel bearing**

* For changing the mobile hopper C.T. wheel bearing, we have to remove the wheel and change the bearing.
* Ensure that the mobile hopper is aligned below the structural member of compacting station so that the wheel can be lowered with the help of chain block(2T).
* Take electrical shutdown of the Mobile hopper.
* Provide temporary support to side of mobile hopper with 25T jack of which wheel to be removed.
* Take the load of the wheel on the chain block by mounting the chain block to the structure of CST above the mobile hopper.
* Remove the mounting bolts of the wheel and lower the wheel on the ground.
* Dismantle the end covers of the bearing and remove the bearing. If Bearing is tight on the shaft , hydraulic press to be used.
* Mount new bearing on the shaft and place the shaft in the housing.
* Lift the wheel assembly with the help of chain block and place it in the position.
* Tighten the mounting bolts and release the chain block.
* Remove the chain block.
* Release the electrical shutdown after ensuring all the tools and tackles are removed.
* Take trials and hand over for operations.

1. **Activity No 5 : Alignment of compacting box.**

* Take electrical shutdown of the Compacting station (except Pneumatics) without cake in the compacting box.
* Transfer the points of Centerline on the compacting box which is marked on the either structural column.
* Join the Points with the help of piano wire.
* Inflate the compacting box side walls upto 7 bar
* Measure the distance from the centerline to inside of the compacting box. The distance should be 1350mm. If not we have to adjust the side wall with the help of studs connected to the side wall.
* Perform the process at all 8 columns of the box.
* After completion of the job release the electrical shutdown.

1. **Activity No 6 : Vibromotor changing for Winch assembly**

**A.**   **Removal of vibrocompactor**

* Inform shift SS about the job and ensure that the compacting box is empty with charging plate.
* Lower the winch inside the compacting box so that it rests on the charging plate under close supervision with sufficient gap for workmen to work.
* Take the electrical shutdown of the winch & obtain workpermit for the job from shift SS.
* Remove the slings of the identified vibrocompactor for replacement
* Ensure electrical cables to the vibromotors are physically disconnected
* Clear the compacting box of any human presence
* Temporarily clear electrical shutdown & lift the winch frame upwards till its home position
* Before removing the charging plate with damaged vibromotors, ensure Plate Handler is ready with spare charging plate at -3 location & CCM at

-3 location.

* Charging machine to pull the charging plate (with damaged vibromotors) out of the box & place on plate handler stand & keep plate in latched condition.
* Then plate handler will insert the empty charging plate inside compacting box.
* After inserting the spare plate inside the box, Charging machine will transfer the charging plate (with damaged compactors) onto Plate handler.
* Take electrical shutdown of the plate handler after parking at -3 location
* Replace the old compactors after marking the position of old compactors to be removed so that the new vibrocompactors are kept at exactly same location. 15T crane/truck mounted crane to be used
* After placement of new vibrocompactors, clear plate handler electrical shutdown.

**C.**      **Installing new vibrocompactor**

* Lift the front wall of the compacting box and remove the spare charging plate inside compacting box with charge car
* Lift the rear wall of the compacting box and insert the plate with new vibrocompactors inside the compacting box using plate handler.
* Close front & rear wall of compacting box and   
  lower down the winch under supervision so that vibromotors rest on the plate.
* Take electrical shutdown of the winch.
* Connect the slings firmly to new vibrocompactors and Electrical connection to be done on the same vibromotors.
* Clear the compacting box from any human intervention
* Clear electrical shutdown & work permit·
* Take winch frame upwards.

1. **Activity No 7 : Strengthening of 30T winch base frame**

* Lower the vibro-compactors inside the box.
* Cover the vibro-compactors with ceramic wool & asbestos cloth falling below the winch work.
* Take electrical shutdown of compacting station.
* Take workpermit for the job from Shift SS.
* Remove the gratings part by part for which work is to be carried out.
* Fix ISMB 200 beam in position below winch frame
* After completion of job, clear workpermit & electrical shutdown.
* Take trial after completion of job.

1. **Activity No 8 : Compacting box complete hydraulic line replacement**

* Ensure working area is clean & free from coal
* Keep the end wall in closed condition with cylinders in retracted condition.
* Close the *shut-off valve* of outlet of Hydraulic pump.
* Take Electrical shutdown of both Hydraulic pumps of Compacting station.
* Close the shut-off valves of end wall cylinders
* Start dismantling of hydraulic lines starting from front wall , then side walls & then rear wall
* Remove the old hydraulic line channel supports & clamps
* Erect the new hydraulic line channel supports with clamps at a height above the existing level
* Install the new hydraulic line & clamp it simultaneously
* Install the other accessories like check valve, pressure reducing valve in the respective location.
* *Loop the newly installed hydraulic metallic pipelines with hoses for hydraulic flushing and carry out flushing for minimum 12 hrs.*
* Connect the hoses to the pipeline & valves
* Ensure all fittings & hose connections are firmly connected
* Clear electrical shutdown of pump & take trial
* Check for leakages from fittings & hoses
* Operate end wall for opening & closing & check for oil leakages from new line , fittings & hoses
* Clear work permit.

1. **Activity No 9 : Mobile hopper -LT & CT gear box oil replacement : Omala 320**

* Take electrical shutdown of Mobile hopper in home position.
* Take workpermit for the job from Shift SS.
* Open the gear box oil drain port with allen key(8mm)
* Drain out the old oil in 5 lit can
* Close the drain port
* Open the oil top-up port & port at 90 deg with allen key & fill with Omala-320 oil until oil starts overflowing from 90 deg port.
* Close the oil top-up & 90 deg port firmly with allen key.
* Follow the same procedure for other gear boxes.

1. **Activity No 10: Mobile hopper alignment**

* Ensure Mobile hopper in aligned in home position & keep it empty
* Place pre-fabricated metallic stools below the mobile hopper with jacks placed beneath the mobile hopper.
* Guide & gently rest the mobile hopper on the Jack slowly till it rests firmly on the jacks.
* Take electrical shutdown of mobile hopper
* Take work permit from shift SS
* Brief workmen about the job
* Loosen the mobile hopper winkle roller bracket bolts on both sides
* Jack the hopper on both sides & check for equal level with water level.
* Tighten the mobile hopper winkle roller bracket bolts on both sides
* Check height on both sides with water level.
* If found Ok, clear the electrical shutdown & workpermit.

1. **Activity No 11: Compacting box-SS U-seal replacement**

* Position mobile hopper halfway over the long side wall & Ensure vibrocompactors are is in home position with mobile hopper below it
* Ensure compacting box is empty without charging plate and U-seals cleaned thoroughly.
* Take electrical shutdown of mobile hopper & winch.
* Take work permit from shift SS
* Remove the old SS U-seal with cutting rod-Cutrode by glouzing.
* Prepare the surface properly by grinding to remove burrs
* Fix the new U-seal in position & carry out welding with SS welding rod-Staintrode.
* Clear the electrical shutdown & workpermit.

1. **Activity No 12: Pulley block replacement**

* Ensure coal cake in the compacting box before start of job.
* Rest the vibrocompactors on the coal cake.
* Relieve the load from the pulley block & gently rest it on the vibrocompactor top frame meant for cable trolley.
* Both the pulleys to be guided and rested simultaneously without damage to winch cables/ vibromotor cables.
* Take electrical shutdown of winch.
* Take workpermit from Shift SS.
* Remove the end covers of the pulley & then both the wire ropes from pulley sheaves
* Open the rope clamps & remove the bracket of center wire rope sling & then loosen and remove the wire rope sling.
* Suspend chain pulley block of 2T with 10-12 mtr’s chain length from winch beam just above the pulley block using webbing sling.
* Hook the pulley to this chain block & lower it away from the box using CPB
* After placing pulley block on ground, remove with 15T crane.
* Place the new pulley block on ground with 15T Crane
* Lift it using chain block & place it on top of winch
* Fix the wire rope slings on the pulley block , rope clamps & brackets.
* Measure wire rope sling for equal lengths on both sides of frame from center of pulley top , adjust & then Fix end covers & lock in position with bolts
* Carry out similar procedure for other pulley block
* Clear electrical shutdown.
* Take trial & check rope tightness & winch frame level from HCM side. Difference in level should not be more than 20 mm.
* Also check whether the vibrocompactor frame is not abnormally tilted towards Operator cabin side
* Clear work permit.

1. **Activity No 13: Air Compressor maintenance**
2. Take electrical shutdown of compressor to be worked upon.
3. Take work permit from Shift SS.
4. Close the air discharge valve of respective compressor
5. Remove the spares one by one to be replaced
6. Fix the new spares.
7. Follow S.No 3 to 5 for the other compressor also.
8. Clear electrical shutdown.
9. Clear work permit.
10. **Activity No 14: Replacement of charging plate**

* Shift the new charging plate of dimensions – 13450mmx 2660mm x 40mm to the erection area behind plate handler near vibrocompacting station before start of job.
* Only certified riggers & crane operators are allowed to carry out the job under close & proper supervision of signalman.
* Position the plate Handler at -3 location with old charging plate and drive in extreme rear position(towards road) and in grip released condition
* Take shutdown of Plate handler & HCM DSL
* Crane of minimum 80T capacity is required for replacement job ( Approx wt of load – 11.5 T)
* Position the crane parallel to the plate handler after filling rail and making ramp for crane wheels to pass through.
* Suspend the old plate with certified rigging equipment viz wire rope slings of 5m long(4 nos) & Horizontal plate lifting clamps( 4 nos) of appropriate capacity at equal distance from centre.
* Remove the old plate from Plate Handler with crane and keep on road. Gye ropes to be used for guiding the charging plate while shifting , hoisting & lowering on ground. Remove the rigging equipment
* Make use of wheel loader to shift the old plate and then shift and bring the new plate within reach of crane i.e safe working radius of crane.
* Suspend the new plate with certified rigging equipment viz wire rope slings of 5m long(4 nos) & Horizontal plate lifting clamps( 4 nos) of appropriate capacity at equal distance from centre.
* Shift the new plate on plate Handler with crane & then remove the rigging equipment after final positioning
* Clear shutdown of Plate handler & HCM DSL. Grip the new plate with grip block.
* Take trial of plate handler by inserting inside compacting box & check for front & rear limit readings else adjust the limit/encoder reading for auto operation.
* Demobilise the crane & clear the ramp for LT of plate Handler

1. **Activity No 15: Replacement of Air Bellow**

* *Function of Air Bellow is to inflate and deflate the side walls for coal cake making and provide rigidity to the compacting side walls during cake making*
* *Air bellows inflate & remain inflated during cake making, deflate after cake making to allow smooth retraction of coal cake from box.*
* Keep the compacting box in deflated condition & empty
* Take shutdown of both air compressors & close discharge valve
* Identify the air bellows to be replaced.
* Remove the airline PU tube(12mm OD) and then remove the bellow along with mating plate by removing bolts on either side of bellow
* Shift the old bellow assembly to ground & replace with new bellows & PU connector.(M8x25 allen bolts are used for bellow & mounting plate)
* Fix the new bellow in position and connect the PU tube. Replace PU tube if found brittle.
* Clear the shutdown , inflate and check for air leakages
* Handover the equipment top Operations Deptt.

1. **Activity No 15: Replacement of Compacting box Hydraulic cylinder**

* Shift the required spares, tools & Tackles to site
* Open the front/rear wall for which cylinder is to be replaced and then close after providing packing(100mm) below wall at centre inside box. The wall should rest on the packing. To be done under supervision & co-ordination.
* Take Electrical shutdown of compacting station & work permit from shift SS.
* Remove the rubber belt connecting end wall pin & cylinder clevis
* Ensure & Disconnect the SSI cables through Electrical department before removing the cylinders
* Remove the hydraulic hoses & cover loose ends with cotton cloth.
* Remove the tunion pin mounting bracket of one side & remove the cylinder.
* Shift the new cylinder near to the box & check for readings & functioning of sensor after connecting SSI cable by moving the sensor back & forth.
* Fix the new cylinder in position & connect the SSI cables, hoses.
* Restore the rubber belt connecting end wall pin & cylinder clevis
* Clear Electrical shutdown as per procedure
* Take trial of cylinder 3-4 times in presence of operations & check for leakages from fittings
* Handover to operations

1. **Activity No 17: Preventive Maintenance**

Preventive Maintenance of Compacting station is covered under

1. CLTI. (Cleaning, Lubrication, Tightening, Inspection)
2. Monthly Preventive maintenance.
3. Quarterly Preventive Maintenance.
4. Half Yearly Preventive Maintenance.
5. Yearly Maintenance.
6. Once in 2 years

CLTI is basically is routine run check inspection and any identified abnormality is documented and updated in SAP in MR Notification. On opportunity the same is resolved and the abnormality is closed.

` **Procedure for Preventive maintenance**

* Check the preventive maintenance schedule in SAP.
* Take system generated print of generated PM and hand it over to maintenance crew for execution.
* Isolate the machine with proper isolation procedure as per the Vedanta isolation standard.
* Carry out all tasks mentioned in the checklist as per guidelines and update the job completed and actual conditions with the time taken for completion of the job.
* Ensure all the jobs are completed and in case of any abnormality or pending jobs in the list, a separate notification has to be raised in SAP for ensuring the compliance.
* 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.
* Take trial of machine after job & report abnormality noticed if any.

After completion of PM activity, the generated order needs to be closed within 24 hrs of the execution.

1. **REFERENCES:**

OEM manuals & Reference drawings

1. **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/57 | Hazard Identification | IMS | Soft | 1 Yr. |
| 5. | RA/57 | Risk Assessment | IMS | Soft | 1 Yr. |

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| **Signature:** | **Signature:** | **Signature:** |
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