**SOP FOR**

1. **PURPOSE: - Safe working at hydraulic cylinder of ladle tilter.**
2. **SCOPE:** **PCM accessories .**
3. **RESPONSIBILITY: Engineer In charge & workmen on duty.**
4. **PROCEDURE: Replacement of hydraulic cylinder of ladle tilter  .**

PPE’s to be used:

         Helmet, Safety shoes, Cotton cloth, hand gloves and goggles, ear plug

**TASKS COVERED**

**Work no.1**: Procedure for replacement of hydraulic tilter cylinder.

**Work No.2**: Replacement of tilter latch cylinder.

**Work no.3**: Hose replacement

**Work No 4**: Replacement of bracket of tilter cylinder

Work No 1 : Replacement of hydraulic cylinder of ladle tilter

**Aspect Impact**

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| --- | --- |
| Oil Spillage | Land contamination & Resource Depletion |
| Oil traced waste generation | Land contamination & Resource Depletion |

Hazards identified

**Mechanical Hazard**

1. Trapping in between parts, weights, moving components.
2. Impact of hammer, weights, etc.
3. Fall of objects such as hammer, tools, etc.
4. Fall of person from height.
5. Entanglement while replacing the hose
6. Pressure of oil during sudden removal of hose in pressurized condition.
7. Impact of ladle
8. Fall of skull
9. Hot metal, chips
10. Slip due to oil accumulation, house keeping, uneven surface
11. Failure/ slip of sling
12. Impact ladle transfer car, crane, ladle etc,

**Physical Hazard**

1. Burn injury from metal, runner, and ladle.
2. Pressure from hydraulic system, impact, etc.

Human Behavior - Workmen under influence of alcohol

Violation of procedure

Not wearing PPE’s

Not concentrating while working

**Work no.1** : **Procedure for replacement of hydraulic tilter cylinder**

Before Dismantling:

1. Check for available hydraulic cylinder in all aspects like dimensions and shape.
2. Verify the dimensions, shape of Hydraulic cylinder with that of spare cylinder.

Dismantling procedure:

1. Take work permit for replacement of hydraulic cylinder of ladle tilter.
2. Remove the ladle from the cradle of tilter arms.
3. Position the 20 Ton hook of 100T crane exactly above the cylinder to be replaced .
4. Lift the tilter slightly until there is gap of around 800mm from the tilter bottom to the tilter supporting frame(towards the latch cylinder bracket end).
5. Take electrical shutdown of Tilter power pack of both pumps.
6. Take mechanical isolation of hydraulic powerpack pressure line & return line.
7. Kindly barricade the area near by for safety purpose.
8. Provide mechanical stopper at the rear end preferably ISMB150 / box section of ISMC150 , 800 mm long at the rear end.
9. Weld 2 angles on either side of the other cylinder in order to support in its position.
10. Wrap 3 ton belt sling around the hydraulic cylinder & engage it to 20T hook.
11. Dismantle the bolts connecting top yoke of the cylinder and tilter arm stool of the both the cylinders.
12. Temporary clear the electrical shutdown , mechanical isolation & lower both the cylinders.
13. Take electrical shutdown of powerpack both pumps and mechanical isolation of hydraulic powerpack pressure line again.
14. Disconnect the hydraulic hoses of the cylinder to be removed & loop them.
15. Remove the bottom pin of cylinder.
16. Now slowly start hoisting the 20T hook in order to remove the cylinder from its position.

**Note**: Job should be done under close co-ordination with crane operator. Only Concerned Mech. Engineer shall give instructions to crane operator.

1. Take the cylinder to nearby location and lower it .
2. Wrap the sling around the new /overhauled cylinder and connect it to the 20T hook.
3. Using 20T, slowly lift the cylinder & then position it at the cylinder mounting area..
4. Ensure that bottom bracket & cylinder mounting bore is in line .
5. Slowly insert the bottom pin & lock it.
6. Now connect the bottom hydraulic hose back to the cylinder .Other port hose should be put into the oil collecting bucket in order to release the air from the cylinder during first operation.
7. Now temporary clear the electrical shutdown , mechanical isolation of pressure and return line & start hoisting operation.
8. Match both the cylinder mounting bracket holes with the tilter bracket & connect the bolts. (Only HT bolts to be used with double nuts).
9. Now further lift the cylinder in step wise until full stroke is completed.
10. Once full stroke is achieved, connect the other port hose of replaced cylinder.
11. Now perform the lowering operation.
12. Take 2-3 trials without ladle, then perform empty ladle trail & finally filled ladle trial
13. Hand over to operation dept. after clearing the shutdown, mechanical isolation & work permit and remove the barrication.
14. Ensure to perform housekeeping

**Work No.2** : **Replacement of tilter latch cylinder .**

1. Take work permit from PCM operation in charge.
2. Remove the ladle from tilter arm.
3. Ensure that Tilter is slightly lifted until there is a gap of 600mm between tilter bottom & tilter bracket at the rear end. (This is to ensure that crane operator does not place ladle on tilter erroneously).
4. Take electrical shutdown of tilter power pack of both pumps.
5. Take mechanical isolation of hydraulic powerpack pressure line and return line of both pumps.
6. Kindly barricade the area near by for safety purpose.
7. Operate the DC valve of latching operation in order to release the line pressure.
8. Now loosen the hoses and loop them by connecting nipple in between.
9. Loosen the cylinder bracket and remove the old cylinder
10. Replace with new /overhauled cylinder and tighten the bracket.
11. Connect the hoses .
12. Clear the electrical shutdown , mechanical isolation and take trial and remove barication after trail.
13. Check for oil leakage if any
14. Clear the work permit & give clearance.

**Work No. 3: Hose replacement**

1. Take work permit from PCM operation in charge.
2. Remove the ladle from tilter arm.
3. Ensure that Tilter is slightly lifted until there is a gap of 600mm between tilter bottom & tilter bracket at the rear end. (This is to ensure that crane operator does not place ladle on tilter erroneously).
4. For replacement of latch hose follow below procedure :
5. Take electrical shutdown of powerpack both pumps and mechanical isolation of hydraulic powerpack pressure line and return line.
6. Ensure to release the line pressure by operating the DC valve.
7. Remove the old hose & replace it with new one.
8. Clear electrical shutdown and mechanical isolation.
9. Take trial & give clearance
10. For replacement of lifting cylinder hose follow below procedure:
11. Provide mechanical stopper at the rear end preferably ISMB150 / box section of ISMC150 , 800 mm long at the rear end.
12. Take electrical shutdown of powerpack both pumps and mechanical isolation of hydraulic powerpack pressure line and return line.
13. Ensure to release the line pressure by operating the DC valve.
14. Remove the old hose & replace it with new one.
15. Remove the stoppers
16. Clear electrical shutdown and mechanical isolation.
17. Take trial & give clearance

**Work No 4: Replacement of bracket of tilter cylinder.**

1. Lift the tilter 200-300mm up.
2. Take electrical shutdown of powerpack both pumps and mechanical isolation of hydraulic powerpack pressure line and return line.
3. Lock the tilter at the position of 200-300mm up with help of ISMC 200 (box type) with proper support.
4. Give proper support to the cylinders before loosening the bolts of brackets.
5. Loosen the lock plates of pin.
6. Remove the pin.
7. Loosen the bolts of brackets.
8. Remove the bracket and replace it with new one and bolts tightening to be done replaced bracket.
9. Insert the pin and match it with tilter cylinder fork.
10. Check the tightness of all brackets bolts and remove the locking of tilter after that.
11. Clear the temporary shutdown of PCM hydraulic power pack & mechanical isolation.
12. Take trial for 4-5 times.
13. Give clearance to operation after clearing the workpermit

 DO:

* Wear gloves, goggles while working at PCM area.
* Cordon the total workable area
* Take necessary precautions while working at PCM as it is a hot metal handling area.
* Take necessary care while handling items, which are smeared with grease and oil.
* Collect oil in tray of the hose pipes.
* Use proper slings while dismantling.
* Oil should be handled as per [WI/MAINT/93](http://sgl-panj-sp-01:8080/sil_quality/Mech.html/Activity%20WI/WIMAINT93%20LUBRICATION.htm)

# DO NOT:

* Do not take trial with filled ladle.
* Do not take trial of hydraulic cylinders by keeping hoses loose.

**REFERENCES: Operation & Maintenance manual.**

**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: 08.01.2023** | **Review Date: 08.01.2023** | **Review Date: 08.01.2023** |