WI-19 **Work instruction various activities in CT fan**

Work No:1 : Procedure for CT fan strainer cleaning.
Work No:2 : Procedure for CT gear box lube oil system replacement.
Work No:3 : Procedure for CT fan nozzle cleaning work.
Work No:4 : Procedure for CT fan blade angle inspection.
Work No: 5 : Procedure for CT fan Gear box replacement
Work No. 6 : Additional cooling tower installation.
Work No: 7 : Procedure for CT Cell repair and Fills replacement.

Work No:1 : Procedure for CT strainer cleaning.

Objective	Procedure for CT strainer cleaning.
Responsibility	Mechanical Engineer In charge
PPEs to be used	Helmet, Safety shoes, life buoy, hand gloves and goggles.

Aspect - Impact

Scrap Generation	Resource depletion
Dust Generation	Air pollution

Hazards identified

Mechanical hazard	Slip, fall and trap Cut injuries from sharp edges of items
Human behavior	Poor housekeeping, Non use of PPEs, Alcoholism.

PRECHECKS

Take the work permit from control room and before starting of work..
Area behind strainer to cell area needs to be barricaded.

PROCEDURE:

After getting clearance from operation department start to shift all portable lifting arrangement material near the strainer.
Assemble and fix the lifting arrangement in the centre of the strainer.
Fix the lifting equipments like chain block, slings and hold the strainer rigidly.
Lift the strainer slowly by using chain blocks and remove it.
Clean the entire strainer thoroughly and relocate in to original place.
After relocating of strainer remove all lifting equipments, lifting arrangement, barricade material and clean the work area and give clearance to operation department.

Work No:2 : Procedure for CT fan gear box lube oil line replacement

Objective	Procedure for CT fan gear box lube oil replacement.
Responsibility	Mechanical Engineer In charge
PPEs to be used	Helmet, Safety shoes, safety belt, hand gloves and goggles.

Aspect - Impact

Oil Spillage	Land contamination
Scrap Generation	Resource depletion
Dust Generation	Air pollution

Hazards identified

Mechanical hazard	Slip, fall and trap Cut injuries from sharp edges of items
Human behavior	Poor housekeeping, Non use of PPEs, Alcoholism.

PRECHECKS

Take the work permit and electrical permit before starting of work.
Ensure complete cell isolation before starting of work.
In this case either the shaft should have been isolated, secured and at zero energy or the machine guard should have been in place.
Permits should not be issued before the relevant authority has physically verified isolation and zero energy at the site.

PROCEDURE:

After obtaining clearance from operation department start and drain the entire gear box oil and collect in to the tray properly.

Dismantle the entire existing pipe line by using spanner set.

Clean the entire gear box and oil line tapping portion completely.

Fix the new fabricated line as per the existing and tightened properly.

Fill the oil in to the gear box up to required level.

Clean the work area after completion of work and shift all generated scrap in to designated place and cancel the work permit.

Prepared & Reviewed:	Approved:	Issued:
HOD – Mech – PP	Head – Power	MR
06.04.2021	09.04.2021	09.04.2021

Work No:3 : Procedure for CT fan nozzle replacement and cleaning work.

Objective	Procedure for CT fan nozzle replacement and cleaning work.
Responsibility	Mechanical Engineer In charge
PPEs to be used	Helmet, Safety shoes, safety belt, hand gloves and goggles.

Aspect - Impact

Waste Generation	Resource depletion

Hazards identified

Mechanical hazard	Slip, fall and trap Cut injuries from sharp edges of items
Human behavior	Poor housekeeping, Non use of PPEs, Alcoholism.

PRECHECKS

Take the work permit and electrical permit before starting of work.
Ensure complete cell isolation before starting of work.
In this case either the shaft should have been isolated, secured and at zero energy or the machine guard should have been in place.
Permits should not be issued before the relevant authority has physically verified isolation and zero energy at the site

PROCEDURE:

After obtaining clearance from operation department wear safety belt and enter in to the CT cell.

Fix the safety belt properly on concrete block which beside of CT nozzle pipe lines.

Properly hold the leg on mesh jointing portion and sit very closure to the nozzle.

Remove the threaded nozzle slowly, clean it and check the entire line by using torch.

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HOD – Mech – PP	Head – Power	MR
06.04.2021	09.04.2021	09.04.2021

In between the line if found any waste material clean the same by removing the nearest nozzles.

Same way need to be clear entire pipes nozzles and pipe lines.

If the nozzle found in damage condition need to be replacing with new one.

Clean the work area after completion of work and shift all generated scrap in to designated place and cancel the work permit.

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Work No: 4 : Procedure for CT fan blade angle inspection

Objective	Procedure for CT fan blade angle inspection.
Responsibility	Mechanical Engineer In charge
PPEs to be used	Helmet, Safety shoes, safety belt, hand gloves and goggles.

Hazards identified

Mechanical hazard	Slip, fall and trap Cut injuries from sharp edges of items
Human behavior	Poor housekeeping, Non use of PPEs, Alcoholism.

PRECHECKS

Take the work permit and electrical permit before starting of work.
In this case either the shaft should have been isolated, secured and at zero energy or the machine guard should have been in place.
Permits should not be issued before the relevant authority has physically verified isolation and zero energy at the site

PROCEDURE:

After obtaining clearance from operation department put make a platform arrangement inside of cell to inspection door. Get the temporary platform certified by safety department
Open cell inspection door and rotate the fan blades completely two to three time, check the blade freeness.
Check the blade angle by using angle measuring bevel protractor device on tip of the blade.

If any changes required wear safety belt and move near the blade connecting fan hub portion and loose the blade bolts slowly, shift the angle as required and tightened the bolt properly.

Same way need to be check entire fan blade angle and set it for same angle.

After setting blade angle remove entire platform which is provided inside of cell and clear the work permit to start.

Work No: 5 : Procedure for CT fan Gear box, motor replacement

Objective	Procedure for CT fan gear box, motor replacement..
Responsibility	Mechanical Engineer In charge
PPEs to be used	Helmet, Safety shoes, full body harness safety belt, hand gloves and goggles.

Hazards identified

Mechanical hazard	Slip, fall and trap Cut injuries from sharp edges of items
Human behavior	Poor housekeeping, Non use of PPEs, Alcoholism.

PRECHECKS

Take the work permit and electrical permit before starting of work.
Working belongs to working at height on work platform Ref. SP-44G
In this case either the shaft should have been isolated, secured and at zero energy or the machine guard should have been in place.
Permits should not be issued before the relevant authority has physically verified isolation and zero energy at the site

PROCEDURE:

After obtaining clearance from operation department ensure riser valve has been closed and lube oil line main valve has to be closed.
Ensure proper platform arrangement inside of cell near work area to inspection door with proper binding/clamping. Get the temporary platform certified by safety department
Ensure all precautions like safe working environment, full body harness locking provision, proper approach/platform surrounding work area has been placed.
Lock FRP blades to avoid any rotations while working inside.
Start dismantles of CT fan cone and FRP blade locking plate fasteners to looseness the holding clamp one by one and remove the blade.
De couple the both end coupling i.e. motor end and gear box end and motor foundation bolt removal and shift the motor bit behind, rest/hold interconnecting shaft proper in place.
Use suitable crane for lifting gear box, Motor preferable 80T/100T only. Before utilizing crane for said job , ensure or cross check on safety point of view i.e. condition of crane, crane hook, latches, lifting capacity load chart, crane positioning , belt conditions, D shackle condition, crane position easy to work and better way of direction given to operator, operator's license, crane license and cross check the crane details documentation and get it certify from safety officers before starting of work.

After crane certify and positioning of crane, fix belt slings, D shackle for lifting the job.
After ensure tiding of belt slings, only one person give direction to crane operator to lift the same from replacement.
After dismantling of gear box and remove/interchange the FRP blade holding clamp locking plate, hub and coupling with new gear box.
After readiness of new gear box lift the same and positioned the same by using same crane.
Gear box erection and making master by using water tubing and install the FRP blade one by one.
Couple both end of coupling and connect the intermediate shaft and do proper alignment work.
Cross check FRP blade angle before tightness and top up the gear box lube oil as per required level.
Dismantle of all temporary platforms and do proper housing keeping before cancelling the work permit.
Note – The interconnecting shaft between Gear box and Motor end earlier was heavy duty SS316 MOC which is replaced with light weight ADDOX shaft resulting vibration of CT cell equipment reduced from 6 to 2mm/se and surrounding vibration reduced less than 1mm/sec.

Work No: 6 : Additional cooling tower installation

Objective	Procedure for Installation of additional CT cell .
Responsibility	Mechanical Engineer In charge
PPEs to be used	Helmet, Safety shoes, life line, full body harness, hand gloves and goggles.

Aspect - Impact

Scrap Generation	Resource depletion
Dust Generation	Air pollution

Hazards identified

Mechanical hazard	Slip, fall and trap Cut injuries from sharp edges of items
Human behavior	Poor housekeeping, Non use of PPEs, Alcoholism.

PRECHECKS

Take the work permit from control room and electrical permit before starting of work.
Ensure complete cell isolation before starting of work.
Area behind strainer to cell area needs to be barricaded.

PROCEDURE:

After getting clearance from operation department start to shift all portable lifting arrangement material near the strainer.
Before starting basin work ensure that all underground CT cell return line need to be relocated.
Cell get installed and commissioned under the direction of OEM.
Before installation of cell HIRA needs to be in place.

Work No: 7 : Procedure for CT Cell repair and Fills replacement.

Prepared & Reviewed:	Approved:	Issued:
HOD – Mech – PP	Head – Power	MR
06.04.2021	09.04.2021	09.04.2021

Objective	Procedure for CT cell repair and fills replacement..
Responsibility	Mechanical Engineer In charge
PPEs to be used	Helmet, Safety shoes, full body harness safety belt, hand gloves and goggles.

Hazards identified

Mechanical hazard in water	Slip, fall and trap, Cut injuries from sharp edges of items, Drowning
Human behavior	Poor housekeeping, Non use of PPEs, Alcoholism.

PRECHECKS

Take the work permit and electrical permit before starting of work.
Working belongs to working at height on work platform Ref. SP 44G
Lifebuoy to save from drowning in water in case of fall in CT cell.
In this case either the shaft should have been isolated, secured and at zero energy or the machine guard should have been in place.
Permits should not be issued before the relevant authority has physically verified isolation and zero energy at the site

PROCEDURE:

After obtaining clearance from operation department ensure riser valve has been closed.
Lock FRP blades to avoid any rotations while working inside.
Provide Lifebuoy in CT cell with rope one end tied to it and another end outside with some structure, such that same can be thrown to location in case someone falls in CT cells to prevent drowning.
Ensure proper platform arrangement inside of cell near work area to inspection door with proper binding/clamping. Get the temporary platform certified by safety department.
Erect scaffolding outside till sump height. Push around 6 meter pipe onto wall at mid of CT cell. Clamp a pipe to scaffold erected outside at one and other end rest it to wall in the middle of CT cell.
The same pipe can be utilized as lifeline for Safety belt while moving inside CT cell for scaffold erection.
Erect scaffolding in CT cell to height upto which it is comfortable to reach CT fills and remove layer by layer.
Cut CT fills hanger support and shift support and its grid outside CT cell.
Again create another level plateform to remove CT fills and support. Similarly remove all CT fills.
Ensure all precautions like safe working environment, full body harness locking provision, proper approach/platform surrounding work area has been placed.
After removing CT Fills, Inspect for damage areas and identify the same.
Do the surface preparation, then apply the required chemical on the wall.
Once the CT cell repair is completed, start the work for CT cell fill erection, level by level with required supports.
After CT cell fills complete erection, Dismantle of all temporary platforms and do proper housing keeping before cancelling the work permit.

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