



**DALMIA CEMENT (B) LIMITED – CEMENT PLANT
ARIYALUR
INSTRUMENTATION MANUAL**

Issue No. 02	Rev. No: 00	Effective Date: 01.11.2019	INST/SOP/22
Issued By: M.R		Approved By: HOD - INSTRUMENTATION	
SOP for checking of Air conditioning systems			

Scope : This SOP is applicable to Safe working for Maintenance AC systems

Responsibility : AC Technician.

Accountability : Instrument -Section Engineer.

PPE:

1. Safety helmet.
2. Safety shoe.
3. Mask.
4. Gloves.
5. Safety googles.

Tools:

- Multimeter
- Tester
- Insulated Screw Driver sets
- Hand Blower
- Ring spanner sets

Hazards:

Risks associated	Mitigating Measures
Skin Allergy (Contact with Soft water)	Use Hand Gloves
Cold burn & Frostbite (Contact with R22 gas)	Use Hand Gloves and Safety Goggles
Electrocution	Use Insulated Hand Gloves and Tools

Training needs:

1. People have knowledge to work in Chiller Unit
2. Emergency procedure



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Chiller Unit:

- 1 Switch off the System by pressing the Start / Stop symbol button in Controller.
- 2 Ensure the System off Condition by seeing Red Light indication in Controllerl.
- 3 Take the Line clearance.
- 4 Use proper PPE and Tools.
- 5 Ensure non availability of Electric supply.
- 6 Close Inlet and Outlet valve of Condenser water line.
- 7 Close Inlet and Outlet valve of Chiller water line.
- 8 Open the Chiller Comperssor-1 Condenser cover and clean the Condenser by using 5mm rod
- 9 Flush out Chiller Compressor-1 Condenser line by using condenser water line.
- 10 Close the Chiller Compressor -1 Condenser cover after completion of cleaning.
- 11 Repeat the Point no 6 & 7 for Compressor no 2, 3 & 4.
- 12 Check the all sensors tightness in Condenser water line, Chiller water line and R22 gas line.
- 13 Clean the Electrical panel by using hand blower.
- 14 Check the tightness of Power and Control cables.
- 15 Clean the dust above the Compressors and condenser lines by using Clothes
- 16 Open the Inlet and Outlet valve of Condenser water and Chiller water line.
- 17 Normalize the Line Clearance.



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- 18 Switch ON the System by pressing the Start / Stop Symbol button in Controller.
- 19 Ensure the Compressors running condition by seeing Green Light indication in Controller.
- 20 Check the entry water and leaving water temperature in controller and ensure the delta temp is more than 5 Deg.C
- 21 If less than 5 Deg.C Check the Working area room temperature is below the set point and AHU working condition. Also check the condenser water flow and inlet temp shall be less than 31 Deg.C.
- 22 Check the R22 Gas Pressure in Compressor -1 Suction line and Discharge line.
- 23 The Suction Pressure should be 60 to 75 Psi and Discharge Pressure should be 200 to 250 Psi.
- 24 If the suction pressure is less than 50 Psi. Switch off the Chiller system.
- 25 Does the leak test in Compressor -1 by using soap water.
- 26 If any leak found in bolt and nut area tight the same.
- 27 If the leakages is not visible drain the R22 gas to storage cylinder and ensure the line pressure is zero.
- 28 Apply high pressure N2 gas (250 Psi) in gas line and do the point no .25 & 26
- 29 After leakage found drain the N2 gas and ensure the line pressure is Zero.
- 30 If any leakage due to damaged part replace same.
- 31 If any welding is required arrest the same by following hot work permit.
- 32 After drain the R22 gas arrest the leakage by following hot work procedures.
- 33 Switch ON system. Connect the R-22 Cylinder in Compressor-1 Suction line, Refill the R22 Gas in Compressor-1 Up to 65 Psi.



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34 Repeat the Point no 17 to 31 for Compressor 2, 3 and 4.

35 Update PM Check list No: INST/PM/39 for Chiller unit.

Air Handling Unit (AHU):

- 1 Take the Line clearance.
- 2 Use proper PPE and Tools.
- 3 Close Inlet and Outlet valve of Chiller water line.
- 4 Remove all the filters from Air handling unit.
- 5 Open the air handling unit door.
- 6 Clean the electric motor and blower vanes by using clothes and brush.
- 7 Check the belt conditions of blower, Change the belt, if it is necessary.
- 8 Check the condition of electric motor pulley, if it is loose tight and align with blower.
- 9 Apply the lubricant in blower bearing.
- 10 Clean the evaporator coil by using soap water.
- 11 Check the water drain line condition and ensure no water storage in drain tray.
- 12 Close the Air handling unit door.
- 13 Clean all the filters by using hand blower and brush.
- 14 Fix the filter in correct position.
- 15 Open the inlet and outlet valve of chiller water line.
- 16 Normalize the Electrical clearance



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- 17 Switch ON the System.
- 18 Check the operation of Chiller water control valve by varying the temperature setting in controller.
- 19 If the operation is not properly adjust the positioner in control valve.
- 20 Check the temperature actual & set point in temperature controller and ensure the differential temp shall be less than 3 Deg.c
- 21 If the Differential temp is more than 3 Deg.c, check the air leak in air flow duct and arrest the same. Also ensure the all the entry doors and windows are closed in AHU room and working area.
- 22 Update the PM check list No: INST/PM/40 for Air handling unit.

Cooling Tower:

- 1 Take the Line clearance.
- 2 Use proper PPE and Tools.
- 3 Close Inlet and Outlet valve of Condenser water line.
- 4 Close the makeup water line valve.
- 5 Open the cooling tower drain line valve.
- 6 Check the sprinkler rotation with sprinkler pipes. If the rotation is uniform clean the pipes and sprinkler by using wire brush and clothes.
- 7 If the sprinkler rotation is not uniform remove the PVC pipes and remove sprinkler and change necessary spares.
- 8 Fix the sprinkler and PVC pipes, if it is removed for service.
- 9 Clean the Fills by using pipe and wire brush.



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- 10 Clean the bottom tank by using wire brush.
- 11 Open the makeup water line and clean the bottom tank.
- 12 Close the drain water line.
- 13 Check the operation of float valve in makeup water line, change or service if it is necessary.
- 14 Open the inlet and outlet valve of condenser water line.
- 15 Open the makeup water line and fill the water up to below the over flow level.
- 16 Normalize the Line clearance and switch ON the system.
- 17 Update PM check list No: INST /PM /41 for Cooling tower.

Water Pump:

- 1 Take the Line clearance.
- 2 Use proper PPE and Tools.
- 3 Close Inlet and Outlet valve of water line.
- 4 Open the strainer flange and clean the strainer and flush out the strainer line by opening inlet valve.
- 5 Put strainer back in line and close the flange.
- 6 Check the pump gland rope condition, replace or change if it is required.
- 7 Check condition of reflector, change if it is necessary.
- 8 Open the water inlet and outlet valve.
- 9 Normalize the line clearance and switch ON the system



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10 Check the water leakage in pump gland rope, tight the gland to optimize the water leakage.

11 Update PM check list No: INST / PM / 42 for water pump.

Emergency / Emergency Shut OFF:

1. If any unconsciousness is there, give First aid and inform to the Safety department or Call Emergency number 3108/9865152222/9750963761.

Records/Annexure:

1. Refer Line clearance certificates.
2. JSA as enclosed below.
3. Check List

JOB SAFETY ANALYSIS (JSA) FOR CHILLER UNIT:

Job Safety Analysis	Job: Chiller Unit	Date: 20.09.2017	Analysis by: Section Head	Reviewed by: HOD
Title of employee doing job: AC - Technician	Supervisor: Section Engineer	Department: Instrumentation	Section: AC	Approved by:
Req'd/recommended PPE: Safety helmet, Safety shoe, Mask, Goggles & Gloves.				
Sequence of Basic Job Steps	Potential Hazards	Recommended Safe Job Procedure	What Could Go Wrong	Corrective Action
Take the line clearance & switch off the isolator	Live supply 3 phase is exposed at the panel side	Ensure the isolation of power supply at the incoming side & check the incoming supply with Multimeter.	Result in electrocuted & flashing.	Check the incoming supply with Multimeter.



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Close the inlet and outlet valve of condenser and chiller water line	Soft water flow in Water line	Wear Goggles and Gloves.	Soft water may fall on our Hand and it will give the skin allergy.	If the Valve condition is not good, stop the respective water pump and change the valve.
Clean the Chiller Condensers.	Soft water in Condensers.	Wear Goggles and Gloves.	Soft water may fall on our Hand and it will give the skin allergy.	Wear Goggles and Gloves
Cleaning of Electrical Panel	Fine dust will come out.	Wear Goggles, Nose Mask and hand Gloves.	Coughing, Eye irritation may occur	Wear Goggles, Nose Mask and hand Gloves.
Check the tightness of power and control cable tightness	Chances for Terminal block damages.	Use proper tools based on the types of terminal blocks	Terminals may get damage and nuisance operation during panel startup	Select the proper tools
Clean the dust above the compressors and condensers	Fine dust will come out.	Wear Goggles, Nose Mask and hand Gloves.	Coughing, Eye irritation may occur	Wear Goggles, Nose Mask and hand Gloves.
Open the inlet and outlet valve of condenser and chiller water line	Soft water flow in Water line	Wear Goggles and Gloves.	Soft water may fall on our Hand and it will give the skin allergy.	If the Valve condition is not good, stop the respective water pump and change the valve.



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Check the R22 Gas Pressure in Compressor Suction and Discharge Line.	Chances for R22 Gas Leak.	Wear Goggles, Gloves and Nose Mask	Touch the R22 Gas will Create Cold burn and Frostbite	Wear Goggles, Gloves and Nose Mask
Refill the R22 Gas	Chances for R22 Gas Leak.	Wear Goggles, Gloves and Nose Mask	Touch the R22 Gas will Create Cold burn and Frostbite	Wear Goggles, Gloves and Nose Mask

JOB SAFETY ANALYSIS (JSA)FOR AIR HANDLING UNIT:

Job Safety Analysis	Job: Air Handling Unit	Date: 20.09.2017	Analysis by: Section Head	Reviewed by: HOD
Title of employee doing job: AC - Technician	Supervisor: Section Engineer	Department: Instrumentation	Section: AC	Approved by:

Req'd/recommended PPE: Safety helmet, Safety shoe, Mask, Goggles & Gloves.

Sequence of Basic Job Steps	Potential Hazards	Recommended Safe Job Procedure	What Could Go Wrong	Corrective Action
Take the line clearance & switch off the isolator	Live supply 3 phase is exposed at the panel side	Ensure the isolation of power supply at the incoming side & check the incoming supply with Multimeter.	Result in electrocuted& flashing.	Check the incoming supply with Multimeter.
Close the inlet and outlet valve of Chiller Water line	Soft water flow in Water line	Wear Goggles and Gloves.	Soft water may fall on our Hand and it will give the skin allergy.	If the Valve condition is not good, stop the Chiller Water pump and change the valve.



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Clean the electric motor and blower vanes	Fine dust will come out.	Wear Goggles, Nose Mask and hand Gloves.	Coughing, Eye irritation may occur	Wear Goggles, Nose Mask and hand Gloves.
Clean the Evaporator Coils	Cold water Condensation	Wear Hand Gloves	Cold burn in Hands	Wear Hand Gloves
Cleaning of Evaporator Coil Filters	Fine dust will come out.	Wear Goggles, Nose Mask and hand Gloves.	Coughing, Eye irritation may occur	Wear Goggles, Nose Mask and hand Gloves.
Open the inlet and outlet valve of Chiller Water line	Soft & Cold water flow in Water line	Wear Goggles and Gloves.	Soft water may fall on our Hand and it will give the skin allergy.	If the Valve condition is not good, stop the Chiller Water pump and change the valve.



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JOB SAFETY ANALYSIS (JSA) COOLING TOWER:

Job Safety Analysis	Job: Air Handling Unit	Date: 20.09.2017	Analysis by: Section Head	Reviewed by: HOD
Title of employee doing job: AC - Technician	Supervisor: Section Engineer	Department: Instrumentation	Section: AC	Approved by:
Req'd/recommended PPE: Safety helmet, Safety shoe, Mask, Goggles & Gloves.				
Sequence of Basic Job Steps	Potential Hazards	Recommended Safe Job Procedure	What Could Go Wrong	Corrective Action
Take the line clearance & switch off the isolator	Live supply 3 phase is exposed at the panel side	Ensure the isolation of power supply at the incoming side & check the incoming supply with Multimeter.	Result in electrocuted& flashing.	Check the incoming supply with Multimeter.
Close the inlet and outlet valve of Condenser Water line	Soft water flow in Water line	Wear Goggles and Gloves.	Soft water may fall on our Hand and it will give the skin allergy.	If the Valve condition is not good, stop the Condenser Water pump and change the valve.
Clean the Cooling Tower fills	Dust will come out.	Wear Goggles, Nose Mask and hand Gloves.	Coughing, Eye irritation may occur	Wear Goggles, Nose Mask and hand Gloves.
Clean the Cooling tower bottom tank	Dust will come out.	Wear Goggles, Nose Mask and hand Gloves.	Coughing, Eye irritation may occur	Wear Goggles, Nose Mask and hand Gloves.



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Open the inlet and outlet valve of Condenser Water line	Soft water flow in Water line	Wear Goggles and Gloves.	Soft water may fall on our Hand and it will give the skin allergy.	If the Valve condition is not good, stop the Condenser Water pump and change the valve.
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