

Section 10

Method Statement for Mechanical (HVAC) Installation

MECHANICAL

Method Statement
Installation of HVAC Ductwork

METHOD STATEMENT FOR INSTALLATION OF HVAC DUCTWORK

SCOPE AND PURPOSE

This "Method Statement" covers the on site installation of HVAC duct work and accessories and the requirement of checks to be carried out.

REFERENCE DOCUMENTS

- Project Specifications
- Approved shop drawings (latest revision)
- Approved material submittals
- Duct work standard DW 144

GENERAL

HVAC duct work generally includes all types of Supply Air Duct, Return Air Duct, Fresh and Exhaust Air Duct and their accessories such as duct elbows, offsets, transformation pieces branch off pieces, tee connections, access doors, Fire Dampers, Volume Control Dampers, Sound Attenuators, flexible ducting and insulation.

EQUIPMENT

- Portable grinding Machine
- Drilling Machine
- Sheet metal cutting tools and bender
- Spirit level
- Scaffolding
- Duct erector hand tools
- Testing instruments
- Air Compressor

RESPONSIBLE PERSONNEL

- Project Engineers
- Construction In-Charge.
- Site Engineer/Site supervisor.
- QA/QC Inspectors.
- Safety officer
- Site Foremen.
- Pipe fitters / Welders
- Helpers

METHOD OF PRE INSTALLATION

- Ensure that approved material required to carryout work will be available.

- Prior to commencement of work, area and access will be inspected to confirm that the site is ready to commence the work
- All relevant documentation and material applicable to particular section of works will be checked by site engineer before commencement.
- Physical verification of material will be carried out for any damages prior to taking from stores.
- The site engineer / supervisor will give necessary instruction to tradesman and provide necessary construction / shop drawings.
- The site engineer / supervisor will also check that tools and equipments available are in compliance to contract requirements.
- The site supervisor also explains tradesman regarding safety pre-cautions to be observed.
- Prior to Leak testing, Site Engineer will ensure that Calibrated test kit is available and are in good condition.

METHOD OF INSTALLATION

1. Prior to commencement of work coordination will be done with other
2. Determine the position of duct supports as per approved construction layouts and specification.
3. Prepare and fix the duct supports as per approved construction drawing and specification.
4. Any cut edges of angles, channels or threaded rods will be touch up with Zinc rich paint.
5. Transport the Duct pieces and fittings to final location.
6. Pre-assemble the Duct pieces "and" fittings as per approved shop drawing ensuring the alignment.
7. Acoustic insulation will be carried out wherever required.
8. Raise the duct work on to the supports ensuring that each length is aligned with preceding length as per dimensions shown on approved shop drawings.
9. Approved duct sealant shall be applied on the joints. Any excess sealant so that the joint left in clean and tidy condition.
10. Ensure that duct work is clean and no tools/ construction debris exists within duct work before proceeding to next length.
11. All open ends of the duct works shall be temporarily sealed with polythene sheets/ply wood before leaving the job site to prevent moisture and dirt.
12. Ensure that all accessories like Volume control dampers, Fire dampers, Access doors, Test points, Sensors are installed in accordance with approved shop drawings.
13. Install Sound Attenuators according to approved shop drawings
14. Installation of duct work (complete with accessories) shall be checked before applying insulation at joints.
15. Leak test will be carried out for duct work as applicable in DW144 standard.
16. Insulation of duct work will be completed as per manufacturer's recommendations (copy-enclosed).
17. Ensure the duct surface is clean and dry before applying any insulation material.
18. Ensure the thickness of insulation as per approved shop drawing.

19. Ensure that all edge joints are closely butted and ends are flush and seated properly.
20. Apply ALUGLASS Tape (Self Adhesive Aluminium Foil Laminated on Glass fabric) at Joints of insulation.
21. Ensure the continuity of vapor barrier and other protective coatings on insulation surface as well as at connections.
22. Ensure firm adherence of insulation around_ ducting by using approved adhesive between sheet metal and Insulation material.
23. Where insulated duct work passes through fire rated wall/partitions the gap between sleeve and duct work shall be filled with approved fire barrier.

QUALITY CONTROL

- QCE along with Project Engineer and site Supervisor will monitor that all components are installed as per the contract specifications and approved submittals.
- Inspection Request (IR) shall be submitted to the Main Contractor/Consultant during the following stages :-
 - After completion of installation before testing
 - Leak testing of duct work
 - After complete insulation

SAFETY

- Work will commence as per safety regulations laid down in the contract specification and project safety plan.
- Proper safety harness to be used and secured, if required.
- All personal protective equipment shall be used as appropriate according to the nature of job.
- Housekeeping shall be of good standard and all cut lengths and debris shall be removed.
- Good ventilation for duct work insulation shall be ensured.

Method Statement
Installation and insulation of Spiral Round
Ducting and Duct Accessories

MECHANICAL

METHOD STATEMENT FOR INSTALLATION AND INSULATION OF SPIRAL ROUND DUCTING AND DUCT ACCESSORIES

SCOPE AND PURPOSE

This "Method Statement" covers the on site installation of Spiral round ducting and duct accessories and the requirement of checks to be carried out.

REFERENCE DOCUMENTS

- Project Specifications
- Approved shop drawings (latest revision)
- Approved material submittals
- Duct work standard DW 144

GENERAL

GI Spiral round ducting generally installed in for FCU return air, and supply air as shown in approved shop drawing includes spiral round ducting, fittings such as elbows, tees, couplings, reducers, collars etc, volume control dampers, flexible ducting insulation.

EQUIPMENT

- Portable grinding Machine
- Drilling Machine
- Sheet metal cutting tools and bender
- Spirit level
- Scaffolding
- Duct erector hand tools
- Testing instruments
- Air Compressor

RESPONSIBLE PERSONNEL

- Project Engineers
- Construction In-Charge.
- Site Engineer/Site supervisor.
- QA/QC Inspectors.
- Safety officer
- Site Foremen.
- Pipe fitters / Welders
- Helpers

METHOD OF PRE INSTALLATION

- Ensure that approved material required to carryout work will be available.

- Prior to commencement of work, area and access will be inspected to confirm that the site is ready to commence the work
- Check all the GI Spiral ducting received are pre fabricated with tag number labeled and received at site in accordance with specifications and correct dimensions as per approved drawings.
- All relevant documentation and material applicable to particular section of works will be checked by site engineer before commencement.
- Physical verification of material will be carried out for any damages prior to taking from stores.
- The site engineer / supervisor will give necessary instruction to tradesman and provide necessary construction / shop drawings.
- The site engineer / supervisor will also check that tools and equipments available are in compliance to contract requirements.
- The site supervisor also explains tradesman regarding safety pre-cautions to be observed.

METHOD OF INSTALLATION

1. Prior to commencement of work coordination will be done with other services.
2. Determine the position of duct supports as per approved Shop drawings and coordinated layouts and specification.
3. Prepare and fix the duct supports as per approved construction drawing and specification.
4. Any cut edges of angles, channels or threaded rods will be touch up with Zinc rich paint.
5. Transport the duct pieces and fittings to final location.
6. Before assembly ensure that all ducts are free from dirt.
7. Check that ducts and fittings are undamaged. This is specially important with regard to the rubber gaskets.
8. Assemble the Duct pieces and fittings as per approved shop drawing ensuring the alignment.
 - a) Push the fittings into the duct right to the stop. Turning the fitting a little makes insertion easier.
 - b) Fasten fittings to the duct with self tapping screws or centered pop rivets.
 - c) Distribute the screws or pop rivets evenly around the circumference, ensuring the rubber gaskets are not damaged i.e. placing the them approx.10mm from stop and end of the duct. In the event of incorrect assembly, holes caused by screws or pop rivets must be sealed.
9. Raise the duct work on to the supports ensuring that each length is aligned and leveled with preceding length as per dimensions shown on approved shop drawings.
10. Ensure that duct work is clean and no tools/ construction debris exists within duct work before proceeding to next length.
11. All open ends of the duct works shall be temporarily sealed with polythene Sheets/ply wood before leaving the job site to prevent moisture and dirt.
12. Ensure that all accessories like Volume control dampers, Test points, Sensors are installed in accordance with approved shop drawings.
13. Installation of duct work (complete with accessories) shall be checked before applying insulation at joints.
14. Insulation of duct work will be completed as per manufacturer's recommendations (copy enclosed).

- a) Ensure the duct surface is clean and dry before applying any insulation material. Apply thinner /cleaner where necessary to make the area grease free.
 - b) Apply glue recommended by manufacturer with an even spread on complete surface of insulation sheet.
 - c) Once the glue on the sheet gets dry, apply glue on the GI duct and let it dry, then stick the sheet on one end and slowly press the sheet on the duct from one end to the other so as to ensure that the sheet sticks on the GI duct completely avoiding air bubbles between the insulation sheet and GI duct.
 - d) In the areas where the GI duct comes into contact with the duct hangers, rigid support is recommended such as wood. The wood piece should be glued onto the duct hanger and layer of rubber to be glued on the wood, so that there is no direct contact between the duct insulation and the wooden piece thus preventing tearing of the duct insulation. In case the positioning of the support is available in advance, wood by itself can be used. In this case it has to be made sure that insulation will be glued to the wood from both sides accordingly.
15. Where insulated duct work passes through fire rated wall/partitions the gap between sleeve and duct work shall be filled with approved fire barrier.

QUALITY CONTROL

QCE along with Project Engineer and site Supervisor will monitor that all components are installed as per the contract specifications and approved submittals.

- Inspection Request (IR) shall be submitted to the Main Contractor/Consultant during the following stages :-
- Mock up installation of GI spiral round ducting before and after insulation
- After complete insulation

SAFETY

- Work will commence as per safety regulations laid down in the contract specification and project safety plan.
- Proper safety harness to be used and secured, if required.
- All personal protective equipment shall be used as appropriate according to the nature of job.
- Housekeeping shall be of good standard and all cut lengths and debris shall be removed.

Method Statement
Installation, Testing & Insulation of Chilled
Water System

MECHANICAL

METHOD STATEMENT FOR INSTALLATION, TESTING & INSULATION OF CHILLED WATER SYSTEM

SCOPE AND PURPOSE

This "Method Statement" covers the on site installation, testing and insulation of the chilled water piping system including risers and the requirements of checks to be carried out.

REFERENCE DOCUMENTS

- Project Specifications
- Approved shop drawings (latest revision)
- Approved material submittals

GENERAL

Chilled water piping system includes chilled water pipes, fittings, valves and accessories used for transportation (supply and return) chilled water for AHU's and FCU's through Chilled water pumps. Pipes and fittings up to 50 NB dia. size shall be threaded type and 65 NB and above shall be either grooved or welded type.

EQUIPMENT

- Electrical grinding Machine
- Scaffolding
- Drilling Machine
- Ladders
- Heavy duty cutter.
- Pipe fitter hand tools
- Grooving machine
- Electrode oven/ Quivers
- Threading machine
- Pressure test pump
- Welding machine
- Test pressure gauges
- Cutting Torch set.

RESPONSIBLE PERSONNEL

- Project Engineers
- Construction In-Charge.
- Site Engineer/Site supervisor.
- QA/QC Inspectors.
- Safety officer
- Site Foremen.
- Pipe fitters / Welders
- Helpers

METHOD OF PRE INSTALLATION

- Ensure that approved material required to carryout work will be available.

- Proper materials including chilled water pipes, fittings and associated accessories are with drawn from stores according to approved shop drawing and good engineering practices.
- Prior to commencement of work, area and access will be inspected to confirm that the site is ready to commence the work
- All relevant documentation and material applicable to particular section of works will be checked by site engineer before commencement.
- Physical verification of material will be carried out for any damages prior to taking from stores.
- The site engineer / supervisor will give necessary instruction to tradesman and provide necessary construction / shop drawings.
- The site engineer / supervisor will also check that tools and equipments available are in compliance to contract requirements.
- The site supervisor also explains tradesman regarding safety pre-cautions to be observed.
- Prior to Hydrostatic Pressure testing, Site Engineer will ensure that Calibrated pressure gauges are available and are in good condition

METHOD OF INSTALLATION

1. All welding activities will be carried out by certified welders only.
2. Supervisor/Foremen will carryout a site survey and mark the route of Chilled water piping as per approved shop drawings. In the event that there are any discrepancies or difficulties in executing the work, these will be brought to the notice of Project Engineer for corrective action.
3. Determine the position of supports and fix the supports using anchor bolts and ensure all fixing are tight and secure.
4. Any cut edges of angles, channels or threaded rods will be touch up with Zinc rich paint.
5. Install the pipes in position by using suitable lifting equipments(If necessary).
6. Assemble the pipes and fittings as per approved shop drawing.
7. After installation of pipe work check for correct leveling, position alignment and proper grooving/threading or welding.
8. Where the pipes of dissimilar materials are to be joined together necessary; dielectric unions shall be used.
9. Sufficient spacing shall be maintained between pipes for insulation.
10. Spacing between supports / hangers will be maintained in accordance with latest approved shop drawings.
11. Ensure all open ends of pipes, fittings and valves are covered with polyethylene sheet before leaving work space.
12. All high point on piping system will be provided with an air vent. Drains ; will be provided at low point with an access. High point vents will be connected nearest drains.

13. INSTALLATION OF VALVES AND ACCESSORIES

- Install system valves and accessories as per latest approved shop drawings.
- Ensure that system equipment, valves and accessories are secure and rigid

- The installation shall be done allowing sufficient access to all Valves/strainers/Gauges as per Manufacturer's recommendations.

14. INSTALLATION OF CHILLED WATER RISERS

- Pipe sizes will be identified first as per latest approved shop drawing and shifted to respective floors.
- Install the supports as per approved shop drawing.
- The pipe shall be thoroughly cleaned prior to joining.
- On completion of joining, install the pipes using necessary equipment / manpower.
- After installation of risers check the pipeline for proper alignment and supports.

HYDROSTATIC PRESSURE TESTING

1. Complete pipe work will be subjected to hydraulic pressure tested as per technical specification. Depending on ongoing Construction activities sectional hydro testing will be under taken to meet the requirements of the programme. Test pressure will not be less than 1.5 times the working pressures but not less than 1035 KPa (for 24 hour period) which ever is greater. Prior to any testing the system pressure will be detailed on the pressure testing documentation.
2. Pressure gauges used for Pressure testing will have valid calibration certificate.
3. After successful Pressure testing ensure that piping system is fully drained and released for chemical cleaning which will be carried out at later date as per approved method statement

INSULATION

1. Before application of thermal insulation, Chilled water pipes will be ; painted with a primer paint as per specification. Painting of welded joints will be carried out after pressure testing.
2. Insulation of chilled water pipe work will be carried out as per details as shown in approved submittals. Thermal insulation of welded joints will be carried out after pressure testing.
3. Ensure thickness of insulation is as per approved drawing

QUALITY CONTROL

- QCE along with Project Engineer and site Supervisor will monitor that all components are installed as per the contract specifications and approved submittals.
- Inspection Request (IR) shall be submitted to the Main Contractor/Consultant during the following stages :-
- After completion of installation before hydrostatic pressure test.
- Pressure testing of piping
- After completion of insulation

SAFETY

- Work will commence as per safety regulations laid down in the contract specification and project safety plan.
- Proper safety harness to be used and secured, if required.
- All personal protective equipment shall be used as appropriate according to the nature of job.
- Housekeeping shall be of good standard and all cut lengths and debris shall be removed.
- Fire Extinguishers will be provided in the near vicinity during welding and cutting operations.
- Where ever required fire blanket will be provided.
- Hot work permit system will be followed.



Method Statement
Installation of Fan Coil Unit (FCU)

METHOD STATEMENT FOR INSTALLATION OF FAN COIL UNIT

SCOPE AND PURPOSE

This "Method Statement" covers the on site installation of FAN COIL UNITS (FCU) and the requirements of checks to be carried out.

REFERENCE DOCUMENTS

- Project Specifications
- Approved shop drawings (latest revision)
- Approved material submittals

GENERAL

Fan Coil Units generally be installed in locations shown in drawings, serving apartments mechanical -rooms etc.-; both in concealed areas and exposed supplying cold dehumidified air conditioned space.

EQUIPMENT

- Drilling Machine
- Spirit Level
- Scaffolding
- Hand tools of Trades men

RESPONSIBLE PERSONNEL

- Project Engineers
- Construction In-Charge.
- Site Engineer/Site supervisor.
- QA/QC Inspectors.
- Safety officer
- Site Foremen.
- Pipe fitters
- Helpers

METHOD OF PRE INSTALLATION

- Ensure that approved material required to carryout work will be available.
- Prior to commencement of work, area and access will be inspected to confirm that the site is ready to commence the work
- All relevant documentation and material applicable to particular section of works will be checked by site engineer before commencement.
- Physical verification of material will be carried out for any damages prior to taking from stores.
- The site engineer / supervisor will give necessary instruction to tradesman and provide necessary construction / shop drawings.

- The site engineer / supervisor will also check that tools and equipments available are in compliance to contract requirements.
- The site supervisor also explains tradesman regarding safety pre-cautions to be observed.

METHOD OF INSTALLATION

1. Prior to commencement of work coordination will be done with other services.
2. Determine the position of Fan Coil Unit on the ceiling and mark the location of supports as per approved shop drawing.
3. Prepare and fix the Fan Coil Unit supports as per approved construction drawing and specification.
4. Ensure that Vibration Isolators of approved make, type and model are installed.
5. Install the Fan Coil Units by lifting it slowly by using suitable lifting aids (if necessary). Manufacturer's recommendations shall be followed during installation.
6. Any cut edges of angles, channels or threaded rods will be touch up with Zinc rich paint.
7. Fan Coil Units will be connected with Piping Connections complete with valves and accessories as indicated in approved shop drawing.
8. Ensure that Dielectric unions are used for piping connection to FCU's.
9. FCU Valve packages shall be provided with drain pan as shown in approved shop drawing
10. Ensure that drain connections are made with adequate slope with running trap.
11. Complete the duct connections to Fan Coil Units as shown in approved shop drawing.
12. Complete the Electrical power connection includes earthing a all respects as per approved electrical drawing and Manufacturer's recommendations.
13. Ensure that adequate space for maintenance of fan coil units and valve package is available.
14. Install the thermostat control units as per shop drawing/ Architectural PE/SS/FM drawing.
15. Complete the BMS interfacing with DDC controllers as per approved BMS drawings.

QUALITY CONTROL

- QCE along with Project Engineer and site Supervisor will monitor that all components are installed as per the contract specifications and approved submittals.
- Inspection Request (IR) shall be submitted to the Main Contractor/Consultant.

SAFETY

- Work will commence as per safety regulations laid down in the contract specification and project safety plan.
- Proper safety harness to be used and secured, if required.
- All personal protective equipment shall be used as appropriate according to the nature of job.
- Housekeeping shall be of good standard and all cut lengths and debris shall be removed.

Method Statement
Installation of Fans

PREP

SECTION

METHOD STATEMENT FOR INSTALLATION OF FANS

SCOPE AND PURPOSE

This "Method Statement" covers the on site installation of FANS and the requirements of checks to be carried out.

REFERENCE DOCUMENTS

- Project Specifications
- Approved shop drawings (latest revision)
- Approved material submittals

GENERAL

Fans generally are installed in locations shown in drawings. Types of fans used in mainly classified as Toilet extract fans(TEF),Kitchen extract fans(KEF),Refuse fans, Lobby pressure relief fans(LRF),Stairwell pressurization fans(SPF),Car park exhaust fans, Jet fans etc.

EQUIPMENT

- Drilling Machine
- Spirit Level
- Lifting Equipments (Cranes)
- Scaffolding
- Hand tools of Trades men

RESPONSIBLE PERSONNEL

- Project Engineers
- Construction In-Charge.
- Site Engineer/Site supervisor.
- QA/QC Inspectors.
- Safety officer
- Site Foremen.
- Pipe fitters
- Helpers

METHOD OF PRE INSTALLATION

- Ensure that approved material required to carryout work will be available.
- Check the name plate details of Fans as per approved shop, drawing/schedules and material submittals before installation.
- Prior to commencement of work, area and access will be inspected to confirm that the site is ready to commence the work
- All relevant documentation and material applicable to particular section of works will be checked by site engineer before commencement.

- Physical verification of material will be carried out for any damages prior to taking from stores.
- The site engineer / supervisor will give necessary instruction to tradesman and provide necessary construction / shop drawings.
- The site engineer / supervisor will also check that tools and equipments available are in compliance to contract requirements.
- The site supervisor also explains tradesman regarding safety pre-cautions to be observed.

METHOD OF INSTALLATION

1. Prior to commencement of work coordination will be done with other services.
2. Make sure that fans are free from damage and all internal components are complete and in good condition.
3. Fan assemblies will be transported to the nearest point of erection. Care will be taken while handling the units to avoid damage/distortion.
4. Manufacturer's recommendation will be followed for installation of fans.
5. Fans will be installed in location as per approved shop drawing.

INSTALLATION OF FLOOR MOUNTED FANS

1. Ensure that builders work foundation is provided as per approved shop drawing.
2. Ensure the level of Foundation by spirit level.
3. Check the size and orientation of foundation for its suitability to install the fans.
4. Fix the Vibration Isolators to foundation as per approved submittal.
5. Install the Fan assembly mounting brackets on vibration Isolators as per manufacturer's recommendations.
6. Complete the ductwork / damper installation as per approved shop drawing.

INSTALLATION OF IN "LINE MOUNTED FANS(CEILING SUSPENDED)

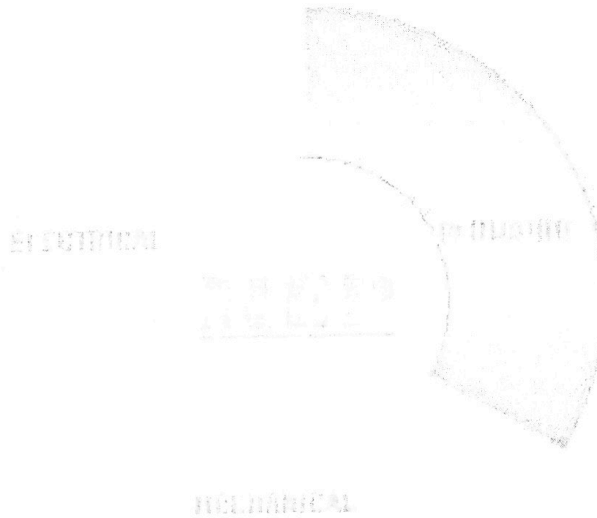
1. Fans can be mounted either horizontally or vertically as per approved shop drawing.
2. Support the fans by using threaded rods to the fan casing as per manufacturer's recommendations.
3. Provide vibration isolators (approved type) as per manufacturer's recommendations on the mounting brackets/holes.
4. Complete the ductwork/damper connection as per approved shop drawing.
5. Ensure that sufficient space is available to allow removal of access covers and subsequent removal of fan and motor assemblies etc. as per manufacturer's recommendations.
6. Complete all electrical connections as per approved electrical drawing and manufacturer's terminal diagram.
7. Earthing shall be provided as per requirements.
8. Complete the labeling of electrical connections as per schematic drawings.
9. Fan rotation shall be checked before duct connection.

QUALITY CONTROL

- QCE along with Project Engineer and site Supervisor will monitor that all components are installed as per the contract specifications and approved submittals.
- Inspection Request (IR) shall be submitted to the Main Contractor/Consultant.

SAFETY

- Work will commence as per safety regulations laid down in the contract specification and project safety plan.
- Proper safety harness to be used and secured, if required.
- All personal protective equipment shall be used as appropriate according to the nature of job.
- Housekeeping shall be of good standard and all cut lengths and debris shall be removed.
- All lifting operations shall be monitored by Safety Officer.



Method Statement
Installation of Chilled Water Pumps

METHOD STATEMENT FOR INSTALLATION OF CHILLED WATER PUMPS

SCOPE AND PURPOSE

This "Method Statement" covers the on site installation of CHILLED WATER PUMPS and the requirements of checks to be carried out.

REFERENCE DOCUMENTS

- Project Specifications
- Approved shop drawings (latest revision)
- Approved material submittals

GENERAL

Chilled water Pumps generally to be installed in locations shown in drawings in the Plant Rooms.

EQUIPMENT

- Drilling Machine
- Spirit Level
- Lifting Equipments (Cranes)
- Scaffolding
- Hand tools of Trades men
- Alignment tools

RESPONSIBLE PERSONNEL

- Project Engineers
- Construction In-Charge.
- Site Engineer/Site supervisor.
- QA/QC Inspectors.
- Safety officer
- Site Foremen.
- Pipe fitters
- Helpers

METHOD OF PRE INSTALLATION

- Ensure that approved material required to carryout work will be available.
- Check the name plate details of Chilled Water Pump as per approved shop, drawing/schedules and material submittals before installation.
- Prior to commencement of work, area and access will be inspected to confirm that the site is ready to commence the work

- All relevant documentation and material applicable to particular section of works will be checked by site engineer before commencement.
- Physical verification of material will be carried out for any damages prior to taking from stores.
- The site engineer / supervisor will give necessary instruction to tradesman and provide necessary construction / shop drawings.
- The site engineer / supervisor will also check that tools and equipments available are in compliance to contract requirements.
- The site supervisor also explains tradesman regarding safety pre-cautions to be observed.

METHOD OF INSTALLATION

1. Prior to commencement of work coordination will be done with other services.
2. Make sure that the Pumps are free from damage and all internal components are complete and in good condition.
3. Chilled Water Pumps assemblies will be transported to the nearest point of erection. Care will be taken while handling the units to avoid Damage/distortion.
4. Ensure that foundations of Chilled Water Pumps are as per approved shop drawing.
5. Install Inertia base assembly on the foundation as per approved shop drawing. Ensure the orientation, axis and level of inertia base is as per approved shop drawing.
6. Fix the vibration isolators to inertia base as per approved shop drawing. Ensure that the locations are matching with Chilled Water Pump base anchoring details.
7. Complete the concrete filling in the Inertia base as per approved shop drawing.
8. Concreting of Inertia bases will be carried out by Main Contractor.
9. Install the chilled water pumps on the inertia base with vibration isolators connected to chilled water pump base frame.
10. Ensure the orientation axis and level of pump as per approved shop drawing.
11. Ensure that pump and motors are properly aligned.
12. Complete the piping connections, including Valves and accessories/flexible connections to pump suction and discharge sides as per approved shop drawing.
13. Piping connections shall be erected to allow access for operation and maintenance of pump motor and valves.
14. Make sure that the piping connections are supported properly and no imposed load of piping is transferred to the pump.
15. Complete all instrument mountings required as approved shop drawing.
16. Complete all electrical connections to pump motor with all necessary electrical protection and controls as per approved electrical shop drawing.
17. Complete the final alignment of pump and motor under manufacturer's representative's supervision.

QUALITY CONTROL

- In general, it shall be ensured by Site Engineer that product manufacturer's recommendations are

followed and shall be monitored by QA/QC Engineer. However, the following points shall be ensured, in particular;

- The appropriate and approved material is used.
- The appropriate pump is used.
- Skilled labour is employed for installation of pumps.

TESTING

- The piping connections to pumps shall be pressure tested to 1.5 times the working pressures.
- Strainer shall be cleaned after initial flushing of Chilled water piping system.
- Insulation of piping to be done after pressure testing.
- Electrical circuits / controls and connections are to be checked.

INSPECTION

- Inspection request (IR) shall be raised for consultant's inspection.
- QC inspection shall be carried out as per the installation checklist and manufacture's instructions.
- Inspection shall be recorded in the approved format.

SAFETY

- Work will commence as per safety regulations laid down in the contract specification and project safety plan.
- Proper safety harness to be used and secured, if required.
- All personal protective equipment shall be used as appropriate according to the nature of job.
- Housekeeping shall be of good standard and all cut lengths and debris shall be removed.
- All lifting operations shall be monitored by Safety Officer.

Method Statement
Installation of Air Handling Unit (AHU's)

ELECTRICAL

ACEP

MECHANICAL

METHOD STATEMENT FOR INSTALLATION OF AIR HANDLING UNITS (AHU's)

SCOPE AND PURPOSE

This "Method Statement" covers the on site installation of AIR HANDLING UNITS (AHU's) and the requirements of checks to be carried out.

REFERENCE DOCUMENTS

- Project Specifications
- Approved shop drawings (latest revision)
- Approved material submittals

GENERAL

Air Handling Units generally be installed in locations shown in drawings, serving corridors and supplying treated fresh air to the lobbies and apartments located at various floors.

EQUIPMENT

- Drilling Machine
- Spirit Level
- Lifting Equipments (Cranes)
- Rollers
- Scaffolding
- Hand tools of Trades men

RESPONSIBLE PERSONNEL

- Project Engineers
- Construction In-Charge.
- Site Engineer/Site supervisor.
- QA/QC Inspectors.
- Safety officer
- Site Foremen.
- Pipe fitters
- Helpers

METHOD OF PRE INSTALLATION

- Ensure that approved material required to carryout work will be available.
- Check the name plate details of Air handling Units as per approved shop, drawing/schedules and material submittals before installation.
- Prior to commencement of work, area and access will be inspected to confirm that the site is ready to commence the work

- All relevant documentation and material applicable to particular section of works will be checked by site engineer before commencement.
- Physical verification of material will be carried out for any damages prior to taking from stores.
- The site engineer / supervisor will give necessary instruction to tradesman and provide necessary construction / shop drawings.
- The site engineer / supervisor will also check that tools and equipments available are in compliance to contract requirements.
- The site supervisor also explains tradesman regarding safety pre-cautions to be observed.
- Ensure that all lifting operations are carried out as per approved procedure.

METHOD OF INSTALLATION

6. Prior to commencement of work coordination will be done with other services.
7. Check the foundation of AHU for size, orientation and finishes as approved shop drawing
8. Make sure that AHU's are free from damage and all internal components are complete and in good condition.
9. AHU's will be installed in location as per approved shop drawing.
10. Install the AHU's on concrete foundation by using suitable equipment recommended by manufacturer (eg. Rollers/jacks etc.). Manufacturer's recommendations will be followed during erection of AHU.
11. Multi-section units will be joined as per Manufacturer's instructions. Ensure to remove Shipping Bolts.
12. Ensure the orientation of AHU's as per approved shop drawing during installation.
13. Serrated rubber pads (Neoprene Isolator) will be provided below AHUs.
14. AHU's which are ceiling suspended will be mounted by using threaded rods, spring hangers etc. as per approval.
15. Any cut edges of angles, channels or threaded rods will be touch up with Zinc rich paint for ceiling suspended AHU's.
16. Connect all piping and accessories to AHU's as per approved shop drawing.
17. Ensure that Dielectric unions/Flanges are used for piping connection to AHU's.
18. Ensure that drain connections are made with adequate slope and approved U-trap.
19. Complete the duct connections to Air handling Units as shown in approved shop drawing.
20. Filters of specified sizes will be provided.
21. Check that adequate space for maintenance of Air Handling Units is provided as per approved shop drawing.
22. Complete the Electrical power connection including earthing in all respects as per approved electrical drawing and Manufacturer's recommendations.
23. Complete the BMS interfacing with DDC controllers as per approved BMS 9-drawings.

QUALITY CONTROL

- QCE along with Project Engineer and site Supervisor will monitor that all components are installed as per the contract specifications and approved submittals.
- Inspection Request (IR) shall be submitted to the Main Contractor/Consultant.

SAFETY

- Work will commence as per safety regulations laid down in the contract specification and project safety plan.
- Proper safety harness to be used and secured, if required.
- All personal protective equipment shall be used as appropriate according to the nature of job.
- Housekeeping shall be of good standard and all cut lengths and debris shall be removed.
- All lifting operations shall be monitored by Safety Officer.



Method Statement
HVAC Testing, Adjusting & Balancing

METHOD STATEMENT FOR TESTING, ADJUSTING & BALANCING OF HVAC SYSTEM

SCOPE AND PURPOSE

This "Method Statement" covers the on site Testing, Adjusting and Balancing of HVAC systems installed. This Method statement to be read in conjunction with project commissioning plan.

REFERENCE DOCUMENTS

- Project Specifications
- Approved shop drawings (latest revision)
- Approved material submittals

GENERAL

The HVAC system testing, adjusting, and balancing is the process of checking and adjusting all environmental systems in a building to produce the design objectives. This process Includes:-

- Balancing air and water distribution systems
- Adjusting the total system to provide design quantities.
- Electrical measurements.
- Establishing quantitative performance of all equipment.
- Sound measurements.

The above procedures are accomplished by

- Checking the installations for conformity to design.
- Measuring and establishing the fluid ' quantities of the system as required to meet design specifications.
- Recording and reporting the results

EQUIPMENT

- Balometer
- Anemometer
- Micromanometer
- Pitot Tubes
- Tachometer
- Sound Meter Tester
- Water gauges (duel/single)
- Multimeter/ Tong Tester
- Hand tools of Trades men

RESPONSIBLE PERSONNEL

- Commissioning Manager
- Seder (Specialist commissioning agency) personnel

- Equipment/ system supplier (as applicable)
- Project Engineers
- Construction In-Charge.
- Site Engineer/Site supervisor.
- QA/QC Inspectors.
- Safety officer
- Site Foremen.
- Electrician
- Helpers

METHOD OF PRE INSTALLATION

- Ensure that approved material required to carryout work will be available.
- Ensure that As-Built marked up drawings are available reflecting the actual site installations.
- Prior to commencement of work, area and access will be inspected to confirm that the site is ready to commence the work
- Commissioning Manager along with representatives of Sender will carryout Visual inspection of all installations in order ensure that installations are in accordance with approved documents? In case of any discrepancy observed the same shall be brought to the notice of the Project engineer and Consultant for resolution of same.
- Ensure that all instruments are calibrated and are in proper working condition.
Prior to start commissioning that it will be ensured that all chilled water pipe work is hydrostatically pressure tested satisfactorily and all documentation is available.
- Prior to Commissioning of chilled water system, it will be ensured that all piping is satisfactorily flushed chemically cleaned. And all the pipe work is reinstated to original positions.
- Accessibility of all valves, VCD's will be ensured before start of commissioning. Where required temporary access shall be provided for VCD's.

METHOD OF INSTALLATION

1. Testing, adjusting and balancing of HVAC systems installed will be CM/SP/PE carried out as per the specialist commissioning procedures attached by specialist commissioning agency.
2. Commissioning Manager ensures that all manpower deployed by Specialist agency is competitive and sufficient to complete the TAB work.
3. All the test documentation will be recorded on the test sheets attached to the Specialist commissioning procedures.
4. Manufacturer's Representative will be associated for start equipment and as required.
5. Status of Testing and commissioning will be maintained and reported periodically to Project Managers. Consultant.

QUALITY CONTROL

- QCE in coordination with Commissioning Manager and Project CM//PE/QCE Engineer notify to Consultants for testing and commissioning of HVAC systems area wise for witnessing the same.

- QCE in association with Commissioning Manager and Project Engineer will ensure that all the test documentation is complete and signed off.

SAFETY

- Work will commence as per safety regulations laid down in the contract specification and project safety plan.
- All personal protective equipment shall be used as appropriate according to the nature of job.
- Housekeeping shall be of good standard and all cut lengths and debris shall be removed.

ATTACHMENTS:-

SEDER HVAC TAB METHOD STATEMENT ALONG WITH REPORT FORMS.



Method Statement
Flushing & Chemical Treatment Chilled Water
System

METHOD STATEMENT FOR FLUSHING & CHEMICAL TREATMENT CHILLED WATER SYSTEM

SCOPE AND PURPOSE

This "Method Statement" covers the on site flushing and chemical cleaning of the Chilled Water System installed in JBR-Sector4 including towers and podium should be read in conjunction with approved material submittal

REFERENCE DOCUMENTS

- Project Specifications
- Approved shop drawings (latest revision)
- Approved material submittals

GENERAL

Chilled water system includes pipes, fittings and valves used for transportation of chilled water to FCU's, AHU's through chilled water pumps. Flushing of system ensures removal of all contamination that may occur during manufacturing, storage and installation of piping. Chemical cleaning ensures the removal of oxides, oils and greases by using chemicals such as acids, alkalis, complexing agents etc;. Continuous monitoring of the condition of the cleaning solution by the cleaning specialist will be necessary throughout the chemical cleaning process.

EQUIPMENT

- Chilled Water Pumps
- Temporary hoses for filling/ drainage
- Temporary water tanks for disposal of chemical/ flushing water

RESPONSIBLE PERSONNEL

- AHEE MEP Coordinator
- Sr. Project Engineer HVAC
- Construction In-Charge.
- Site Engineer/Site supervisor.
- Personnel from specialist supplier
- QA/QC Inspectors.
- Safety officer
- Site Foremen.
- Electrician
- Helpers

PROCEDURE:

PRE REQUISITES FOR FLUSHING:

1. Chemical cleaning of the system will not be undertaken until the system installation has been completed, pressure tested and approved by consultant, vented and filled with clean water, static and dynamic flushing completed and circulating (system) pumps are available for operation.
2. Full access to all parts of system to be available, including access panels in ceilings, to enable access to valves, drains and vents etc.
3. Flushing will be carried out for each tower & each chilled water circuit (secondary and tertiary) separately. A detailed procedure is indicated here, which is common for all the circuits. Marked up schematic drawings for each secondary and tertiary chilled water circuit for each tower, for flushing are enclosed for reference. Following points are identified and marked in the enclosed schematic drawings for each circuit:

Note: At present only one marked up schematic drawing for CO 2 TO 2 tower, secondary circuit is attached for review & comments.

- a) Number of floors covered in the circuit.
 - b) Number of Terminal units (Heat exchangers, AHUs, FCUs) at various levels.
 - c) Fresh water filling point.
 - d) Drain point from where the system water will be drained out.
 - e) Number of terminal units at various levels, where temporary bypass loops shall be provided.
4. Before flushing work commences ensure that:
 - a) All pipe ends are looped/ closed prior to filling the water.
 - b) All valves except drain valves (gate/butterfly/globe/DRV/commissioning set valves) are fully open. Drain valves will be closed. All 2 way control valves are fully isolated. Inlet and outlet valves for terminal units, where bypass loops are not provided will be closed to avoid flushing water passing through the coils. Water will be drained from these units at the final stage of flushing before adding final chemical.
 - c) All necessary temporary bypasses installed around terminal units (heat exchangers, AHU's and FCU's) to be verified as fully open.

- d) Sufficient fresh and clean water supply is available continuously with adequate pressure at water filling point.
 - e) Drain points are properly connected / kept ready for connection to nearest drain point. Drain points will be decided in consultation with plumbing / drainage department and will be approved by Consultants.
 - f) Portable storage tanks to store drained water will be arranged, as required.
5. The objective of the flushing and cleaning treatment process is to provide acceptable water quality (defined in 6.0) and internal pipe conditions that will permit the commissioning of the systems and provide a foundation from which an effective ongoing regime of water treatment and system management can commence.
6. At all stages of the flushing and cleaning process the system will be offered for witnessing by the Consultant. The witnessing will include water quality, water quality, water analysis, pressure readings and strainer, deposits. The witnessing will be a continuous exercise and the full involvement of all witnessing parties will be required. During every stage of flushing process, for each circuit, samples of water will be taken from top & bottom level of each stage and tested an after satisfactory report next sage of flushing will commence.

FLUSHING PROCESS:

Generally flushing will be carried out in following steps for each secondary an l d tertiary chilled water circuit.

A. STATIC FLUSHING:

1. Complete system to be filled with clean water from bottom most point of the system AND vented through air vents at various locations and at the high points of the system
2. System pumps to be operated for a period of 1.2 hours to agitate any debris within the system
3. With pumps switched 'off, drain system at lowest point(s) of system all drains and air vents to be opened at same time to expedite the flushing. It is to be ensured that drain point ~is,,b&40d maximum to dram any: large sized debris in side the system. Ensure that all system is &aiii6d & no, water is remained inside the pipes
4. Check quality of drained water. Water be drained shall be collected in a separate tank (as required) and then disposed off safely or will be drained in nearest manhole available.
5. Upon completion of draining, system to be re-filled and vented with cleans water

B. DYNAMIC FLUSHING

6. Once the entire system is full of water, then valves at the branch connection to the riser at each level/floor will be closed & only valves of top five levels/floors in the circuit and the plant room floor will be opened for water circulation

The flushing velocities will be achieved by utilizing the installed circuit pumps. The number of pumps running will depend on the amount of the circuit being flushed. Prior to starting the pumps, direction, alignment and installation will be checked.

The removal of general contaminant from the system will be achieved by using a dynamic balanced flushing procedure.

System pumps will run and draw water to drain, but only at the rate at which clean water is introduced. At all times the system pressure will be maintained at such a level so as to exceed the static head. The system will not be drained during the dynamic flushing, to prevent the induction of air, which could accelerate the rate of corrosion, and also lead to air locks.

During this process, water will be drained from the lowest point at the rate fresh water is introduced in to the system. Also during this process, all the strainers in each level/floor will be opened & cleaned. Also water will be drained from the end points to ensure that dirt is not settled in the system. After every 8 to 10 hours, valves at the branch connection from the riser of the top five levels/floors will be closed & valves of next five (lower side) levels/floors will be opened for flushing. Same procedure will be followed till all the levels/floors for the entire circuit are completed. After that finally, valves at the branch connection from the riser for all the levels/floors, for the entire circuit will be kept open for water circulation for 3 to 5 hours. During this process, all the strainers in each level/floor will be once again opened & cleaned as required. At all the time during the entire process, water samples from top level & bottom level of each stage in the system will be checked for water quality.

7. The aim of the flushing process will be to initially remove all large debris from the pipe work. The pumps will be continually rotated during this process so the strainers can be cleaned. The flow in the pipes will be measured (through commissioning sets) and accordingly velocities will be recorded. These will be monitored and the strainers shall be cleaned if flow decreases. The main isolating valves may be set to create a balanced flush.
8. All strainer screens within the system will be checked and cleaned at regular intervals during the flushing process, until the screens no longer show any signs of contaminant.
9. Drain point will be kept as near to the filling point as possible to ensure that water is circulated completely in the system. Water will be drained (and make up water is introduced at the same rate), until it is as clean as the make up water. Dynamic Flushing will continue until water quality is at acceptable levels (defined in 6.0),

CHEMICAL CLEANING:

1. Cleaning chemical M-235 will be introduced into the system. Refer to the attached table. M235 to be remained in system for 24 hours and not to exceed 72 hours.
2. The chemical will be circulated throughout the system to establish an even concentration. Water samples will be taken at the lowest point, highest point and intermediate floors (if necessary) and far points of the system (locations will be identified in chilled water riser diagram and to be approved prior to proceed with flushing) and tested at regular intervals.
3. The dynamic flushing process will then be carried out again for the entire circuit, until it is free of contaminants. The parameter for acceptance of the system will be:
 - TDS (total dissolved solids) - within 10% of incoming mains water.
 - Iron - below 1 ppm.
 - Visual - clear, bright and free from particulate matter.
4. Upon successful completion of the cleaning and flushing process, system to be re- filled with clean water and vented completely. Long term corrosion inhibitors (M-381) and a chemical biocide (M-403) will be introduced into the system, in proportion to the system volume. Refer to the attached table for each building.
5. The corrosion inhibitor and biocide will be circulated throughout the system and tests undertaken to establish full circulation and correct concentration.
6. All temporary bypass loops will be removed and all Heat exchangers, AHUs & FCU coils will be back flushed. Heat exchangers, FCU / AHU coil connections will be completed for normal working conditions.

ACCEPTANCE CRITERIA

The acceptance criteria for the results of the witnessed measurements carried out in Clause 5.2.4 & 5.3.3. are that:

Static Flushing

- (1) The TDS levels achieved at the end of each high velocity flush are not greater than 10% above the incoming mains water.

Dynamic Flushing

a) Before Cleaning Chemical Addition -

Water appearance : Clear, Yellowish.

Iron Level : Less than 10ppm.
TDS : within 10% of incoming mains water.

b) After Cleaning Chemical Addition - Water

appearance : Clear.

Iron Level : Less than 1 ppm.

TDS : within 10% of incoming mains water.

(2) The velocities during each high velocity flushing stage are in excess of 1.36 m/s in the largest pipe in the system

DISPOSAL OF EFFLUENT:

The chemically treated water shall be discharged in to mobile tankers and discharged properly as per local authority regulations.

QUALITY CONTROL

- Project Engineer along with Specialist supplier will monitor the flushing process and ensures that same is in full compliance as per approved submittals.
- Quality Control Engineer will coordinate with Consultant for all witnessing activities during chemical cleaning process

SAFETY

- Where chemical cleaning is being carried adequate notices will be displayed for " NO SMOKING" and Warning Signs.
- All tradesmen engaged will be given proper safety orientation for chemicals being used. And appropriate personnel protective equipments will be provided.
- Continuous monitoring will be carried out by trained operatives for any emergency actions.
- Ensure that good house keeping at all times.