**PROJECT NAME**

**Method Statement**

Method Statement for Installation & Testing Of Chilled Water System.

|  |  |
| --- | --- |
| Project Logo | **Client****Consultant****Contractor****Issued on**  |

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**1. Purpose**

This document describes the methodology and procedure for installation and testing of chilled water system of XYZ Project, and to ensure that all concerned persons are familiar with the sequence of activities, utilization of resources, and execution of the works in compliance with applicable Safety and Quality Procedures, and Project Documents and Specification.

**2. Scope of Works**

This document covers the following scope of works:

This method statement is intended to outline the activities and the methods used in installation and testing of chilled water system. All activities will be carried out in accordance with the contract details and in full compliance to the Contract Specifications and Documents. All work within the rights-of-way of the standards and specifications will be done in compliance with requirements issued by authorities.

**3. Legislation and Code of Practice**

* All related codes and standards referenced in the Contract Specifications

**4. Reference**

* Contract Specifications Section for Air Conditioning Piping and Cleaning
* Approved Drawings and schematics.

**5. Definitions**

Client :

Consultants :

Contractor :

**6. Resources**

6.1. Equipment / Tools

|  |
| --- |
| **DESCRIPTION** |
| * Welding Machine
* Cutting Equipments (oxygen, acetylene cylinders and cutting torch etc.)
* Threading Cutting Machine
* Scaffolding
* Pipe Wrench
* Drilling Machine
* Welding machine
* Lifting arrangement
* Tool Box
* Measuring Tape
* Spirit level
* Manual pressure Pump.
* Calibrated pressure gauge .
* Steel Hammer
* Hole Saw Cutter
 |

6.2 Safety of Equipment’s

Necessary measures will be taken for the safety of the equipment and any other works affected by the works subject of this document. Relevant entities which might require protection include any such works in the vicinity of the area of work or on the service access or discharge path. The construction team will ensure that any such requirements are documented.

**7. Health, Safety & the Environment**

7.1 Construction Hazards (tick as appropriate)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Corrosive** | **Oxidizing** | **Highly flammable** | **Extremely flammable** | **Toxic** | **Highly Toxic** | **Irritating** | **Harmful** |
|  |  |  |  |  |  |  |  |
| **🞏** | **🞏** | **🞏** | **🞏** | **🞏** | **🞏** | **🞏** | **🞏** |
| **Explosive** | **Danger for the Environment** | **Constrained Space** | **Slippery Surface** | **Danger of Electrocution** | **Falling from Height** | **Other** |
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The hazards identified above will be controlled under the overall project specific safety plan which is a separate document communicated to all parties on the project.

7.2. Personal Protective Equipment (tick as appropriate)

The works subject of this document requires that the following PPE be used:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Safety Precaution** | **Helmet** | **Hi-Viz** | **Eye Protection** | **Face Protection** | **Mask Required** | **Respirator Required**  | **Ear Protection** |
|  |  |  |  |  |  |  |  |
| **🞏** | **🞏** | **🞏** | **🞏** | **🞏** | **🞏** | **🞏** | **🞏** |
| **Gloves Required** | **Safety Shoes Required** | **Protective Clothing** | **Safety Harness** | **Equipment Guards** | **Lifejacket** | **Other** |
|  |  |  |  |  |  | **🞏\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
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7.3. Safety Training and Emergency procedures

Before commencing any works, all employees will attend a site safety induction training to ensure all safety measures are understood and implemented and to cover specific procedures in case of emergency. If necessary, practical training exercises will be conducted on escape routes, signage, evacuation and rescue.

7.4. First Aid

Prior to the commencement of work, arrangements will be made for medical facilities and medical personnel to be available from prompt attention to the injured person. The contractor’s vehicle assigned to the job site will be used for transporting the injured person to the first aid station and to the nearest hospital as applicable and when required.

|  |  |  |
| --- | --- | --- |
| http://www.clubnautique.net/images/FirstAidLogoCalendar.gif | **Name of On-Site First Aider/s:** |  |
|  |  |
| **First Aid Box Location:** |  |
|  |  |
| **Location of Nearest Hospital:** |  |
|  |  |
| **First Aid and Medical Supplies available at site:** |
| Potable Water | Ice Cubes |
| 10x6cm Sterile Gauze Pad | 4x6cm Gauze Roller Bandage |
| 10x10cm Sterile Gauze Pad | 8x10cm Gauze Roller Bandage |
| Large Sterile Gauze Pad | 10x12cm Gauze Roller Bandage |
| Burn Dressings | 5cm Elastic Bandage |
| 7.5cm Elastic Bandage | 10cm Elastic Bandage |
| Triangular Bandage | Barrier Device for CPR |
| Adhesive Skin Tape | Adhesive Leucoplast Tape |
| Emergency Blanket | Safety Pins |
| First Aid Scissors | Tweezers |
| Disposable Gloves | Instant Cold Pack |
| Non-prescription Medicines (Aspirin, Ibuprofen, Acetaminophen) | First Aid and Burn Spray, Deep Heat Spray |

**8. Detailed Construction Sequence (Methodology)**

**Handling and Storage**

On receipt of the material at site, necessary precautions shall be taken for unloading, shifting, and storage as follows:

All material shall be inspected, handled and stored properly upon receipt at site.

It shall be stored in a place free of water, dust and adequately covered to avoid any kind of damages.

All insulation materials shall be inspected for the thickness and densities.

While unloading, shifting and storage, it should be ensured that there are no transit damages.

Any discrepancies, damage, and etc. found to the materials will be notified and reported to QA/QC Engineer and Project Engineer for further action.

Materials found not suitable for site use should be removed from site immediately.

* 1. **work Sequence and Methodology**

## The propossed chilled water pipes above grade is Seamless black steel SHIELD in accordance to ASTM A-53 Grade-B SCH-40 as per manufacturer recommendation and specifications.

## Fix the sleeves as per approved shop drawings and specification, during the construction of structural elements.

## Ensure all chilled water pipes shall be painted with two coats of red oxide primer prior to application of insulation.

## Pipe sizes 65mm and larger shall have welding joint. Pipe sizes 50mm and smaller shall have threaded ends as per manufacturer.

## Mark the location of piping as per specification and approved shop drawing.

## Install approved supports, brackets for piping as per specification, approved shop drawings and site requirements for each individual case (ie. Slab, Wall etc.).

## Supports shall be installed as per pipe manufacturer’s.

## Ready made hardwood shall be used for supporting the vertical chilled water piping, which is placed on galvanized L angle or U channels and fastened with GI threaded rods.

## Roller supports shall be installed for the pipes 200mm and above and in the expansion joints.

## Flexible Pipe connectors shall be installed in at all air handling units, pumps, and chillers.

## All the open ends of the pipes shall be protected properly at the end of each day’s work.

## Drains shall be installed at low points in mains and branch lines (Vertical / Horizontal) consisting of gate valve and short threaded nipple and cap so that the system shall be drained completely.

## Valves, Piping specialties and accessories shall be installed as per manufacturer recommendation and approved shop drawings.

## Unions shall be provided adjacent to each screwed type valve and shall be on the outlet side of the valve.

## All valves shall be installed suitably to permit easy access for future maintenance.

## Eccentric reducers shall be installed in Horizontal chilled water system & concentric reducers shall be installed in vertical chilled water system.

## Automatic Air vents shall be installed at high points and where ever required in order to trap air from the chilled water system.

## Air separator to be installed with in the networks.

## Condensate drain piping shall be connected to the equipment drain pan connections as per approved shop drawings.

## Condensate drain piping will be extended to the nearest floor drain and connected to the drain system.

## Raise Request for Inspection of Installation of Chilled Water Piping and fittings including supports / brackets, valves, piping specialties and accessories as per the approved shop drawing.

## After approval of installation of pipes and fittings, flushing shall be done for chilled water Pipes with clean water to remove dust and debris that might have been present during construction work.

## Plug all connections / branches / drains and fill with clean water for hydro testing.

## Threaded Connection procedure:

## Use the appropriate sealing material.

## The internal parallel threads of the fitting have to be joined to the taper external threads.

## The surfaces of the treads have to be cleaned before being threaded.

## The sealing material has to be applied homogenously and thoroughly on the external thread, using only sealing material suitable for the application.

## A film of lubricant should be applied on the surface to be threaded in order to prevent the sealing material from getting stuck and thus avoid irregularities in the sealing effect.

## Check if all axes of the different threaded joint components are aligned according to the tolerance.

## Welding connection procedure:

## In order to ensure that all welding takes place in safe manner, the following will be considered:

* Welders
* The welding Equipment
* Working location
* Working instructions

Welder:

* The welders to be trained and certified
* The welder must be healthy
* The welder must be trained for safe work i.e toolbox talk etc.

Equipment:

## On site, arc welding is usually carried out with direct current (DC), supplied from diesel driven generator or other power source. Welding leads and welding return cables are frequently dragged over rough surface, their insulation should therefore be suitable for resisting fear and wear.

* The cables and couplings should be examined frequently for defects.
* The part of the cable which connected to the electrode holder should be as flexible as possible.
* The welding return should be firmly connected to the metal by constructed clamp.
* Electrode holder should be fully insulated.
* Electrode holder is essentially a pair of spring loaded jaws.
* The electrode holder must be made from good quality material.

Working requirements:

* Arrange good ventilation in case of welding enclosed resets.
* Insulated materials will be used in case of wet floor.
* Working instructions.
* Fire extinguisher required with welding all the time.
* Screens to be used when necessary, available all the time.
* Avoid welding near flammable materials.
* Checking area before leaving is strongly required.
* Monitoring of the area for gasses will be done.

TESTING OF WELDED PIPEWORK INSTALLATION:

* Testing of welded pipework installation shall be by either destructive of non-destructive test method.
* Destructive Testing & examination shall be exactly as detailed under Test for Welder Qualification.
* Non-Destructive Testing shall consist of radiographic inspection. This test shall be carried out by a specialist company. The specialist company shall provide a report on the Radiographic Test which has been made which includes interpretative results.
* The radiographs which do not comply with the requirement, shall be unacceptable & the weld in question shall be re-examined.
* If a weld fails the testing requirements, then two additional welds made by the same operative shall be tested, at no cost to the contract. If both additional welds are successful then, in the case of destructive testing, the cost of making good shall be at no cost to the contract.
* If either of the two additional welds fails the test requirements, then further tests on other or all of the welds made by that operative shall be carried out, at the client discretion.

TESTING OF CHILLED WATER PIPES & FITTINGS

## Care shall be taken to all the equipments, apparatus, devices to a pressure exceeding its prescribed test pressure as obtained from its name plate data or product catalogues.

## Care shall be taken to Equipments, apparatus and devices that might be damaged by the test pressure shall be removed or blanked off.

## Ensure All Valves are in open condition before starting pressure test, NO pressure shall be applied against closed valves.

## Ensure Temporary blank flanges are anchored firmly in a way to accommodate all developed end trust.

## The Piping system shall be tested closed by plugging all openings in the system in a proper way and filled slowly with water.

## Ensure all system is free from air lock, if so all the vent all entrapped air from the system.

## Ensure water is reached to the entire system by releasing plugs temporarily.

## Pressure shall be applied to the system by means of hand pump drawing from a water container. The pump discharge shall be connected to the system through a globe valve, check valve and calibrated pressure gauge of suitable range to have the test pressure range in the middle of the range.

## Subject the Cold Water piping to hydro test, Test pressure shall be at least 1.5 times the working pressure for 24 hours.

## Ensure Test pressure is same at highest point of the system.

## Repair the leaks and defects if any until satisfactory results are obtained.

## Raise Request for Inspection of hydro testing to witness the same, by consultant.

## After approval of inspection of hydro testing, release the water gradually and protect the piping installation, and end cap the pipe.

INSULATION OF CHILLED WATER PIPING

## Check all required approved chilled water pipe insulations materials are readily available on site.

## Pipes shall be generally insulated with rigid sections of aluminium foil faced glass fibre insulation with density of 64 Kg/m3 having a thermal conductivity factor of 0.029 w/m.k at 10 deg. C.

## Internal chilled water pipes (inside buildings) shall be insulated by 40mm thick rigid insulation for pipes upto 40mm dia and 50mm for pipe sizes 50mm dia and above.

## External chilled water pipes (on roofs and in chiller yard) shall be insulated by 50mm thick rigid insulation for pipe sizes up to 40 mm dia and 75 mm for for 50mm dia and above.

## For both internal and external pipes the insulation shall be finished with a water proof Aluglass Cloth backing (18u / FR Glue / 8x8 Mesh Aluglass Cloth), combined with a high performance flame retardant solvent acrylic adhesive, protected by an easy-release silicone release paper.

## Where insulated pipework is run on roof, in plant room, chillers yard and tunnels it shall be clad using an outer covering of plain aluminium sheet of 0.7mm or thicker.

## Where exposed, insulated pipework runs through occupied or public areas it shall be clad using an outer covering of plain aluminium sheet of 0.7 mm or thicker as per manufacturer recommendation in the material submittals.

## Moke-up for pipe insulation shall be provided for consultant review and approval.

## Apply the approved insulation materials and accessories according to specification and manufacturer instructions.

## Ensure all insulation materials are in dry condition during the application.

## Pipe surface shall be cleaned properly and painted as per specification.

## Apply insulation with longitudinal seams at top and horizontal pipe runs.

## Pipe insulation shall be applied with least number of joints.

## Approved adhesive shall be applied in longitudinal seam and end faces of the insulation and entire pipe surfaces.

## For flanges, elbows, fittings and valves metered section of pipe insulation of same material shall be used.

## Permissible access shall be maintained to the valves to operate without disturbing the insulation.

## Removable type insulation sections shall be prepared and provided to valves including check valves and strainer basket and other valves.

## In case of rising steam valves used in chilled water system, insulation shall be extended and insulation joints and valve specialties seams shall be sealed properly in order to prevent passage of air to pipe surface.

## Aluminium tape shall be applied on the joints of insulation segments properly as per manufacturer recommendation.

## Cover the approved THERMOFOIL sheet properly on the entire circumference of the Insulated duct and pull sheet tight and smooth.

## Use Thermo foil recommended Tape to seal the joints in a way no air can penetrate through the joints

## Raise request for inspection of Insulation of Chilled Water Piping.

## Identification for Chilled Water Supply and return line and valves and specialties shall be done as per specification with approved identification materials.

**9. Construction Program**

* As per main program

9.1 Housekeeping

The work area shall be maintained neat and tidy as reasonable practical at all times.

9.2 Responsibilities

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Position** | **Overall Resp.** | **Supervise** | **Perform** | **Short Description** |
| Project Manager |  | **🞏** | **🞏** |  |
| Construction Manager |  | **🞏** | **🞏** |  |
| Project Engineer | **🞏** |  | **🞏** |  |
| Site Manager | **🞏** |  | **🞏** |  |
| Site Engineer | **🞏** | **🞏** |  |  |
| Land Surveyor | **🞏** | **🞏** |  🞏 |  |
| Safety Engineer | **🞏** |  | **🞏** |  |
| QA/QC Engineer | **🞏** |  | **🞏** |  |
| MEP Coordinator | **🞏** |  🞏 | **🞏** |  |
| General Foreman | **🞏** |  | **🞏** |  |
| Foreman | **🞏** | **🞏** |  |  |
| Charge hand | **🞏** |  | **🞏** |  |
| Labourer | **🞏** | **🞏** |  |  |
| Helper | **🞏** | **🞏** |  |  |

9.4 Records

In accordance with the Quality Management System, the following records will be maintained as documentary evidence of the establishment of this method statement:

|  |  |  |  |
| --- | --- | --- | --- |
| **Records to be retained** | **Responsibility** | **Minimum Retention Period** | **Disposition** |
| Work Notification( If required) | Site Manager | As per Contract Requirements |  |
| Request for Inspection( WIR ) | QA/QC Engineer | As per Contract Requirements |  |

**10. Inspection and Testing**

* In Process works shall be monitored for quality of workmanship and fabrication against approved shop drawings and standards by the relevant supervisor.
* All works shall be inspected for conformance to specification.
* The inspection formats shall be used in accordance with the requirements of the main contractor AFC.
* Raise the inspection and witness invitation for flushing of chilled water system.

**11. Related Forms**

* As per required forms

**12. Attachments**

* Risk Assessment
* Schematic for chilled water piping system