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INSTALLATION OF CHILLED WATER PIPES

1.0 Scope Of Work

To supply, install and commissioning (by doing a pressure testing) of new chilled water piping and accessories as indicated in the specification and approved shop drawings.

2.0 Standard Reference

This method statement shall be read in conjunction with the following documents:

- Healthy, Safety and Environment Plan (HSE Plan)
- Approved Shop Drawings.
- The relevant Malaysian Standards (MS), British Standards (BS), American Standards (ANSI, ASME, NFPA, ASHRAE etc.) and other Codes of Practice where applicable.

3.0 Methodology

a) All chilled water pipes and materials will be installed in accordance with the approved shop drawings and catalogues approved by the Consultant / Client.

b) All chilled water pipe will be installed using the correct jointing and fixing techniques.

c) Care will be taken when fitting valves, gauges and stopcocks to ensure that they fit in the correct orientation and location as shown on the approved shop drawings

1) Pipe Supports

a) Pipe hangers and brackets will be fixed using post-drilled anchors and threaded rod hangers in accordance to approved shop drawings. Please refer to the below table

PIPE SUPPORT INTERVAL SCHEDULE

PIPE SIZE (mm)	VERTICAL (m)	HORIZONTAL (m)
15	2.5	1.8
20 - 25	3.0	2.5
32	3.0	2.7
40 - 50	3.6	3.0
65 - 80	4.5	3.6
100	4.5	4.0
AND ABOVE	5.5	4.5

CHANNEL SCHEDULE FOR PIPE SUPPORT FROM FLOOR

PIPE SIZE (mm)	1 - PIPE	2 - PIPE	2 + 2 PIPE
100 - 125	75	75	100
150	75	100	100
200 - 300	100	100	150

2) Insulation

a) Where required, pipe insulation will be fitted around pipework using proper jointing techniques around bends, tees and other fittings. For external pipework GI sheet protection sheet covers will be used or pre-insulated pipe may be used.

b) Generally all chilled water pipework will be pressure tested before the joint insulation is installed. For pre-insulated pipe joints, pipe fittings and valves, the area is jacketed first with the 0.5 mm GI sheet, and then the annulus is filled with liquid P.U. foam.

c) Condensate drains are insulated with closed cell tubing insulation. Pipe work is first cleaned and dried and then the insulation is either fixed using the slip-on method or snap-on method. All joints and seams are then sealed with adhesive.

3) Pipe Weld Joint Procedure as per BS2633:1987(2001)

a) Set up the welding circuit. Connect the power source to the work cable to the insulated electrode cable.

b) Remove rust, grease, paint or old welds from the work piece with a wire brush.

c) Ensure to using protective equipment like gloves, apron, safety helmet, goggle and safety shoes. And make sure that anyone within 20 feet also wears protective equipment.

d) Make barrier at works area to prevent from any accidental. Avoid welding at wet area to prevent from electrical shock and keep the welding equipment dry.

e) Finally, the welding works can be proceeding.

4) Chilled Water Piping Hydro Test Procedure

a) Fill up the piping with fresh water and press to 150psi and maintain the pressure to 24 hour. The pressure drop tolerance is 10%.

b) If the pressure is maintain, the test is complete. If the pressure drops more than 10%, rectification work must be done and pressure test to be conducted again.

4.0 List Of Site Installation And Test

a) Doc No. AC-002
b) Doc No. AC-002A

Please refer the attachment (CL/INST/PW) and (CL/TEST/HS)

5.0 HSE Requirement

1) The objective is to implement the quality control on site, which shall be followed by the construction team so that the Contractor without any costly re-work would finally accept the finished work.

2) All workers will be provided with appropriate personnel protection equipment (PPE) and this must be worn during the work .Workers who failed to comply with this requirement will be removed from site.

3) Unauthorized personnel are not permitted within construction area.

4) Safety Officer will closely supervise and checked the safety of the construction area.

5) To prepare scaffolding and stage work (relevant works).

6) To provide safe area for the storage of equipments.

6.0 List Of Tools

- Grinder
- Hand Drill
- Cutter
- Oxy Cutter
- Welding Set
- Chain Lock
- Sky Lift – if necessary
- Crane – if necessary
- Pressure gauge

7.0 Attachment

Welding Procedure for Chilled Water Pipe (BS2633:1987(2001))

a. Procedure Qualification

- Prior to production welding commenced, a detail procedure specification shall be established and qualified to demonstrate that welds with suitable mechanical properties and sounders can be made by the procedure.

b. Qualification of Welders

- The purpose of the welder qualification test is to determine the ability of welders to make sound butt or fillet welds using previously qualified procedures.
- Welder performance qualification certificate shall be submitted for approval prior to the actual works commenced.

c. Records

- Details of each qualified welding procedure specification and welders performance qualifications shall be recorded.
- Copy of the records shall be kept by the QA Team and shall be made available to the Employer upon request.

Preparation for Production Welding

- Pipe joints shall be welded by qualified welders.
- The surface to be welded shall be smooth, uniform and free from laminations, tears, scale, slag, grease, paint and other deleterious material that might adversely affect the welding.
- All welded joints shall comply with a accepted British Standards. Pipe ends shall be prepared by machining, grinding or machine gas cutting or hand flame cutting with subsequently grinding.
- For pipes which are intended to be in axial alignment, the plane of the ends shall square with the axis of the pipe.

Alignment

- The alignment of the abutting ends shall minimize the offset between surfaces.
- When a large offset is caused by dimensional variations, it shall be equally distributed around the circumference of the pipe.

Use of Lineup Clamp for Butt Welds

- Lineup clamps may be used for butt welds in accordance with the procedure specification.
- When it is permissible to remove the clamp before the root bead is completed, the completed part of the bead shall be in approximately equal segments spaced equally around the circumference of the joint.

Bevel

- All mill bevels on pipe ends shall conform to the joint design the procedure specification.
- All field bevels may be done machine tool or machine oxygen cutting. The beveled ends shall be reasonable smooth and uniform, and dimensions shall be in accordance with the procedure specification.

Weather Conditions

- Welding shall not be done when the quality of the completed weld would be impaired by the prevailing weather conditions.
- Windshield may be used when practical.

Clearance

- When the pipe is welded in the riser shaft, the clearance shall be large enough to provide the welder with ready access to the joint.

Cleaning Beads

- Scale and slag shall be removed from each and groove by using either hand or power tools.

Position Welding

- All position welding shall be made with parts to be joints secured against movement and with adequate around the joint to allow the welder space in which to work.

Class Welding

- BS 2633, Arc Welding Class I or API 1104 of electrodes used 3.2mm to 6mm thick.
- Welding Process for pipe sizes 100mm and smaller shall use either gas welding (oxyacetylene process) or metallic arc process.
- Welding process for pipe size 150mm and above shall be use metallic arc process.

Butt Welding Procedure For Pre-Insulated Chilled Water Steel Pipe

- Identify the welding pipe (size and location) and removed the pipe insulation minimum 100mm away from the pipe edges.
- Bevel the edges of the pipes by grinding the angle forming around 60^{o} - 75^{o}.
- Align the pipes by using spirit level. Then, tack weld at 4 to 5 points around the joint to hold the alignment in place.
- Use welding rod and butt weld around the pipe until full penetration is achieved.
- Clean the welded face by using wire brush.
- Conduct Visual Inspection and look for any slag with wire brush to ensure smooth surface.
- Upon completion of the piping system, carry out hydrostatic test to check of leakages.
- Paint welded face and adjacent area with approved anti rust paint.
- Complete insulation work around pipe joint.

Inspections & Testing Procedures

- The procedure and checklist for inspection and testing shall be prepared in accordance to the specification, approved codes and standard.
- Method of testing shall be visual inspection and hydrostatic test.
- Inspection and testing shall be performed by the company and to be inspected by Employer representative and the Consulting Engineer.

Test and inspection result shall be evaluated and documented in appropriate record forms by the company and shall be made available upon request.

Visual Inspection

- Visual inspection shall be done ensure that weld joints are free from cracks, inadequate penetration, burn – through and other defect and must present a neat workmanlike appearance. Result of inspection shall be recorded in Welding Inspection form and shall be submitted to the Consulting Engineer and Employer upon request.

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