Installation, Testing & Flushing of Firefighting Piping System

Purpose & Scope

The purpose of this method statement is to ensure that correct materials & equipment are used and agreed procedures are implemented during fabrication, installation, testing and flushing of firefighting piping sprinkler system. This method statement specifies the sequence and methodology to be followed for the installation and testing of firefighting piping and sprinklers, fire hose reels and fire extinguishers activities to achieve the best quality of workman ship for installation works.

Reference s & Standards

- Project specifications for pipe, tubes, valves and firefighting System
- Approved Shop Drawings
- NFPA 10 Standard for fire extinguishers, portable and mobile
- NFPA 13 Standard for installation of sprinkler system
- NFPA 14, Standard for the installation of standpipe and hose systems
- NFPA 20, Standard for installations of centrifugal fire pumps

Tools & Equipment

- Tool Box
- Drilling Machine
- Spirit Level
- Threading Machine & Thread Sealant
- Welding Machine
- Grooving Machine
- Grinder
- Chain Block
- Pipe Wrench

Method Statement for Firefighting System

- Ensure that all materials to be used and equipment to be installed should be checked by the Project Engineer / Supervisor against equipment datasheets and approved drawings.
- All materials and equipment shall be inspected by Quality Control Department prior to shifting to work site.
- The latest revision of the Approved Shop Drawing should be available at the installation area.
- Project Engineer / Supervisor will ensure that safety requirements have been complied with and are in place.
- Project Engineer / Supervisor will orient and familiarize all the workers and assistants involved in the installation regarding relevant approved

drawings, technical submittals, installation procedures and details, acceptance criteria.

- Install fire protection systems in accordance with NFPA rulings, listings and manufacturers recommendations. Locate where accessible for servicing and replacement.

Fabrication & Installation of Threaded Pipe

- The floor/workshop where the threading machine is placed will be protected with a cover of PVC sheets to avoid oil splash on the concrete floor.
- Thoroughly clean the pipe surfaces with damp cloth and let dry the surface. In case, if any foreign materials remain on the surface, which cannot be cleaned by damp cloth, then use a mild wire brush to remove the same. If pipe surface is contaminated with oily material, then use a washing solvent. Avoid scratching and damaging the galvanized surfaces

Firefighting Piping Cutting

- Based on the approved shop drawings, square cut pipes with a pipe cutter – machine mounted or manual, to the exact length, as required.
- For pipe sizes of 2" and below, thread the pipe end using the standard threading machine having BSPT dies. The threading machine will be inspected daily before starting the work. Scale, slag, dirt, and debris will be removed from the pipe and fittings before machining process.
- The pipes will be cut to the actual required length and threaded from both sides. The pipe will be tapered and the threads will be cleaned using steel brush and file. All threading residuals will be removed to restore full inside diameter.

Pipe Jointing

The joint compound will be applied on the ale portion of the thread for fitting assembly. The branches will be either assembled at the fabrication workshop or on installation spot. The pipes will be hanged to the proper level and will be connected to the cross-main. Pipe work will be protected from foreign matters.

Fabrication & Installation of Grooved Pipe

- The Floor where the grooving machine is placed will be protected with a cover of PVC sheets to avoid oil splash portion on the concrete floor. Roller of the grooving machine will be checked for wear and tear before starting the grooving work.
- Grooved fitting is applicable for pipe sizes of 2 ½" and above. Pipes will be inspected to ensure plain ends. (NO Bevelled ends). The OD of

the groove will be measured. The OD of the groove should be within the manufacturer recommended range.

- Before assembly, the grooved joints will be cleaned from any dust, debris, etc.
- The branches will be assembled at the fabrication shop or on spot as per site requirements, all the open ends will be plugged after completing the work.

Fabrication of Pipe at Location of Mechanical Tee

- The pipe will be marked at the location of the mechanical tee.
- The pipe will be holed drilled to the suitable size of the branch and in accordance to the manufacturer's recommendations. The hole will be filed to ensure soft surface.

Installation / Hanging of FF Piping system on Site

- Complete the marking of the routes of the pipe work by following the approved shop drawings, combined services drawings and site coordination with other services based on given and final benchmarks or reference points.
- After marking the pipe routes, the anchoring points will be drilled according to the required support spacing as shown on the approved shop drawings.
- M10 Anchors will be used to support 4" and below pipes while M12 Anchors will be used to support 6"pipes and above, as recommended by NFPA. Thread rods of the appropriate size shall be cut and fixed by using bolts, nuts and washers. Approved type of pipe support / Hanger will be attached to the threaded rods, nuts and washers will be installed as well.
- Piping will be installed so that system can be drained. Where piping cannot be fully drained, nipple and cap will be installed for drainage. Piping will drain to grade or to air gap sewer receptor.
- The branch lines will be hanged to the proper level and will be connected to the cross main. Where piping is embedded or passing through masonry or concrete, sleeves will be provided as per specification mostly of GI material.
- Clean internally the pipes during construction and installation.
- Provide clearance for access to valves.
- Anchors, expansion joints, swing joints and/or expansion loops shall be provided so that piping may expand and contract without damage to itself, equipment or the building. Expansion / Contraction joints will be provided wherever is applicable as per the approved shop drawings.

Installation of Feed mains / Wet Stand Pipes

- Piping shall generally be run parallel to walls and beams. Coordinate with other trades before finalizing the location of any piping to avoid interfering with their work. Care shall be exercise in the installation of the piping so that the system will drain by gravity, back through branches.
- Install a complete combined fire stand pipe and sprinkler system with all piping, valves, hangers, signs, valves, tests, etc., as per approved shop drawings.
- Furnish and install all drain piping, flushing, and connections, drain plugs, drain valves, etc., at drain points and all low points.
- Seal all valves, not provided with tamper switches, in open position by approved means. Flushing connection shall be as per NFPA 13.

Installation of Sprinkler Heads & Accessories

- Installation of sprinkler heads will be done after pipework flushing is completed.
- Apply the PTFE tape only to the male portion of the sprinkler and install the upright sprinkler head using the wrench provided by the manufacturer, and in such a way that the arms are parallel to the branch pipe. Maintain a clearance of 1" between the deflector of upright sprinkler and ceiling. Ensure that sprinkler heads have the correct finish and temperature rating.
- Fix the sprinkler floor control valve as per the approved shop drawing. Ensure that valves are located at an accessible location. Ensure that the arrow of the water flow detector switch points to the direction of the water flow.
- Ensure that supervisory butterfly valves are provided with tamper monitor switch.
- Ensure that the sight glass of the test / drain valve is free of damage. Ensure that test / drain valves are provided as shown on the drawings.

Installation of Cabinets, Hose Reel Valves and Fire Extinguishers

- Prior to the installation the Project Engineer / Foreman will read, understand and strictly follow the manufacturer's instructions.
- Examine the location of the hose reel cabinets and ensure that opening is sufficient for fixing all equipment and the mounting height of the hose valve and hose racks is as per the approved shop drawings and to the requirements of civil defence. Hose reel, hose valves and fire extinguishers are of approved type and have the correct rating.
- The cabinet (without the equipment) will be installed where applicable. Branches to the hose rack (reel) /hose valve will be fabricated and installed on site to ensure actual entry point to the cabinet. Location of Pipe sleeves shall be as per approved drawings.

- Hose reel & valve will be installed as per the manufacturer's instructions at the correct mounting height.
- Keep fire extinguisher inside the cabinet along with the hose rack. Ensure that the top of the wall mounted extinguisher do not exceed from the levels as per approved drawing and specification.
- Shut off valve will be installed in the piping to the breaching inlet. Breeching inlet will be located at conspicuous location.

Hydrostatic Testing of Pipe Work

- Make available a highlighted drawing of area intended for **hydrostatic pressure testing**. Indicate on the drawing the location of vent/drain valve, plugged connections and water pressure pump connection.
- Make sure the test witness timing and pressure duration are agreed by the client/consultant.
- Place safety warnings at all points where personnel may pass through within the vicinity of testing.
- Make sure that no equipment item such as sprinklers, valves etc. are subjected to the pressure test.
- The entire pipe work shall be hydrostatically tested for not less than 2 hours at 15 bars (or 1.5 times the working) pressure without leak.
- Physically check and ensure that all pipes undergoing test is strongly supported and addition of pipe work will not introduce undue stress on any support.
- Make sure that all pipe works are suitably plugged.
- Attach the pressure pump to the desired location through an isolation valve, by pass valve and calibrated pressure gauge to indicate the pressure on the **pipe work**.
- The drain point will be plugged and the highest point of the system will be considered as the water supply point for pressure testing. The selected supply point will be provided with an isolation valve, calibrated pressure gauge and manual water pump.
- Fill the pipe with water and connect the test pump to the pipe work at the filling location, bleed all air from the pipe work.
- Connect a calibrated and approved pressure gauge and fix an isolation valve just below the pressure gauge.
- Apply pressure gradually until it reaches the test pressure. The test pressure will be as per agreed terms and as per Civil Defence requirements.
- Hold the piping under pressure for duration of 2hours and observe for any leakage or pressure drop, if the pressure gauge shows a steady reading after 2 hours; notify the client/consultant and get the test witnessed by the consulting engineer.

Firefighting Pipes Flushing

- Flushing of the firefighting piping system will be after successful completion of the pressure testing. This will be done during the sectional installations of the system and after the completion of the whole work assembly.
- Enough draining points will be left for this purpose. These points will be the lowest point of the area / zone and the water supply point.
- The water will be pumped into the water supply point using the existing fire pumps and the lowest points will be connected to the nearest drainage facility via hose.
- The pipe network will be flushed to ensure that the pipes are clear from debris and other residual materials. Flushing will continued until clear water at the drainage side is observed.

Pre-Commissioning and Commissioning Checks

- Ensure that all equipment included are thoroughly cleaned and checked.
- Ensure that all foreign debris is thoroughly flushed out from the whole pipework system.
- All automatic controls and safety devices shall be inspected and checked for serviceability.
- When various installations have been completed and pre-commissioning has been done, setting of work is to be carried out in the entire installation prior to the issuance of completion certificate.
- Ensure that all apparatus are working as per specification.
- Ensure that all instruments/meters are correctly calibrated with certificates and are accurate.
- Ensure that all services are tested and control systems are functioning correctly and are properly set, sequenced or interlocked.

Final acceptance test

- After the testing and commissioning of the entire firefighting piping system, final acceptance tests shall be carried out prior to the issuance of Performance Certificate in accordance with the program agreed with the consultant.
- Prior to the issuance of Certificate of Completion, tests shall be carried out whenever required by the authorities having jurisdiction over the said performance tests.

Health and Safety Requirements

- All necessary PPE and safety gear shall be worn at all times during the execution of work,
- In full compliance with safety requirements, i.e. Helmets, Safety Shoes, Hand gloves and Safety signs etc.

Safety Checks

- Safety checks will be made prior to commencement of work in order to ensure that materials and equipment are in safe working order in accordance with project and site regulations.
- Ensure that all the access means-scaffolding, stepladders are of good quality and strength. Do not use weak or broken scaffolding or stepladders. Always use hard hats at the construction premises.
- Wear hand gloves whenever working at site
- Wear Goggles of adequate visibility, whenever using gas torches, grinders, cutting machines, or doing chipping, drilling etc. Do not use goggles with starched glasses or of poor visibility.
- Wear safety belts whenever working at heights exceeding 1.5m
- Safety shoes must be worn always.
- Wear full body harness when working at heights exceeding 4m and secure to a strong building or other structure.

Material Lifting

- Lifting of any material or equipment should be done only by means of chain/electric hoists appropriately supported.
- Avoid standing right below to items being raised.
- Always use proper slings other approved media for binding the item being lifted.
- Ensure adequate lighting and ventilation whenever working in confined spaces. Carryout works in such areas, only when free entrance and exit from and to the area is ensured and entry/exit is continually manned during the whole working period.
- Application of paints, primers, thinners varnishes etc. should be carried out at ventilated places only.