WATER SUPPLIES DEPARTMENT

STANDARD SPECIFICATION EM-02-11

PIPING, VALVES & ACCESSORIES

FOR CHLORINATION PLANT

December 2023

CONTENTS

PIPING, VALVES & ACCESSORIES FOR CHLORINATION PLANT

PIPING, VALVES & ACCESSORIES FOR CHLORINATION PLANT

1. PIPING

1.1 General

Except for pipes which are mounted vertically, all exposed pipes shall be properly protected by covers with adequate strength to withstand the loading when being stepped on by operation personnel.

For plastic pipes to be installed outdoor under direct sunlight, stainless steel enclosure shall be provided to protect the pipes from ultraviolet radiation.

The procurement of PVC piping systems shall follow WSD Standard Specification EM-00-05.

1.2 Pipes and Fittings for Chlorinated Solution and Chlorine Gas Vacuum Lines

UPVC / PTFE pipes and fittings shall be used for chlorinated solution and chlorine gas vacuum lines. The UPVC pipes and fittings shall be of either Class D / Class E to BS 3506 (lately replaced by BS EN ISO 15493) or pressure rating PN10 / PN16 to BS EN ISO 1452 or Schedule 40 / Schedule 80 of ASTM D 1785. The PTFE pipes and fittings shall be to ASTM D4894 and D4895. The pressure class of all pipes and fittings adopted for a particular application shall be capable of withstanding the maximum hydrostatic pressure continuously in conveying the chlorinated solution.

For nominal pipe size equal to or less than 100 mm and for low pressure applications (with design pressure less than 10 bar), other piping standards may be accepted subject to approval of the Engineer.

1.3 Pipes and Fittings for Chlorinator Water Supply

Pipes and fittings for chlorinator water supply shall comply with WSD Standard Specification M-02-02, and shall be capable of withstanding the maximum mworking pressure and hydrostatic test pressure of the supplied water.

1.4 Pipes and Fittings for Sodium Hypochlorite Solution

UPVC pipes and fittings shall be used for piping systems conveying sodium hypochlorite (NaOCl) solution. The UPVC pipes and fittings shall be of either Class E to BS 3506 or pressure rating PN16 to BS EN ISO 1452. All pipes and fittings shall be capable of withstanding the maximum operating pressure of the sodium hypochlorite solution dosing system. The gaskets, o-rings and elastomeric seals shall be made of peroxide cured EPDM or FPM (also known as FKM and Viton).

1.5 Pipes and Fittings for Fluorosilicic Acid Solution

UPVC pipes and fittings shall be used for piping systems conveying fluorosilicic acid (H_2SiF_6) solution of 25% concentration by weight. The UPVC material for pipes and fittings shall comply with cell classification 12454 in ASTM D1784. The wall thickness and dimensions shall conform to Schedule 80 in ASTM D1785 for pipe and ASTM D2467 and D2464 for fittings. The solvent cement shall be compatible with fluorosilicic acid. The gaskets, o-rings and elastomeric seals shall be made of FPM (also known as FKM and Viton).

Except pipes and fittings for overflow and drain purpose, the pipes and fittings shall be double-contained construction. The outer pipe of the double-contained construction shall be transparent and capable of withstanding the maximum operating pressure of the inner pipe. Automatic detection device shall be provided to give local and remote alarms if leakage is detected.

1.6 Pipes and Fittings for Other Chemical Applications

CPVC pipes and fittings shall be used for conveying chemical solutions other than Clauses 1.2 to 1.5 above unless otherwise approved. The CPVC pipes and fittings materials shall be to Class 23447 as per Table 1 of ASTM 1784 as a minimum. The dimensions of pipes and fittings shall conform to Schedule 40/80 in ASTM F441/F438/F439. The pressure class of all pipes and fittings adopted for a particular application shall be capable of withstanding the maximum hydrostatic pressure continuously in conveying the chemical solutions.

For highly corrosive solutions such as hydrochloric acid (HCl) and sodium hydroxide (NaOH), the pipes and fittings shall be of double-contained construction and able to withstand highly corrosive solution. Automatic detection device shall be provided to give local and remote alarms if leakage is detected.

2. VALVES

2.1 Not Used

2.2 Water Supply Valves

Manual isolation valves shall be gate valves to BS EN 1074 with ductile iron body, flanged to BS EN 1092, PN16. The valves shall be provided with hand wheels and shall be of the internal screw non-rising spindle type.

2.3 Chlorinated Solution Valves

Manual valves for chlorinated solution shall be of the diaphragm or globe type manufactured from UPVC, PTFE or other corrosion and chlorine resistant materials.

2.4 Electrically Operated Valves

Electrically operated valves of solenoid or motorised type shall operate on either 24V d.c. supply or 220V, 50 Hz a.c. supply and shall be designed for satisfactory operation in association with the chlorination equipment supplied. Valve configuration shall comply with Clause 2.2 to 2.3 as specified above.

2.5 Valves for Sodium Hypochlorite Solution

Isolation valves shall be ball valves with pre-drilled balls to prevent trapping of sodium hypochlorite solution in the cavity between the valve body and the ball. For pipelines with diameters larger than 50 mm, butterfly valves may be used as an alternative subject to the approval of the Engineer or acceptance by the *Project Manager*.

Degassing valves which automatically vent gases and vapours released from the sodium hypochlorite solution inside the pipework shall be installed at high points of the piping system.

All components of the valves shall be constructed of materials suitable for contact with sodium hypochlorite solution of 12.5% concentration by weight. The gaskets, o-rings and elastomeric seals shall be made of peroxide cured EPDM or FPM (also known as FKM and Viton).

2.6 Valves for Fluorosilicic Acid Solution

All components of the valves shall be constructed of materials suitable for contact with fluorosilicic acid solution of 25% concentration by weight. The gaskets, o-rings and elastomeric seals shall be made of FPM (also known as FKM and Viton) and the valve seat shall be made of PTFE or PDVF.

2.7 Valves for Other Chemical Applications

Manual valves for chemical applications other than Clause 2.3, 2.5 and 2.6 above shall be of the diaphragm or globe type manufactured from CPVC, UPVC, PTFE or other corrosion resistant materials suitable for the particular application.

3. ACCESSORIES

3.1 Not Used

3.2 Not Used

3.3 Chlorine Pressure Gauges

The measuring range of the pressure gauge shall provide clear and precise indication over the full range of working pressure of the medium being measured. Technical requirements of the pressure gauges shall comply with WSD Standard Specification EM-02-09.

3.4 Chlorinated Solution Dosing Diffuser

The dosing diffuser shall be designed to ensure uniform distribution of chlorinated solution at the point of application.

For dosage to an open channel, a submerged diffuser shall be provided for vertical or horizontal mounting in the channel. All mounting brackets, clamps and holding down bolts shall be of corrosion resistant materials to chlorinated solution.

Where pressurized dosing is required, a corporation cock shall be provided. The diffuser device shall be withdrawable with a non-return valve and an isolating valve and shall enter the pressurized application point through the corporation cock. All construction materials shall be corrosion resistant to chlorinated solution.

3.5 Not Used

4. PRESSURE TEST

In accordance with BS EN 1452, UPVC/PTFE pipes and fittings used for conveying chlorinated solution upon completion of installation shall be hydraulically tested to 1.5 times the maximum working pressure or the maximum working pressure plus 5 bar whichever is lower for a duration of one hour.

CPVC pipes and fittings used for other chemical applications shall be hydraulically tested to 1.5 times the maximum working pressure or the maximum working pressure plus 5 bar whichever is lower for a duration of one hour.

- End of Specification -