

**WATER SUPPLIES DEPARTMENT**

**STANDARD SPECIFICATION M-06-04**

**PIPING, VALVES & ACCESSORIES**

**FOR CHLORINATION PLANT**

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## **PIPING, VALVES & ACCESSORIES FOR CHLORINATION PLANT**

### **1. PIPING**

#### **1.1 Pressure Pipes and Fittings for Chlorine Gas/Liquid Lines**

The flexible connection to chlorine containers shall be made of silver plated copper tube of outside diameter not less than 6 mm and shall be in the form of a coil of at least two turns of not less than 150 mm diameter.

Schedule 80 carbon steel seamless pipe of the appropriate diameter, but not less than 20 mm N.B. and to ASTM-A106 shall be used.

All fittings shall be forged carbon steel of class 3000 to ASTM-A105 and shall be either socket welded or flanged. Flanged unions shall be of the 2 bolt ammonia type. A sufficient number of flanged connections shall be included in the pipework to facilitate the removal of individual plant items without having to dismantle unrelated pipework. Malleable iron plumbing fittings shall not be accepted.

Pipes carrying gas/liquid chlorine at container pressure must be arranged so as to slope back to the container .

#### **1.2 Pipes and Fittings for Chlorine Gas Vacuum Lines**

UPVC/PTFE pipes and fittings shall be used for chlorine gas vacuum lines. The UPVC pipes shall be of Class E to BS 3506 and fittings shall be to BS 4346. The PTFE pipes and fittings shall be to ASTM D1457.

#### **1.3 Pipes and Fittings for Chlorinator Water Supply**

Copper or PVC / PTFE lined mild steel pipes and fittings shall be used, and shall be capable of withstanding the maximum pressure of the supplied water.

#### **1.4 Pipes and Fittings for Chlorinated Solution**

UPVC / PTFE pipes and fittings shall be used, and shall be capable of withstanding the maximum pressure of the chlorinated solution. The UPVC pipes shall be of Class E to BS 3506 and fittings shall be to BS 4346. The PTFE pipes and fittings shall be to ASTM D1457.

## 2. AIR DUCT

The ventilation ducting system for the chlorine plant/storage area shall be constructed from mild steel sheet to BS 1449 : Part I or otherwise specified. Thickness of the air ducts shall not be less than 1.6 mm. The ducts shall be supplied and installed true in section and free of twist and distortion .

Unless otherwise specified, the ductwork supplied shall be painted as follows:-

Internal : One coat of zinc rich primer followed by two coats of coal tar epoxy paint .

External : Two coats of red lead primer followed by one coat of finishing paint of colour to BS 4800 Shade 18 B21 light grey .

For the ventilation ducting system connecting to the scrubber plant which may be exposed to chlorine gas, all ductwork shall be constructed from stainless steel sheet. Fibreglass ducting is acceptable, but it shall be non-combustible to BS 476 Part 4 and shall be approved by FSD.

## 3. VALVES

### 3.1 Chlorine Liquid/Gas Valves

Valves for the purpose of isolating chlorine cylinders/drums shall be of bronze body, and valves for the purpose of line shutoff shall be of forged steel body. Both types of valves shall have Monel or 'Hastelloy' C trim at all internal parts including the valve stem. Needle valves, and globe valves with flanged and bolted bonnet type shall be used. Gland packing shall be of PTFE or other approved material. For globe valve of size 25 mm and above, the gland packing shall be tightened by studs and nuts (a single gland nut type shall not be accepted). Ball valves shall not be used except those forming part of standard bulk manufactured equipment and equipped with an automatic device for relieving excess pressure built up within the ball cavity towards the high pressure (upstream) side of the valve.

### 3.2 Water Supply Valves

Manual isolation valves shall be sluice valves to BS 5150 with cast 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.

### 3.3 Chlorinated Solution Valves

Manual valves for chlorinated solution shall be of the diaphragm or globe type manufactured from UPVC, PTFE or other corrosion resistant materials. Isolating valves at the points of application shall also be provided .

### 3.4 Electric Operated Valves

The electric operated valves of solenoid or motorised type shall operate on either a 24V d.c. supply or 220V, 50 Hz supply and shall be designed for satisfactory operation in association with the chlorination equipment supplied. The valve construction shall be to Clause 3.1 to 3.3 as specified above.

## 4. ACCESSORIES

### 4.1 Chlorine Liquid Line Pressure Relief System

Pipes carrying liquid chlorine shall be protected against excessive pressure built-up.

A set of liquid line pressure relief system shall be supplied for EACH liquid header i.e. at the location immediately upstream of the electrically operated changeover valve, and at the liquid line upstream of EACH evaporator. Each pressure relief system shall include a tee for connection to the liquid line, a rupture disc assembly, an expansion chamber and a pressure switch/gauge with diaphragm seal unit. The expansion chamber shall have a volume equal to at least 20% of the line volume. A high pressure setting on the pressure switch/gauge shall be connected to the main control panel for alarm initiation and indication in the event of a ruptured disc.

All interconnecting pipework, mounting brackets, supports etc shall be included. A metal or hard plastic tag shall be provided with each rupture disc assembly, for attaching to the fitting. The tag shall indicate the part number, size and rupture pressure of the disc.

All fittings including the expansion chamber shall be constructed according to the recommendations of the chlorine institute or similar body. The expansion chamber shall also meet the unfired pressure vessels code or standard of the country of manufacture.

### 4.2 Chlorine Gas Line Pressure Relief System

A pressure relief system shall be provided at the gas line downstream of EACH Evaporator. The relief system shall be of the 2 stage type. Stage 1 of the system shall have a rupture disc and connect to a pressure switch for alarm initiation and indication in the event of a ruptured disc. The rupture disc shall be suitable for vacuum operation on the pressure side. Stage 2 shall

have a pressure relief valve which will be set to open at the rated working pressure of the system. The pressure relief valve will be connected to the vent line leading to the location of the nearest leak detector and the intake of the chlorine scrubber extraction system.

#### 4.3 Chlorine Pressure Gauges

The pressure gauges supplied shall be of flanged and diaphragm type specifically suitable for use in chlorine systems. The dial diameter shall be at least 150 mm.

The measuring range of the pressure gauge shall be appropriate for the plant installed.

#### 4.4 Chlorinated Solution Dosing Diffuser

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

On 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 bolts shall be of corrosion resistant materials to chlorinated solution.

Where dosage is into a pressurized pipe, a corporation cock shall be provided. The diffuser device shall be of the withdrawable type with a non-return valve and an isolating valve and shall enter the pipe through the corporation cock. All construction materials shall be corrosion resistant to chlorinated solution.

#### 4.5 Gasket

Gasket for chlorine pressure pipes shall be of C.A.F. or 2-4% antimony lead. Rubber insertion for water and chlorinated solution shall be of 3 mm thick.

### 5. PRESSURE TEST

All chlorine pressure piping system including flexible, valves, fittings and accessories after installation shall be pressure-tested with dry nitrogen at the following pressures for a duration of one hour:

- (A) For liquid chlorine draw-off system.
  - (i) 3.86 MPa without rupture discs and

(ii) 2.0 MPa with rupture discs.

(B) 3.3 MPa for gas chlorine draw-off system.

Other plant and pipework shall be hydraulically tested to 1.5 times the maximum working pressure for a period of one hour.

- End of Specification -