

WATER SUPPLIES DEPARTMENT
STANDARD SPECIFICATION EM-02-09
CHLORINE PRESSURE GAUGES

1. **GENERAL**

The specification covers the technical requirements for chlorine pressure gauges used in chlorination systems.

2. **DESIGN AND CONSTRUCTION**

2.1 **Position of Chlorine Pressure Gauges used in Chlorination Systems**

Chlorine pressure gauges if required shall be provided at the following positions of the chlorination systems :-

(a) **Liquid Draw-off System**

- (i) Two chlorine pressure gauges (P1 and P2) for the automatic changeover system, one on each of the chlorine supply pipes for indication of chlorine supply pressure from the drum, with one alarm contact provided for initiation of container changeover;
- (ii) One chlorine pressure gauge (P3) at the evaporator inlet for indication of chlorine supply pressure to the evaporator, with one alarm contact provided for initiation of “Container Nearly Empty” alarm;
- (iii) One chlorine pressure gauge (P4) at the evaporator outlet for indication of chlorine outlet pressure after the evaporator; and
- (iv) One chlorine pressure gauge (P5) after the pressure regulating valve and before the vacuum regulator-check unit for indication of chlorine pressure after the pressure regulating valve with two alarm contacts provided for initiation of “PRV Pressure Low” and “PRV Pressure High” alarms respectively.

(b) **Gas Draw-off System**

- (i) Two chlorine pressure gauges (P6 and P7) for the automatic changeover system, one on each of the chlorine supply pipes for indication of chlorine supply pressure from the cylinder(s), with one alarm contact provided for initiation of container changeover; and
- (ii) One chlorine pressure gauge (P8) before the vacuum regulator-check unit.

2.2 General Requirements

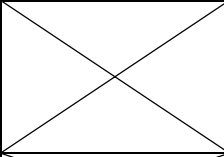

The design and construction of the chlorine pressure gauges shall comply with the following requirements :-

| | |
|---------------------|---|
| (a) Type | Diaphragm sealed with inert fluid as specified in item (h) below filled in the tube of the gauge and the upper part of the diaphragm |
| (b) Dial | 150mm |
| (c) Dial marking | Aluminium, white with black markings : “Testing on Clean, Dry Oil Free Air” and “Use No Oil” |
| (d) Case | <ul style="list-style-type: none"> - Stainless steel or reinforced plastic case with fire-resistant material or equivalent - With blow-out vent, or blow-out disc for ease of leakage checking |
| (e) Window | Laminated glass or transparent polycarbonate or equivalent |
| (f) Pointer | Stainless steel grade 304 or aluminium alloy |
| (g) Tube and socket | Stainless steel grade 316L |
| (h) Filled fluid | Perfluoropolyether (PFPE) or equivalent for oxygen-chlorinated products filled with internal capillary snubber to reduce pulsations |
| (i) Diaphragm | Tantalum |
| (j) Connection | Flanged to ANSI B16.5 Class 300 raised face, nominal pipe size ½” with screwed connection plus welding between gauge and upper flange to eliminate the risk of the joint being accidentally unscrewed |
| (k) Gauge accuracy | Better than $\pm 1.5\%$ of the scale range |
| (l) Alarm contact | <ul style="list-style-type: none"> - Alarm contact(s) if required shall be integrated with the pressure gauge or provided by a separated pressure switch for each alarm contact - Alarm contact(s) shall make contact on pressure rising (MOR) or pressure falling (MOF) as specified in Clause 2.3 - Each pair of the alarm contact(s) integrated with the pressure gauge shall be dial-mounted, volt-free and rated at 220 V 50 Hz 18VA and 10W d.c. - Each pair of the pressure switch alarm contact(s) shall be at least single-pole double-throw and rated at 1A 220V 50Hz and 1A 24V d.c. - Setting range : 0-100% of the scale range, adjustable through key switch - Alarm accuracy : 2% of the scale range |


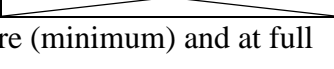
2.3 Other Requirements

Apart from the requirements specified in Section 2.2 of this specification, the chlorine pressure gauges at various locations shall also comply with the following specific requirements :-

(a) Liquid Draw-off System

| Chlorine Pressure Gauge | P1 and P2 | P3 | P4 | P5 |
|------------------------------|--|-----|--|--|
| Measuring Range (in kPa) | 0 - 1600 | | 0 - 2100 | 0 - 500 |
| Flange connection material | Monel for bottom flange housing in contact with chlorine and stainless steel for other parts | | Stainless steel | |
| Additional dial marking | Liquid Chlorine | | Gas Chlorine | |
| Requirement of alarm contact | Yes | | No | Yes |
| Type of contact | One pair of MOF contact | |  | One pair of MOR contact + one pair of MOF contact |
| Pressure setting (in kPa) | 110 | 300 |  | 300 (MOR) 100 (MOF) |
| Gauge testing pressure | At 2400 kPa gauge pressure (minimum) and at full vacuum | | At 2900 kPa gauge pressure (minimum) and at full vacuum | At 750 kPa gauge pressure (minimum) and at full vacuum |
| Seal Withstand pressure | At least 7500 kPa | | | At least 3000 kPa |

(b) Gas Draw-off System

| Chlorine Pressure Gauge | P6 and P7 | P8 |
|------------------------------|---|---|
| Measuring Range (in kPa) | 0 - 1600 | |
| Flange connection material | Stainless steel | |
| Additional dial marking | Gas Chlorine | |
| Requirement of alarm contact | Yes | No |
| Type of contact | One pair MOF of contacts |  |
| Pressure setting (in kPa) | 110 |  |
| Gauge testing pressure | At 2400 kPa gauge pressure (minimum) and at full vacuum | |
| Seal Withstand pressure | At least 7500 kPa | |

- End of this Specification -