

**WATER SUPPLIES DEPARTMENT**

**STANDARD SPECIFICATION M-01-06**

**CHLORINATOR WATER SUPPLY BOOSTER PUMPS**

18.2.2016

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## **CHLORINATOR WATER SUPPLY BOOSTER PUMPS**

### **1. DESIGN**

The pump shall be centrifugal type of robust construction with all rotating parts carefully balanced to prevent undue vibration. Both horizontally and vertically mounted pumpsets are acceptable unless otherwise specified in the Particular Specification.

The pump motor shall be totally enclosed having the degree of protection of IP55 to IEC 60034-5 and shall comply with Water Supplies Department (WSD) Standard Specification E-51-03 for motor rating of 40 kW and above and E-51-04 for motor rating below 40 kW.

Unless otherwise specified in the Particular Specification, the pump shall be supplied and completed with its driving motor, pressure gauges, flexible coupling, safety guards for all rotating parts and a bedplate or mounting bracket in case of vertically (such requirements are specified in Clauses 3 & 4 below) mounted pump with foundation bolts for the pumpset.

### **2. DUTIES AND CHARACTERISTICS**

The pump shall have a stable characteristic and shall be capable for continuous operation at any flow rate over the whole operating range. The operating range together with the duty flow rate and head of the pump shall be either specified in the Particular Specification or to meet the requirement of the chlorinator ejector(s) to be supplied under the contract.

The pump supplied shall satisfy the following requirements in determination of the pump operating range and duty point in meeting with the requirements for chlorinator ejector(s):

- (a) Pump duty flow – the pump duty flow shall be able to meet the flow requirement of the chlorinator ejectors for creation of the required vacuum capable of drawing the specified amount of chlorine into the motive water. In assessing the pump duty flow, a 20% flow margin shall be added to cater for pump deterioration.
- (b) Pump duty head – the pump duty head shall be able to overcome all head losses associated with the pipes, valves, fittings and ejector(s) for the flow requirement as specified in (a) above plus the requirement for injection of the chlorinated solution into the pump delivery pipe or dosing point(s) as specified in the Particular Specification. In assessing the pump duty head, an additional allowance equivalent to 20% of the total losses of the ejector, valves, pipes and fittings shall be added.
- (c) Pump operating range – the pump operating range for flow rate and head shall be able to meet all the possible operating conditions of the chlorinator ejectors and the required injection pressure range as specified in the Particular Specification.

The rating for the motor if required to be provided for the pumpset shall be not less than 120% of the maximum power absorbed by the pump over the whole operating range specified.

**3. HORIZONTAL PUMPSETS**

The pump supplied shall be complete with coupling and foundation bolts. The contractor shall provide a common bedplate for the mounting of the horizontal pumpset if the pump is supplied with motor. The bedplate shall be of a robust and rigid design to ensure that there is no vibration of the plant, and designed as to allow suitable cable access to the motor cable box.

**4. VERTICAL PUMPSETS**

The pumpset with the motor directly on top shall be vertically mounted on a robust mounting bracket. Foundation bolts for the mounting bracket shall be supplied.

**5. PUMP TESTS**

All pump components subject to pressure shall be hydraulically tested to a pressure of not less than 1.5 times the sum of the maximum suction head plus the closed valve head of the pump supplied and shall be sustained for a period of not less than 10 minutes.

The limiting sound pressure level of the pumpset with the motor coupled up at the pump closed valve head shall not exceed 94 dB(A) measured to BS EN ISO 1680 at any point 1 m from the pumpset.

On completion of the manufacturing at the Manufacturer's works the pump shall be coupled to the motor and tested to BS EN ISO 9906 over the full range of its capacity to determine pump output, power absorbed and the overall efficiency of the pumpset.

The tolerance factors to be applied to pump test at the duty flow and head conditions and the corresponding pump efficiency shall comply with the following requirements:

Quantity	Shaft Power Input of Pump	
	≤ 10 kW	> 10 kW
Flow rate, head and pump efficiency	According to Clause 4.4.2 of BS EN ISO 9906	According to Grade 2B in Clause 4.4.1 of BS EN ISO 9906
Witnessed Test	Pump type test certificate in lieu of works test certificate issued by an Independent Inspection Body (IIB) shall be acceptable	The test shall be carried out in the presence of a representative of an Independent Inspection Body

	<p>provided the contractor can guarantee that the performance of the pump offered shall not be inferior to that indicated in the type test certificate, and the pump components have undergone pressure test of not less than 150% of the maximum pressure to be sustained by the pump.</p> <p>If the noise level of pump is not indicated in the type test certificate or other relevant documents cannot be provided by the pump manufacturer, the pump shall be subject to noise measurement in-situ after its installation to verify its compliance with the requirement as set out in the paragraph 2 of this Clause. All costs associated with the necessary remedial measures to limit the pump noise to the acceptable level, if required, shall be borne by the Contractor.</p>	(IIB) unless otherwise stated in the Particular Specification
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**6. MATERIALS OF CONSTRUCTION**

The pump shall be manufactured from the following materials or other superior suitable materials:-

Component	Material Specification
Pump Casing or Pump Chambers	High Quality Grey Cast Iron to BS EN 1561 EN-GJL-250
Impellers	Stainless Steel to BS EN 10088 Designation 1.4408
Wear Rings	Copper-tin alloy to BS EN 1982 – CC483K (Compatible Grade)
Pump Shaft	Stainless Steel to BS EN 10088 Designation 1.4021 / 1.4401
Shaft Sleeves	Stainless Steel to BS EN 10088 Designation 1.4021 / 1.4401

7. **PUMP CASING**

Unless otherwise specified in the Particular Specification, pump casing shall preferably be fitted with renewable wear rings (neck rings). Bosses, radially drilled and tapped to receive pressure gauge connection shall be provided on both the suction and the delivery sides adjacent to the pump connection flanges. Means shall be provided to drain the casing and an air release cock of adequate size shall be fitted at the highest point on the first and last stages of the pump.

8. **PUMP IMPELLER**

The impeller should be designed with sufficient strength to withstand all possible stresses imposed by the drive. The impeller shall be machined to close limits and shall be dynamically balanced.

9. **GLANDS**

The pump shall be fitted with mechanical seals suitable for use with a pressure of at least the closed valve head of the pump plus the maximum suction head.

For vertical pumpset, a water thrower shall be provided to protect the lower bearing of the pump.

10. **BEARINGS**

Ball and roller type bearings shall be sealed, grease lubricated and protected from the ingress of dust and water. These bearings shall conform to relevant BS, ISO or other equivalent standards and shall be readily obtainable. Special bearings and Imperial size bearings are not acceptable.

11. **GAUGES**

Bourdon tube type suction and delivery pressure gauges of suitable range shall be provided for mounting at the pump suction and delivery branches. The gauges shall be graduated in both kPa and metres head of water and each completed with an isolating cock.

Static head correction is not required and the scale diameter shall not be less than 150 mm.

Additional tee connections made of stainless steel, each complete with an isolating cock at the tee-branch shall be provided for installation between the gauge and pump suction and delivery branches.

**12. INFORMATION TO BE PROVIDED IN THE PARTICULAR SPECIFICATION**

The following information shall be provided in the Particular Specification.

<b>Clause in this Standard Specification</b>	<b>Requirement to be specified in the Particular Specification.</b>
Clause 2 Duties and Characteristics	The operating range together with the duty flow rate and head of the pump.

The following information, if specified in the Particular Specification, shall take precedence over the respective requirements stated in this Standard Specification.

<b>Clause in this Standard Specification</b>	<b>Alternative requirements that can be specified in the Particular Specification.</b>
Clause 1 Design	The mounting configuration of the pumpset.
	The components to be supplied with the pumpset.
Clause 5 Pump Tests	The requirement to have the pumpset tested in the presence of a representative of an Independent Inspection Body (IIB).
Clause 7 Pump Casing	The requirement to have replaceable wear rings fitted in the pump casing.

- End of Specification -