

WATER SUPPLIES DEPARTMENT

STANDARD SPECIFICATION M-01-04

SUBMERSIBLE BOREHOLE MULTISTAGE PUMPS

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SUBMERSIBLE BOREHOLE MULTISTAGE PUMPS FOR

1. GENERAL

This Standard Specification shall be read in conjunction with the following WSD Standard Specifications:

M-00-03 General Specification for Supply of Mechanical Plant

E-51-05 Submersible Motors of 40 - 140 kW

E-51-06 Submersible Motors below 40 kW

2. TYPE AND CONSTRUCTION OF PUMP

The pump shall be of multistage, centrifugal type complete with suction strainer to be installed horizontally or vertically suitable for continuous operation in a totally submersed manner.

All rotating components must be balanced both statically and dynamically.

3. DUTIES AND CHARACTERISTICS

The pump shall have a stable characteristic and be capable of continuous operation at within $\pm 50\%$ of the design flowrate.

The minimum submergence for continuous operation and the maximum allowable continuous dry running period of the pump shall be stated in the Tender unless otherwise specified in the Particular Specification. For calculating the available N.P.S.H. at the pump for any operating condition, the minimum atmospheric pressure shall be taken as 10 m of water and the maximum vapour pressure of water as 0.3 m of water.

The pumpmotor shall be started with the delivery valve fully open.

4. PUMP TEST

The pump shall be tested at the Contractor's works over the full range of its capacities to show the pumping heads, efficiencies and power absorbed as specified in the Particular Specification. For pumpsets having motor rating below 40kW, manufacturer's type test certificates in lieu of above tests on the actual pump supplied shall also be acceptable and the Contractor must guarantee that the performance shall be same as that shown on the test certificates.

For pumpsets having motor rating larger than 40 kW, pump tests to BS EN ISO 9906 Grade 2 witnessed by independent inspection body (IIB) shall be required in accordance with the WSD Standard Specification EM-00-01.

All pump components subject to pressure shall be hydraulically tested to a pressure of not less than one and a half times for the sum of the maximum suction head plus the zero flow head of the pump supplied for not less than 10 minutes.

5. MATERIALS OF CONSTRUCTION

The pumpset and its accessories shall be manufactured from the following materials or other superior materials:

Item	Material of Construction
Casing	High Quality Grey Cast Iron to BS EN 1561 Designation EN-GJL-250
Casing Wear Rings (Neck Rings)	Leaded Bronze to BS EN 1982 Designation CC495K
Impeller	Stainless Steel to BS EN 10088 Designation 1.4401
Pump Shaft	Stainless Steel to BS EN 10088 Designation 1.4057
Shaft Sleeves	Leaded Gunmetal BS EN 1982 Designation CC491K
Shroud (when required)	Stainless Steel to BS EN 10088 Designation 1.4401

6. PUMP CASING

The pump casing shall be fitted with renewable wearing rings (neck rings).

Flange or parallel threaded outlet shall be provided for connection between pumpset and pipework at the pump delivery. If flange is provided, the bolt holes shall have drillings to BS EN 1092. A threaded tapping point shall be provided at the delivery pipework for connecting pressure gauge tubing.

7. PUMP IMPELLER

The impeller shall 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.

8. **SHAFT SLEEVE AND SHAFT SEAL**

The pump shaft shall be protected by renewable sleeves of gunmetal where in contact with water. The shaft seal shall be of tungsten carbide or other superior materials.

9. **SUCTION STRAINER**

The pump shall be fitted with a suction strainer to prevent large solid particles from entering the pump.

10. **BEARING**

Water lubricated bearings shall be of materials compatible with the quality of water to be handled.

11. **NON-RETURN VALVE**

For bore hole type application, a non-return valve shall be built-in at the delivery of the pump, and shall be of simple construction. The materials of construction of the valve shall be suitable for the liquid being pumped. The design of the non-return valve shall be suitable for the orientation (vertical or horizontal axis) of the pump as specified.

12. **PRESSURE GAUGES**

Bourdon tube suction and delivery pressure gauges of suitable range and graduated in both kPa and metres head of water shall be provided.

The gauges complete with isolating cocks shall be mounted at the pump branches. Static head correction is not required and the scale diameter shall not be less than 150 mm.

For bore hole type applications only a delivery gauge and isolating cock shall be supplied loose for installation at the delivery header on site.