

WATER SUPPLIES DEPARTMENT

STANDARD SPECIFICATION M-01-04

SUBMERSIBLE MULTISTAGE PUMPS FOR
BOREHOLE AND ABOVE GROUND APPLICATIONS

1.4.2003

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FOR BOREHOLE AND ABOVE GROUND APPLICATIONS

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**SUBMERSIBLE MULTISTAGE PUMPS FOR
BOREHOLE AND ABOVE GROUND APPLICATIONS**

1. GENERAL

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

M-00-03 Supply of Mechanical Plant

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

E-51-06 Submersible Motors of Rating up to 40 kW

2. TYPE AND CONSTRUCTION OF PUMP

The pump shall be of multistage, centrifugal type complete with suction strainer suitable for continuous horizontal or vertical operation in a totally submersed manner. The pump shall be suitable for bore hole application or above ground installation.

Where above ground application is specified, the pump shall be housed in a purposely built stainless steel cylindrical shroud suitable for continuous operation. The cylindrical shroud can be made up of sections for easy dismantling and withdrawal of the pumpset. A drawing showing the arrangement of shroud and pumpset should be submitted together with the Tender.

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. 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 suitable for starting with the delivery valve fully open.

4. PUMP TEST

Manufacturer's type test certificates shall be supplied together with typical pump curves showing pumping heads, efficiencies and power absorbed at various water flowrates. For pumpsets having motor rating larger than 40 kW, pump tests to BS EN ISO 9906 Grade 2 witnessed by independent surveyor shall be required.

All pump components subject to pressure shall be hydraulically tested to a pressure of not less than one and a half times the sum of the maximum suction head plus the zero flow head of the pump supplied for not less than 5 minutes.

5. MATERIALS OF CONSTRUCTION

The following table specifies the materials to be employed for the pumpset and its accessories:

Item	Material of Construction
Casing	High Quality Grey Cast Iron to BS EN 1561 Designation EN-JL 1040 or better
Casing Wear Rings (Neck Rings)	Leaded Bronze to BS EN 1982 Designation CC495K
Impeller	Stainless Steel to BS 3100 Grade 316 C16
Pump Shaft	Stainless Steel to BS 970 : Part 4 Grade 431 S29
Shaft Sleeves	Leaded Gunmetal BS EN 1982 Designation CC491K
Shroud (when required)	Stainless Steel to BS 970 Grade 316

6. PUMP CASING

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

Integral flange shall be provided for connection between pumpset and pipework, and shall have drillings to BS EN 1092. A 3/8" BSP female parallel threaded tapping point shall be provided at the flange peripheral for the reception of 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. SHROUD

The cylindrical shroud shall be suitably designed to withstand the stresses due to hydraulic pressure generated by the pumpset as well as water surge that may arise from inadvertent operation of the pumping system. Sufficient clearance should be provided between the shroud and pumpset to facilitate heat removal and prevent formation of stagnant fluid. The shroud shall be properly designed to ensure satisfactory operation and to avoid cavitation and high pumping noise.

The suction and delivery branches of the shroud shall be suitable for flange connection and shall be faced and drilled to BS EN 1092 as specified. The delivery branch shall be on the top and suction branch at the bottom of the shroud.

Bosses, radially drilled and tapped to receive the suction pressure gauge connection, air bleed and water drain valves shall be provided. Provision of eye-bolts shall also be made for lifting the whole pumpsets, and supporting feet for mounting on the floor.

9. 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 better materials.

10. SUCTION STRAINER

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

11. BEARING

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

12. 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.

13. 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. The diameter of the scale shall not be less than 150 mm. Static head correction is not required. For bore hole type applications only a delivery gauge and isolating cock shall be supplied loose for installation at the delivery header on site.

- End of Specification -