

WATER SUPPLIES DEPARTMENT

STANDARD SPECIFICATION M-01-05

MULTISTAGE CENTRIFUGAL PUMPS AND

ASSOCIATED EQUIPMENT FOR

VILLAGE FRESH WATER SUPPLY

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MULTISTAGE CENTRIFUGAL PUMPS AND
ASSOCIATED EQUIPMENT FOR
VILLAGE FRESH WATER SUPPLY

1. DESIGN

This specification covers pumps of driving motor output power not exceeding 40 kW. The operating speed of the pump shall not exceed 3,000 r.p.m. or as specified in the Particular Specification.

The pump shall be multistage centrifugal type of robust construction with all rotating parts carefully balanced to prevent undue vibration. The pump shall be designed in such a way that no thrust is transmitted to the driving motor. For pumps having a rated output of 15 litres/second or more, the pumpset shall be horizontally mounted whilst pumps having a rated output less than 15 litres/second shall be vertically mounted unless otherwise specified in the Particular Specification.

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 with foundation bolts for the pumpset. The pump shall be suitable for starting with delivery valve fully opened and reflux valve fully closed.

2. DUTIES AND CHARACTERISTICS

The pump shall have stable characteristics 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 specified in the Particular Specification.

The rated power of the driving motor shall be not less than 120% of the maximum power absorbed by the pump over the entire operating range specified.

For calculating the available net positive suction head (NPSH) 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 curve of NPSH required by the pump shall be submitted for assessment after award of contract.

3. 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 zero flow head of the pump supplied. The test shall be sustained for a period of not less than 10 minutes, so as to provide a safety margin against possible surge pressure.

On completion of assembly at the Manufacturer's works, the pump shall be coupled with its driving motor or if not to a slave motor supplied, and tested to BS EN ISO 9906 Grade 2B over the full range of its capabilities to determine pump output, power absorbed and efficiency. The tests shall be carried out in the presence of a representative of an Independent Inspection Body (IIB) unless otherwise stated in the Particular Specification.

Noise measurement shall be made on the pumpset with its own motor coupled up at the Manufacturer's works at closed valve head. The limiting sound pressure level for the pumpset shall not exceed 94 dBA at any point 1 m from the pumpset. Noise measurement shall be conducted in accordance with BS EN ISO 1680.

4. 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
Diffusers	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

5. PUMP CASING

Unless otherwise specified in the Particular Specification, the pump casing shall be fitted with replaceable wear rings. Radially drilled and tapped bosses adjacent to the respective suction and delivery flanges of the pump shall be provided for installation of pressure gauges. Air release cocks, which shall be fitted at the highest point of the first and last stage chambers, and drain valve shall be provided for the pump.

6. PUMP IMPELLERS

The impellers shall be designed with sufficient strength at the boss to withstand all possible stresses imposed by the drive. The impellers shall be machined to close limits inside the pump casing and dynamically balanced.

7. PUMP SHAFT AND SHAFT SEAL

The pump shaft shall be protected from wear by replaceable sleeves as appropriate. The pump shall be fitted with mechanical seals suitable for use with a pressure greater than the sum of the closed valve head of the pump and the maximum suction head.

8. 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 the relevant BS, ISO or other equivalent standards and shall be readily obtainable in the market. Special bearings and Imperial bearings are not acceptable.

9. PRESSURE GAUGES

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

The gauge complete with isolating cock shall be mounted at the tappings adjacent to the pump suction and delivery flanges. Static head correction is not required and the scale diameter shall not be less than 150 mm.

An additional tee connection, with an isolating cock is to be provided for the gauges branch.

10. MOTOR

The motor supplied shall be in accordance with Water Supplies Department Standard Specification E-51-04 for Squirrel Cage Induction Motors below 40 kW

11. INFORMATION TO BE PROVIDED IN THE PARTICULAR SPECIFICATION

The following information shall be provided in the Particular Specification.

Clause in this Standard Specification	Requirement to be specified in the Particular Specification.
Paragraph 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.

Clause in this Standard Specification	Alternative requirements that can be specified in the Particular Specification.
Paragraph 1 Design	The operating speed of the pumpset.
	The mounting configuration of the pumpset.
	The components to be supplied with the pumpset.
Paragraph 3 Pump Tests	The requirement to have the pumpset tested in the presence of a representative of an Independent Inspection Body (IIB).
Paragraph 5 Pump Casing	The requirement to have replaceable wear rings fitted in the pump casing.