

WATER SUPPLIES DEPARTMENT

STANDARD SPECIFICATION M-01-05

CENTRIFUGAL MULTISTAGE PUMPS AND

ASSOCIATED EQUIPMENT FOR

VILLAGE FRESH WATER SUPPLY

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CENTRIFUGAL MULTISTAGE PUMPS AND
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VILLAGE FRESH WATER SUPPLY

1. DESIGN

This specification is for 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 centrifugal and multistage type of robust construction with all rotating parts carefully balanced to prevent undue vibration. The pump shall be so designed 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. Typical village pump house general arrangement for horizontal pumpsets and vertical pumpsets are shown in Sketches A and B respectively.

The pump shall be free from unacceptable noise. The limiting sound pressure level of the pumpset within the operating range will be specified in the Particular Specification with reference to the nearest Noise Sensitive Receiver (NSR) if necessary.

Unless otherwise specified in the Particular Specification, the pump supplied shall be complete with motor, pressure gauges, flexible coupling, safety guards for all rotating parts and bedplate with foundation bolts for the pumpset. The pump shall be suitable for starting with delivery valve fully opened (but with reflux valve closed).

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 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 whole 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.

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 and shall be sustained for a period of not less than 10 minutes, so as to provide a safety margin against inadvertent surge pressure.

On completion at the Contractor's works, the pump shall be coupled to the motor or if not to a slave motor supplied, and tested to BS EN ISO 9906 Grade 2 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 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 Contractor'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 as recommended in 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 Chamber	High Quality Grey Cast Iron to BS EN 1561 EN-GJL-250
Impeller	Copper-tin-lead alloy to BS EN 1982 - CC491K

Component	Material Specification
Casing/Chamber Wear Ring	Copper-tin-lead alloy to BS EN 1982 - CC495K
Pump Shaft	Stainless Steel to BS EN 10800 Designation 1.4057
Shaft Sleeves	Copper-tin-lead alloy to BS EN 1982 - CC491K

5. PUMP CASING

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 suction and delivery sides of the pump 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.

6. PUMP IMPELLER

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

7. PUMP SHAFT AND SHAFT SEAL

The pump shaft shall be protected from wear by renewable sleeves as appropriate. 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 static suction head.

8. BEARING

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. Special bearings and Imperial bearings are not acceptable.

9. **PRESSURE GAUGES**

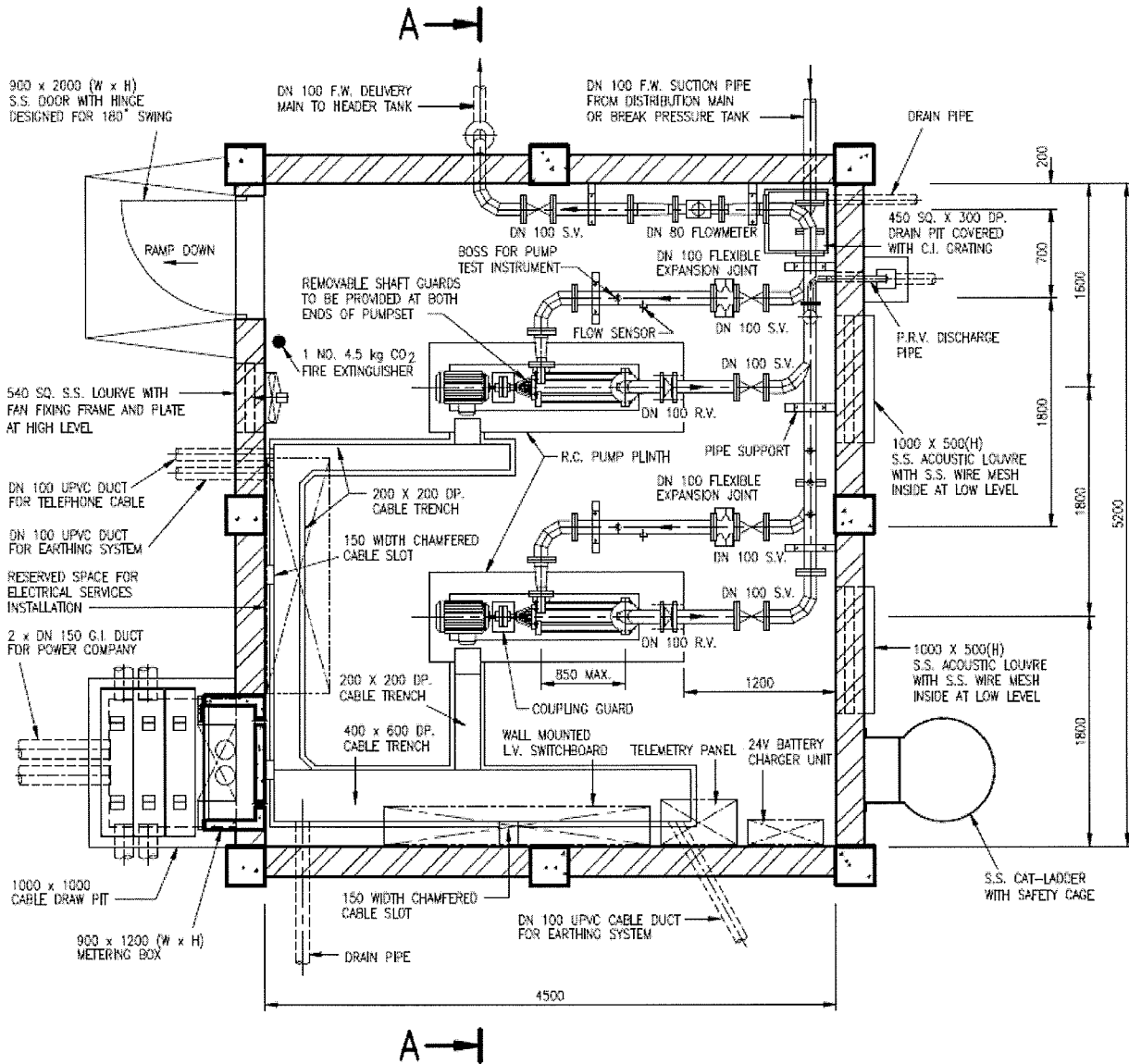
Bourdon tube type suction and delivery pressure gauges of suitable range and graduated in both kPa and metres head of water shall be provided. The scale of the suction and delivery pressure gauges shall be from -10 m to +10 m water gauge and from 0 m to +240 m water gauge respectively or as specified in the Particular Specification.

The gauge complete with isolating cock shall be mounted at the pump suction and delivery branches. 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 between the gauge and pump 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.

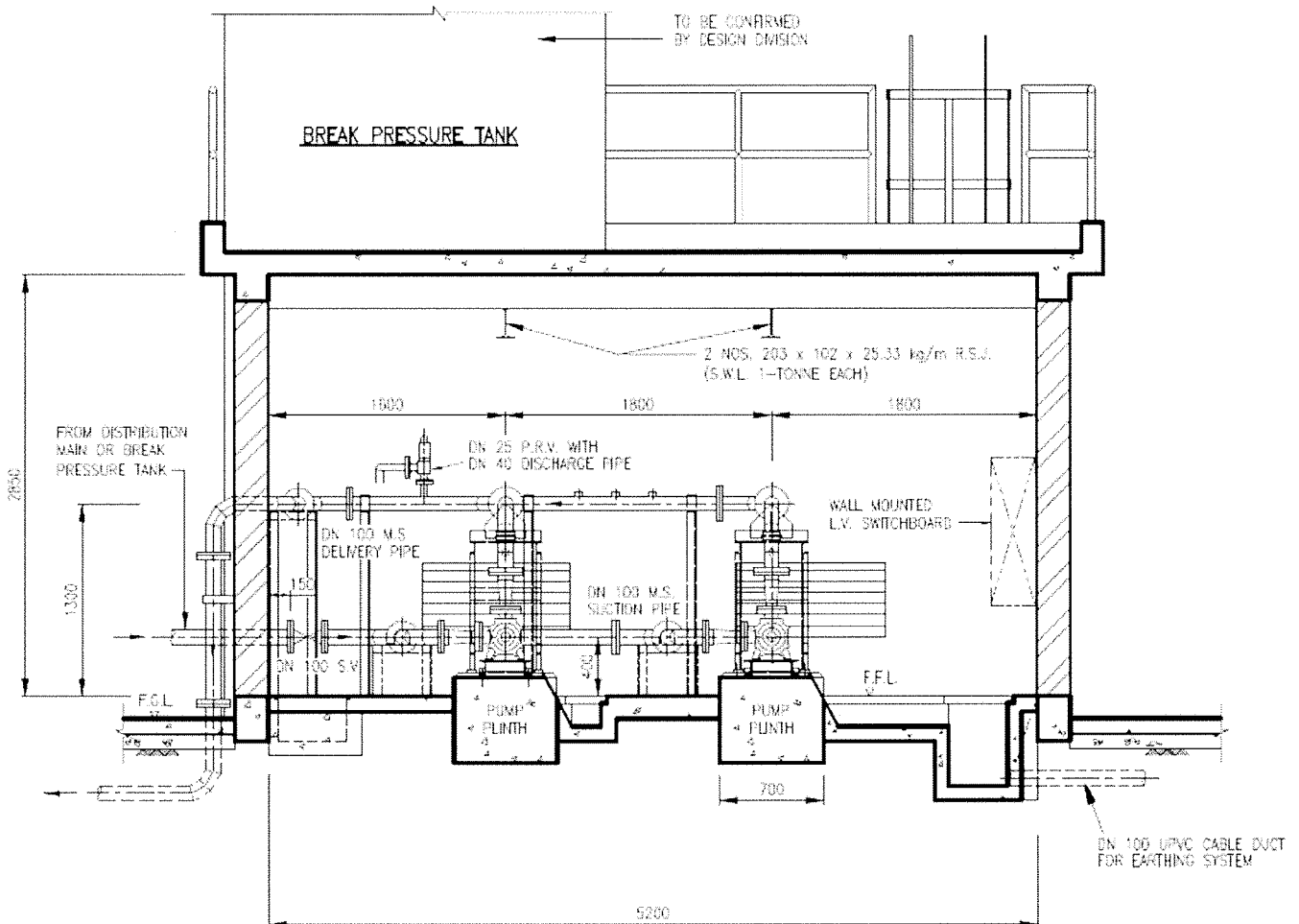


PLAN

NOT TO SCALE

NOTES :
1) ALL DIMENSIONS ARE IN mm

**TYPICAL VILLAGE PUMP HOUSE GENERAL ARRANGEMENT
FOR HORIZONTAL PUMPSETS**

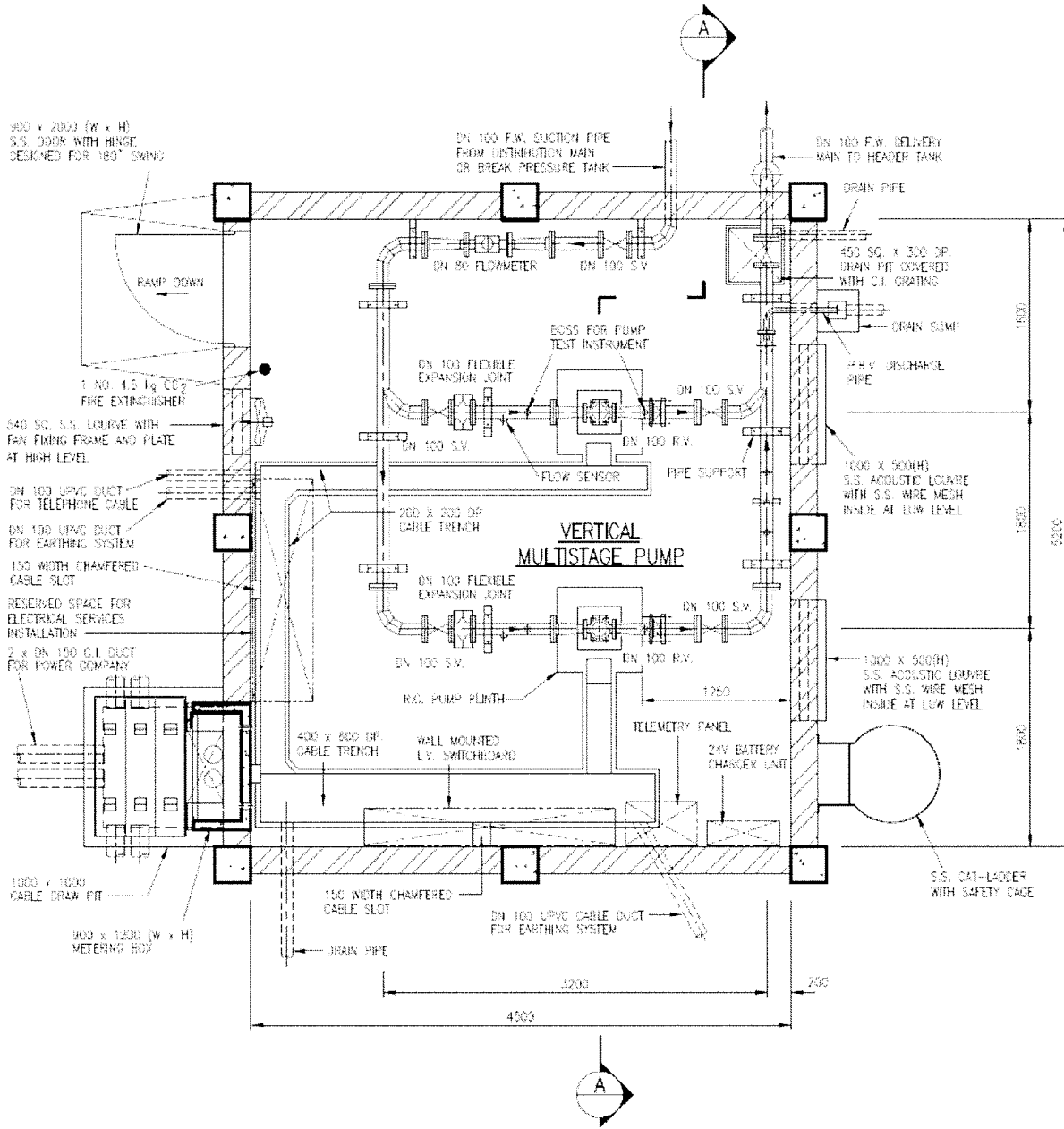


NOTES
1) ALL DIMENSIONS ARE IN mm

SECTION A-A

NOT TO SCALE

TYPICAL VILLAGE PUMP HOUSE GENERAL ARRANGEMENT
FOR HORIZONTAL PUMPSETS

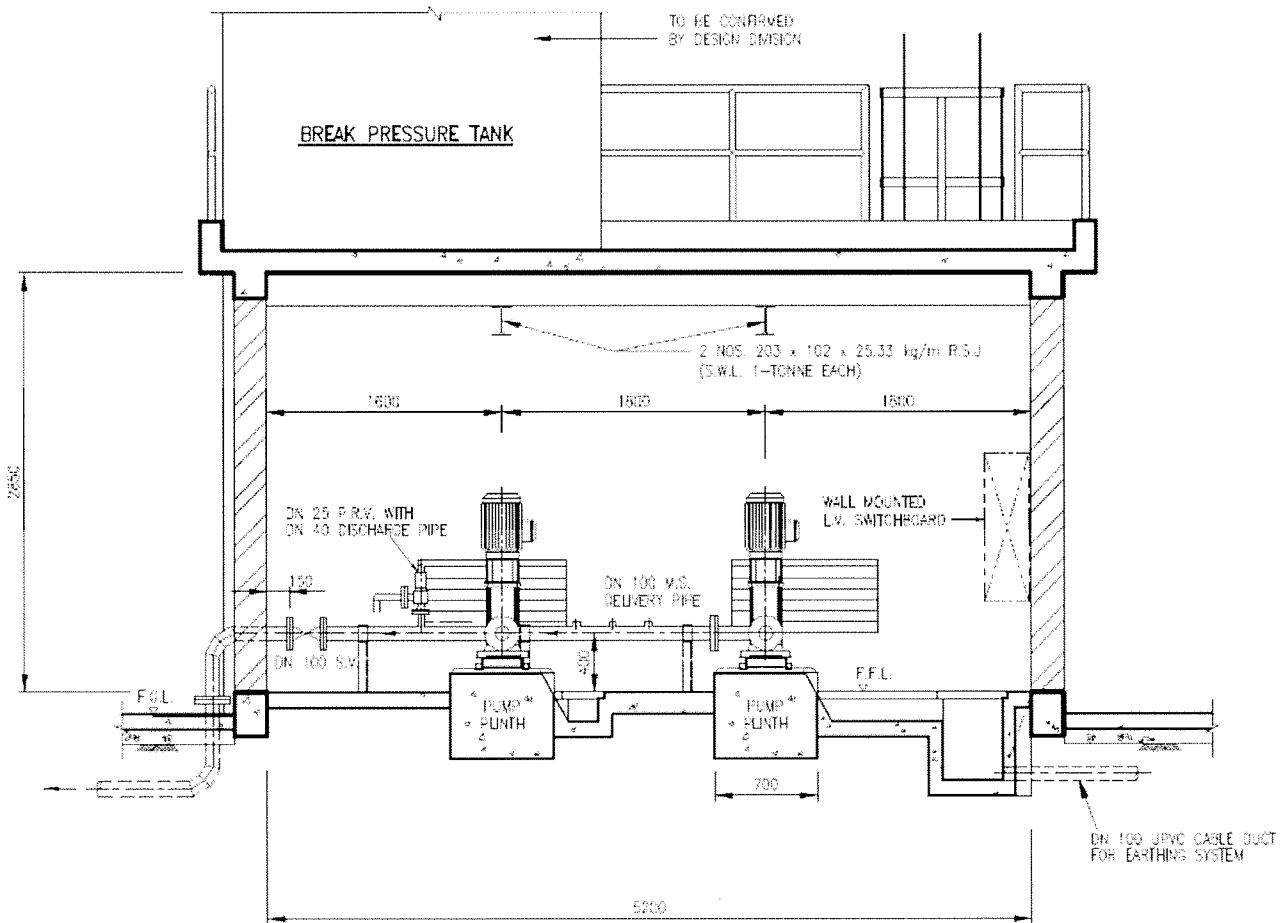


PLAN

NOT TO SCALE

NOTES :
 *) ALL DIMENSIONS ARE IN mm

TYPICAL VILLAGE PUMP HOUSE GENERAL ARRANGEMENT
FOR VERTICAL PUMPSETS



NOTES :
1) ALL DIMENSIONS ARE IN mm

SECTION A-A

NOT TO SCALE

TYPICAL VILLAGE PUMP HOUSE GENERAL ARRANGEMENT
FOR VERTICAL PUMPSETS

- End of Specification -