**SPECIFICATION FOR FLOW METERS**

**AND WASTE METERS**

**TABLE OF CONTENTS**

|  |  |  |
| --- | --- | --- |
|  | **FLOW METERS AND WASTE METERS** |  |
| 1 | General | 6u – 2  |
| 2 | Differential Pressure Meter | 6u – 3 |
| 3 | Inferential Meters | 6u – 3 |
| 4 | Waste Meters | 6u – 4 |
| 5 | Meters for Service Connections to Domestic, Commercial and Industrial Premises | 6u – 4 |

**FLOW METERS AND WASTE METERS**

**1.0 General**

 1.1 Meters shall be suitable for waterworks purposes for measurement of flow of potable water.

 1.2 Differential pressure, inferential and waste meters shall have flanged ends faced and drilled and conform to the dimensions specified in B.S. 4504. The flanges of the waste meters may have slotted holes.

 1.3 Meter bodies shall be hydraulically tested for a period of not less than 15 seconds to the hydrostatic test pressure stated in the Bills of Quantities and shall be suitable for the working pressure stated therein.

 1.4 Recorder charts shall be of the waxed type suitable for marking with a stylus.

 1.5 The Contractor shall supply with each recording instrument two spare stylus, refill quantity of any working fluid such as mercury and one hundred charts for each recording instrument. The charts shall be headed as specified in the notes forming a part of this Specification. Charts shall be graduated in cubic metres and the Tenderer shall submit specimen copies with his tender for approval. The charts shall be suitable for use in the tropical conditions previously mentioned.

 1.6 The chart recorder drums for use on inferential waste meters shall be spring driven and suitable for rewinding when the charts are changed.

 1.7 Each meter shall bear the mark of the Manufacturer and indication of its nominal diameter where appropriate. Such marks may be either cast on, or stamped on.

 1.8 Differential pressure and inferential meters shall be suitable for placing in chambers which may become flooded. Waste meters shall be similarly suitable when the recording mechanism is not in place.

 1.9 The Contractor shall label and clearly mark all items in indelible paint as specified in the notes forming a part of this Specification.

 All lettering and numbering shall be at least 50 mm high.

 In addition, all fittings shall be marked with the corresponding item numbers in the Bills of Quantities, or other number notified by the Engineer.

 1.10 Every precaution shall be taken to avoid damage to meters, instruments and fittings, which shall be carefully packed in boxes and crates.

 1.11 Delicate parts of recording instruments shall be packed separately in purpose made polyurethane foam containers, or otherwise carefully protected. Moving parts of instruments shall be restrained during transit.

 1.12 Each package shall be clearly labeled with the numbers and size and particulars of the contents.

 1.13 The Tenderer shall give full particulars of all meters and instruments offered in the Schedule of Particulars, supported by drawings and dimensions.

**2.0 Differential Pressure Meter**

 2.1 The differential pressure meter shall be of the venturi Tube or `Dall' Tube type.

 2.2 Indicating, integrating and recording instruments shall conform with B.S. 1986.

 2.3 Instruments shall be fitted with linear scales.

 2.4 Recorder Charts shall be of the circular type and suitable for replacement not more frequently than once per week. Chart speed shall be such as will give a clear indication of variations of flow. The design shall allow for site adjustment of the chart speed.

 2.5 The maximum range of the instruments shall be 25% greater than the normal maximum indication.

 2.6 The circular chart recorder and integrator shall be spring driven and suitable for rewinding every seven days.

 2.7 The indicator integrator and recorder will be mounted in a small building over or close to the differential pressure producer. The tenderer shall indicate by a drawing the suggested relative positions, dimensions, and levels of the differential pressure producer, chamber and associated small building.

 2.8 The indicator and recorder shall read in cubic metres. The integrator mechanism shall register in cubic metres.

**3.0 Inferential Meters**

 3.1 Inferential meters for district metering shall be of the helix type with integration of flow registered by 7 digit cyclometer in cubic metres.

 3.2 The entire mechanism of an inferential meter shall be removable from the body for cleaning and maintenance purposes. A blank cover shall be supplied with each meter.

**4.0 Waste Meters**

 4.1 Waste water meters shall be of the gate type. Recording mechanisms shall be suitable for fixing in position before, and removing after waste detection tests are carried out. The recording mechanism shall be supplied in stout lock‑up boxes.

**5.0 Meters for Service Connections to Domestic, Commercial**

 **and Industrial Premises**

 5.1 All meters shall be of the "Dry Dial Type".

 5.2 The body shall be of an alloy of metal of adequate strength and durability to withstand corrosion and wear and tear.

 5.3 The cover lids shall be so designed and manufactured that they cannot be easily broken or detached from the meters.

 5.4 Service meters shall be robust, have a high degree of accuracy of measurement at low flows replaceable working parts and cyclometer counters.

 5.5 The meters shall be calibrated to read in cubic metres and liters, with a return to zero at not less than :

 Size of Meter Integrated quantity

 Up to and including 80 mm 99,999 m3

 Larger than 80 mm 999,000 m3

 5.6 The head losses caused by installing meters in service pipes should not exceed the following at the maximum continuous flow rates quoted.

|  |  |  |
| --- | --- | --- |
| Size of Meter(mm)  | Max. Continuous Flow rate(Cubic metres/hr)  | Approx. head loss(Metres) |
| 1520254050 | 1.52.5 3.56.5 8.0  | 2.52.52.51.00.75 |
| Size of Meter(mm)  | Max. Continuous Flow rate(Cubic metres/hr)  | Approx. head loss(Metres) |
| 80100150 | 13.0 25.0 42.0  | 0.700.40.4 |

 5.7 The Contractor shall state in the Schedule of Particulars the head losses which will occur in the meters he proposes to supply at the maximum continuous flow rates quoted.

 5.8 For sizes up to and including 40 mm, each meter shall have union connections to enable the body to be removed from the service pipe. A male connection screwed B.S.P. shall be provided for connecting to a stop valve on the upstream side of the meter, and a similar male connection shall be provided on the downstream side of the meter.

 For sizes 50, 80, 100, 150 and 200 mm, the meters shall be flanged to Table 16/11 BS 4504. Tenderers shall state the length of straight pipe required, if any, on each side of the meter for accurate measurement of flow.

 5.9 Direction of flow arrows shall be integral with the body metal.

 5.10 The meters shall have strainers in the body of the meter on the upstream side of the mechanism.

 5.11 All meters shall be suitable for horizontal or vertical installation.

* 1. The Contractor shall state the percentage minimum accurate registration in liters per hour for sizes up to 50 mm and in cubic metres for larger sizes, the recommended maximum continuous rate of flow, and the recommended maximum daily and monthly flows.

 5.13 Accuracy of the meter reading shall be within the range of +2% when tested at flows ranging from 150 litres/hr. to the maximum flows stated in Clause 8.30.