# SPECIFICATION

# FOR

# TESTING EQUIPMENT

## REFERENCE METERS

In accordance with the provisions of section 5(5) of the Weights and Measures Act 1985, the Secretary of State hereby approves the material and form of testing equipment of the following description for use by inspectors of weights and measures when testing measuring systems used for the bulk measurement of liquid fuel.

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This specification supersedes SWM 268 (January 1980)

**Department of Trade and Industry**

**October 1986**

# SPECIFICATION FOR TESTING EQUIPMENT

## REFERENCE METERS

### MATERIAL

1 Reference meters shall be constructed of non-porous materials which are compatible with the liquids with which they are to be used.

### FORM

2 Reference meters shall be of the positive displacement type and shall be fitted with a quantity-indicating mechanism reading in either litres, cubic metres or gallons. The quantity-indicating mechanism may be of analogue to digital type and shall be capable of being returned to zero.

3 The resolution of the indicator shall be such that 0.01% of the quantity delivered in one minute at maximum flowrate shall be capable of accurate determination.

4 An air eliminator shall be rigidly attached immediately upstream of the meter.

5 A strainer, suitable for the liquid(s) which the meter is to measure, shall be provided upstream of the meter. The strainer may be incorporated in the air eliminator.

6 Means shall be provided to measure the temperature of the liquid. The scale interval shall be 0.1 °C and the range of the temperature measuring device suitable for the range of temperatures likely to be encountered in use.

7 Means shall be provided to measure the pressure upstream of the air eliminator or strainer and downstream of the meter, so that any blockage or resistance in the meter may be detected. The scale interval of the pressure-measuring device(s) shall be 0.1 bar or llb/in$^2$.

8 Means shall be provided to enable the meter and its ancillary equipment to be emptied in such a manner that the liquid can be collected and measured, so that this quantity of liquid can be taken into account when checking a delivery.

9 Means shall be provided for sealing the meter to prevent unauthorised adjustment.

10 Reference meters may be fitted with other devices, providing they do not affect accuracy. Such devices may include:

A remote indicator )
A rate of flow indicator ) which must be denominated in the same quantity units as the main indicator

A calibrating mechanism

A pre-set device

## INSCRIPTIONS

11 The following data shall be marked permanently, legibly and conspicuously on the meter:

(a) the direction of flow
(b) the minimum and maximum rates of flow or the specific rate of flow
(c) the manufacturer's name
(d) a serial number

Other date which may be marked include:

(e) a pattern approval number
(f) the test liquids or liquid of use
(g) the reference temperature
(h) the coefficient of cubical expansion of the meter.

## APPENDIX

NOTES FOR THE GUIDANCE OF TRADING STANDARDS OFFICERS

1 Where possible a meter should be tested complete with all its ancillary equipment.

2 A meter which is used for testing dipstick measuring systems is normally used at a single flowrate and should be tested in situ in the manner in which it is to be used.

3 A meter which is used for testing meter measuring systems should be capable of operating at any flowrate between 10% and 100% of its maximum flowrate, (ie a 10:1 turndown ratio). Therefore the minimum flowrate will normally be 10% of the maximum flowrate specified by the manufacturer, although the use of other turndown ratios may be authorised.

The recommended intermediate test flowrates are 20%, 40%, 60% and 80% of the maximum flowrate.

The repeatability of the meter should be such that the range or spread of five successive tests at the same flowrate with the same viscosity liquid should not exceed 0.05% of the quantity delivered on each test.

The linearity of the meter should be such that the range of the means of five successive tests using liquid of the same viscosity should not exceed 0.1% of the quantity delivered on each test.

4 Corrections should always be made for the known errors of a reference meter.