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# ANNEX X

# MATERIAL MEASURES (MI-008)

## CHAPTER I

## Material measures of length

SPECIFIC REQUIREMENTS

**Reference Conditions**

1.1. For tapes of length equal to or greater than 5 metres, the maximum permissible errors (MPEs) are to be met when a tractive force of fifty newtons or other force values as specified by the manufacturer and marked on the tape accordingly, or in the case of rigid or semi-rigid measures no tractive force is needed, is applied.

1.2. The reference temperature is 20 °C unless otherwise specified by the manufacturer and marked on the measure accordingly.

**MPEs**

2. The MPE, positive or negative in mm, between two non-consecutive scale marks is (a + bL), where:

— L is the value of the length rounded up to the next whole metre; and

— a and b are given in Table 1 below.

When a terminal interval is bounded by a surface, the MPE for any distance beginning at this point is increased by the value c given in Table 1.

Table 1

| Accuracy Class | a (mm) | b | c (mm) |
|---|---|---|---|
| I | 0,1 | 0,1 | 0,1 |
| II | 0,3 | 0,2 | 0,2 |
| III | 0,6 | 0,4 | 0,3 |
| D — special class for dipping tapes[a] Up to and including 30 m[b] | 1,5 | zero | zero |
| S — special class for tank strapping tapes For each 30 m length when the tape is supported on a flat surface | 1,5 | zero | zero |

**a** Applies to the tape/dip weight combinations.

**b** If the nominal tape length exceeds 30 m, an additional mpe of 0,75 mm shall be permitted for each 30 m of tape length.

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Dip tapes may also be of Classes I or II in which case for any length between two scale marks, one of which is on the sinker and the other on the tape, the MPE is ± 0,6 mm when application of the formula gives a value of less than 0,6 mm.

The MPE for the length between consecutive scale marks, and the maximum permissible difference between two consecutive intervals, are given in Table 2 below.

Table 2

| **Length i of the interval** | **MPE or difference in millimetres according to accuracy class** | | |
|---|---|---|---|
| | **I** | **II** | **III** |
| i ≤ 1 mm | 0,1 | 0,2 | 0,3 |
| 1 mm < i ≤ 1 cm | 0,2 | 0,4 | 0,6 |

Where a rule is of the folding type, the jointing shall be such as not to cause any errors, supplementary to those above, exceeding: 0,3 mm for Class II, and 0,5 mm for Class III.

**Materials**

3.1. Materials used for material measures shall be such that length variations due to temperature excursions up to ± 8 °C about the reference temperature do not exceed the MPE. This does not apply to Class S and Class D measures where the manufacturer intends that thermal expansion corrections shall be applied to observed readings where necessary.

3.2. Measures made from material whose dimensions may alter materially when subjected to a wide range of relative humidity, may only be included in Classes II or III.

**Markings**

4. The nominal value shall be marked on the measure. Millimetre scales shall be numbered every centimetre and measures with a scale interval greater than 2 cm shall have all scale marks numbered.