IS 12278 (2011): Metallic Materials – Tube – Ring Tensile Test [MTD 3: Mechanical Testing of Metals]

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UDC 669-462·2 : 620·172

(Reaffirmed 2003)

Indian Standard

METHOD FOR RING TENSILE TEST ON METALLIC TUBES

Methods of Physical Tests Sectional Committee, SMDC 3 [Ref : Doc : SMDC 3 (3176)]

1. Scope — This standard specifies the method for a ring tensile test of metallic tubes to reveal surface and internal defects by subjecting the test piece to strain until fracture occurs. This test is also used to assess ductility of the tubes.

1.1 The ring tensile test is applicable to tubes with outside diameter exceeding 150 mm and wall thickness not greater than 40 mm. The inside diameter must be greater than 100 mm.

2. Principle of Test — The test consists of subjecting a ring cut from the tube to strain in the circumferential direction until fracture occurs.

3. Testing Equipment — The testing equipment shall consist basically of two circular pins of equal diameter with parallel axis which shall be movable in relation to each other while still remaining parallel. The diameter of the pins shall be the minimum permissible but from strength considerations it should be at least three times the wall thickness of the tube to be tested provided the inside diameter of the tube allows (*see* Fig. 1).

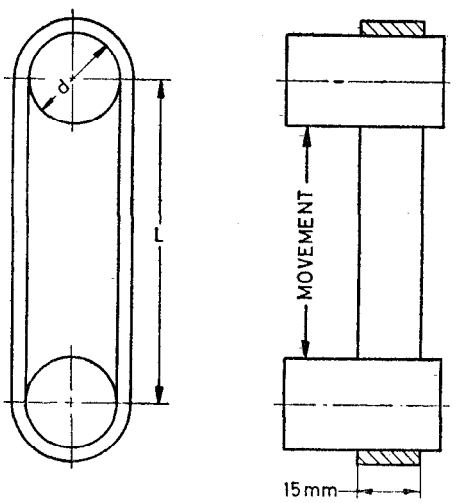

FIG. 1 TEST ARRANGEMENT

4. Test Piece

4.1 The test piece shall be a ring, cut from the tube with end faces perpendicular to the axis.

4.2 The length of the test piece (width of the ring) shall be approximately 15 mm. If the thickness exceeds 15 mm, the length of the test piece may be equal to the thickness.

4.3 The end of the test piece shall be free from burrs. The edges may be rounded by filing.

5. Procedure

5.1 In general, the test shall be carried out at ambient temperature within the limit of 10 to 35°C. Tests carried out under controlled conditions shall be made at a temperature of 23 ± 5°C.

5.2 Place the ring cut from the tube over the pins and subject it to strain until fracture by moving the pins away from each other at a rate not exceeding 5 mm/s.

5.3 Interpretation of the ring tensile test shall be carried out according to the requirements of the relevant standards. When these requirements are not specified, absence of cracks visible without the use of magnifying aids shall be considered as evidence that the test piece has passed the test.

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6. Calculation — The ductility of the tube may be calculated as follows:

$$\text{Ductility percent} = \frac{2L + \pi d - \pi D}{\pi D} \times 100$$

where

L = distance after expansion between the centre of the pins, in mm;
d = diameter of the pins, in mm; and
D = inside diameter of the tube, in mm.

7. Test Report — The test report shall include at least the following information:

a) Reference to this standard,
b) Identification of the test piece,
c) Dimensions of the test piece, and
d) Result of the test.

EXPLANATORY NOTE

In the preparation of this standard, assistance has been derived from ISO 8496-1986 'Metallic materials — Tube — Ring tensile test', issued by the International Organization for Standardization (ISO).

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