INTERNATIONAL STANDARD

ISO 8495

Third edition
2013-11-15

Metallic materials — Tube — Ring-expanding test

Matériaux métalliques — Tubes — Essai de dilatation d'anneaux

Reference number
ISO 8495:2013(E)

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Published in Switzerland

Contents

Page

Foreword ..... **iv**
1 Scope **1**
2 Symbols, designations and units **1**
3 Principle **1**
4 Apparatus **2**
5 Test piece **2**
6 Procedure **2**
7 Test report **3**

Foreword

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The committee responsible for this document is ISO/TC 164, *Mechanical testing of metals*, Subcommittee SC 2, *Ductility testing*.

This third edition cancels and replaces the second edition (ISO 8495:1998), of which it constitutes a minor revision.

Metallic materials — Tube — Ring-expanding test

1 Scope

This International Standard specifies a method for a ring-expanding test on tubes, that is used to reveal defects both on the surfaces and within the tube wall by expanding the test piece using a conical mandrel until fracture occurs. It may be also used to assess the ability of tubes to undergo plastic deformation.

The ring-expanding test is applicable to tubes having an outside diameter from 18 mm up to and including 150 mm and a wall thickness from 2 mm up to and including 16 mm.

2 Symbols, designations and units

Symbols, designations and units for the ring-expanding test are given in Table 1 and are shown in Figure 1.

Table 1

Symbol	Designation	Unit
a [a]	Wall thickness of the tube	mm
D	Original outside diameter of the tube	mm
$D_m$max.	Maximum diameter of the conical mandrel	mm
$D_m$min.	Minimum diameter of the conical mandrel	mm
D_u	Maximum outside diameter of the expanded part of the test piece	mm
k	Length of the taper of the conical mandrel	mm
L	Length of the test piece before the test	mm

[a] The symbol T is also used in steel tube standards.

3 Principle

Expanding a ring cut from the end of a tube, over a conical mandrel until fracture, or until the expansion of the test piece reaches a value specified in the relevant product standard (see Figure 1).

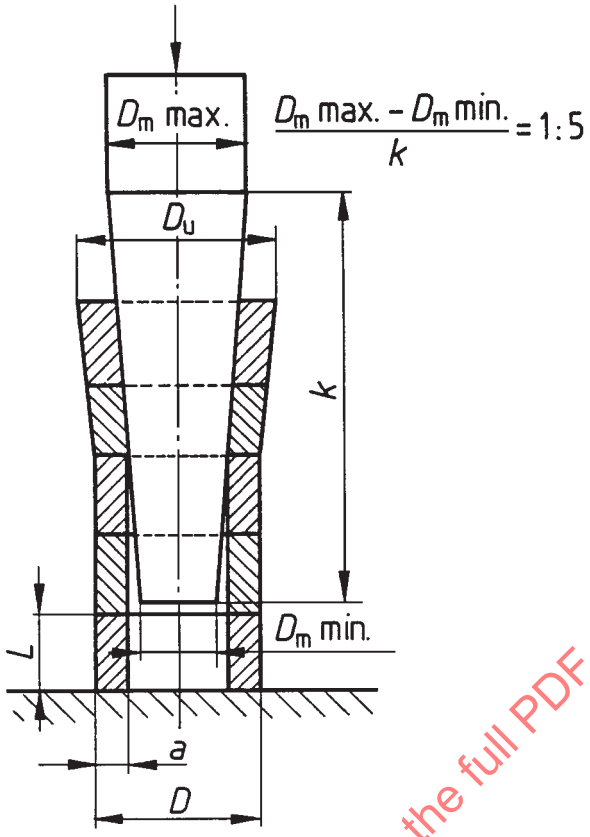

Figure 1

4 Apparatus

4.1 Variable-speed press or **universal testing machine**.

4.2 Conical mandrel, having a working length preferably tapered 1:5 as shown in Figure 1, unless otherwise specified in the relevant product standard, and its surface shall be of sufficient hardness, well-polished and free from scores.

5 Test piece

5.1 The length of the test piece shall be between 10 mm and 16 mm. Test pieces shall be taken from the ends of deburred tubes as manufactured before they are cut to length. The rings shall be cut so that the planes of the end faces are parallel with each other and perpendicular to the axis of the tube.

5.2 The edges of the test piece may be rounded by filing or chamfered by other methods.

NOTE Non-rounded or non-chamfered edges are permissible, if the test result meets the test requirements.

5.3 When welded tubes are subjected to the test, the internal weld flash may be removed.

6 Procedure

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

