SLOVENSKI STANDARD
SIST EN 10274:2000

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Kovinski materiali - Udarni pregibni preskus

Metallic materials - Drop weight tear test

Metallische Werkstoffe - Fallgewichtsversuch

Matériaux métalliques - Essai de chute de masse

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77.040.10 Mehansko preskušanje kovin Mechanical testing of metals

SIST EN 10274:2000 **en**

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English version

Metallic materials - Drop weight tear test

Matériaux métalliques - Essai de chute de masse

Metallische Werkstoffe - Fallgewichtsversuch

This European Standard was approved by CEN on 16 April 1999.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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Contents

Foreword

This European Standard has been prepared by Technical Committee ECISS/TC 29 "Steel tubes and fittings for steel tubes", the secretariat of which is held by UNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 1999, and conflicting national standards shall be withdrawn at the latest by November 1999.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association. This European Standard is considered to be a supporting standard to those application and product standards which in themselves support an essential safety requirement of a New Approach Directive and which make reference to this European Standard.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies the drop weight tear test for metallic materials and includes a method for assessing the fracture appearance of ferritic steels. Assessment can also be based on the energy absorbed in fracturing the test piece, particularly for materials other than ferritic steels.

NOTE 1: This test method is based on the use of a falling weight or pendulum, however other types of machine, e.g. with hydraulic actuators, may be used provided that the requirements of this European Standard are satisfied.

NOTE 2: The test is most commonly applied to ferritic steel tubes and to ferritic steel plate for the manufacture of tubes.

2 Definitions

For the purposes of this European Standard, the following definitions apply:

2.1 shear area: The area of the fractured surface of the test piece that has broken in a ductile manner.

NOTE: It is normally identified by a grey silk-like appearance.

2.2 cleavage area: The area of the fractured surface of the test piece that has broken in a brittle manner.

NOTE: It is normally identified by a shiny crystalline appearance.

2.3 anvil: That part of the testing machine used to support the test piece during impact.

2.4 striker: Part of the hammer which is in contact with the test piece.

NOTE: This definition is identical to that given in 3.5 of EN 10045-2: 1992.

2.5 hammer: The part of the test machine which impacts the test piece.

2.6 fracture appearance transition temperature (FATT): The temperature required to cause a specified percentage of the fracture to occur by shear. Expressed as follows e.g. for 85 % specified percentage of shear fracture at -30 °C, FATT (85) = -30 °C.

2.7 ferritic steel: Steel in which the ferritic state is stable at all service temperatures.

3 Symbols and abbreviations

3.1 Symbols and designations

a	depth of pressed notch
L	length of test piece
L_c	minimum length of unflattened central portion of test piece
R_h	radius of curvature of hammer
R_n	root radius of pressed notch
R_s	radius of curvature of anvil support
S	span between anvils
T	thickness of test piece
W	width of test piece
θ	angle of pressed notch

3.2 Abbreviations

DWTT	drop weight tear test
FATT	fracture appearance transition temperature (see 2.6)
KV	charpy V-notch energy

4 Principle

The test is generally carried out on test pieces taken from plate for the manufacture of tubes or from tube with an outside diameter greater than 300 mm and a thickness greater than 6 mm.

The test involves fracturing a test piece containing a pressed notch by supporting it near its ends, and impacting it behind the notch (see figure 1).

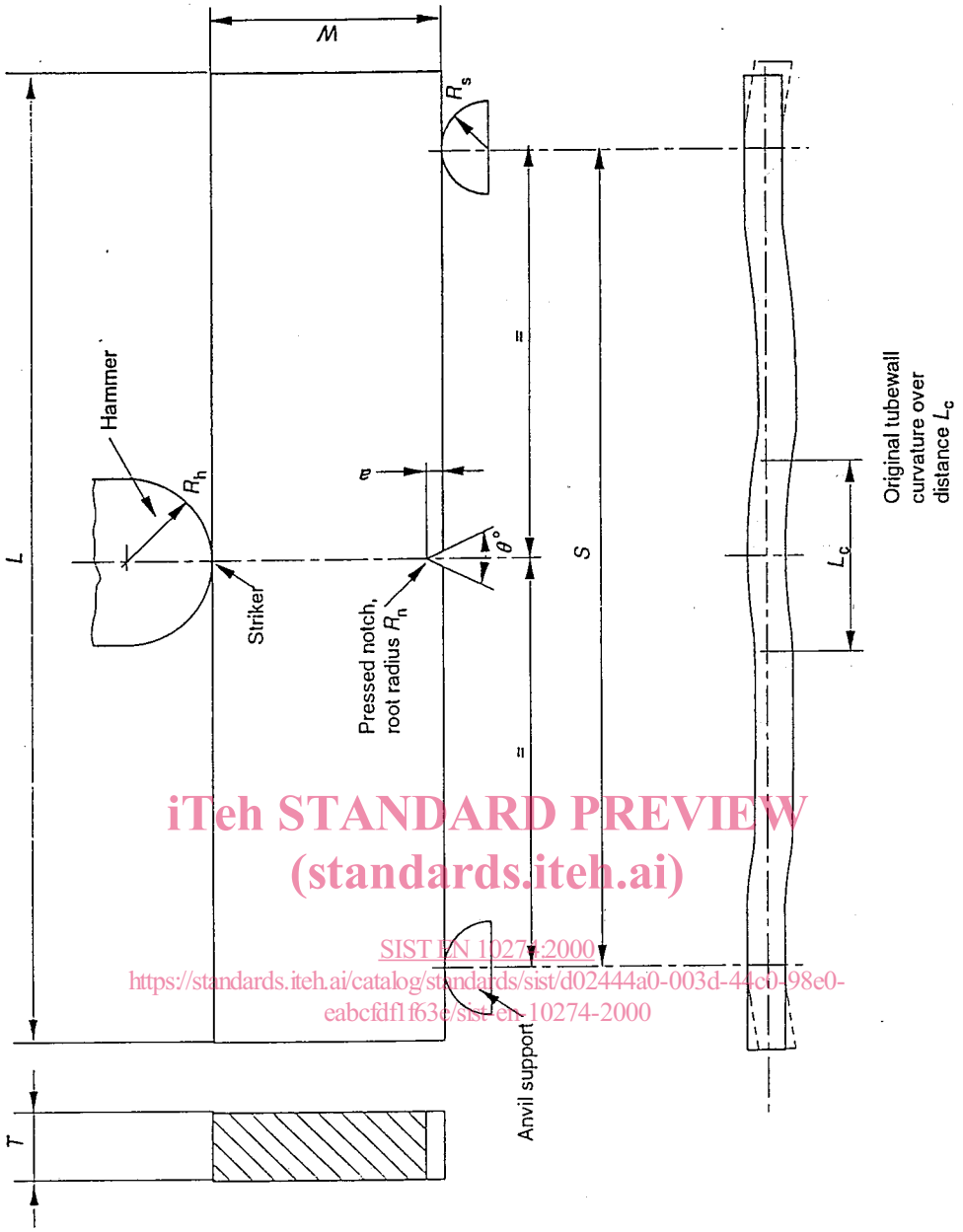

Figure 1: Test piece geometry and recommended flattened tube profile

The test is carried out at a specified test piece temperature.

The test is as follows:

a) To measure the relative proportions of shear and cleavage fracture, which are generally assessed visually, and to derive from these either

1) the temperature at which a specified percentage of shear fracture has occurred (FATT); or

2) the amount of shear area produced by testing at a specified temperature.

and/or

b) To measure absorbed energy at the specified temperature.

5 Apparatus

5.1 The testing machine may be a falling weight type or a pendulum type. Other types of testing machine, e.g. with hydraulic actuators, may be used providing it can be demonstrated that their impact velocity and dynamic performance conform to the requirements of clause 5.2.

5.2 The energy available at impact to be used in the test shall be greater than the anticipated fracture absorption energy of the test piece (see note).

At impact the hammer velocity shall be not less than 5 m/s and not more than 10 m/s.

NOTE: To ensure regular crack propagation an available energy of 1,5 times the absorbed energy is generally sufficient [1]. If the absorbed energy is not measured, the minimum required impact energy (E_{REQ}) can be estimated from the Charpy V-notch energy (KV) adjusted for test piece cross sectional fracture area using the following expression

$$E_{REQ} = 5.6\,(KV) \times \frac{A_{DWTT}}{A_{KV}}$$

where A_{DWTT} is the drop weight tear test fracture area

A_{KV} is the Charpy test fracture area

5.3 The striking edge of the hammer shall be radiused and shall be centred on the anvil with the supports at a span of 254 mm as shown in figure 1. Provision shall be made to prevent out of plane rotation of the test piece on or after impact. The tolerances on the machine and set up dimensions shall be in accordance with table 1.

Table 1: Test machine dimensions and tolerances

Measurement	Dimension mm	Tolerance mm
S	254,0	± 1,5
R_s	15,0	± 1,0
R_h	25,0	± 1,0
Centre line hammer with respect to mid-point between anvil supports	0	± 1,5

5.4 A temperature controlled environment shall be provided in which the test piece can be soaked in a suitable medium for temperature conditioning before testing. Provision shall be made for circulation of the medium to ensure a uniform soaking temperature.

NOTE: A procedure should be developed for test temperatures above or below room temperature to ensure that the temperature variation between the exit from the temperature conditioning medium and the execution of the test are within specified limits.