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Kovinski materiali - Žica - Enostavni vzvojni preskus

Metallic materials - Wire - Simple torsion test

Matériaux métalliques - Fils - Essai de torsion simple

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Metallic materials — Wire — Simple torsion test

Matériaux métalliques — Fils — Essai de torsion simple

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 7800 was prepared by Technical Committee ISO/TC 164, *Mechanical testing of metals*, Subcommittee SC 2, *Ductility testing*.

This third edition cancels and replaces the second edition (ISO 7800:2003), which has been technically revised.

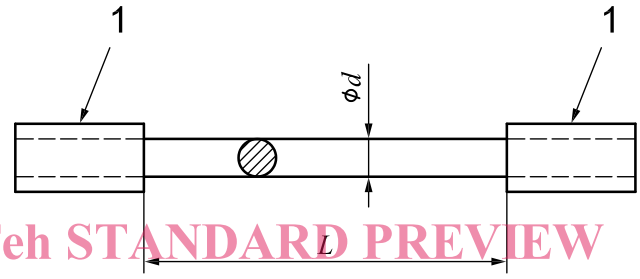
Metallic materials — Wire — Simple torsion test

1 Scope

This International Standard specifies a method for determining the ability of metallic wire of diameter or characteristic dimension from 0,1 mm to 14 mm to undergo plastic deformation during simple torsion in one direction.

2 Symbols and designations

The symbols and designations used in the simple torsion test of round wire and shaped wire are shown in Figure 1 and Figure 2, respectively, and listed in Table 1.



Key

1 grip

Figure 1 — Round wire

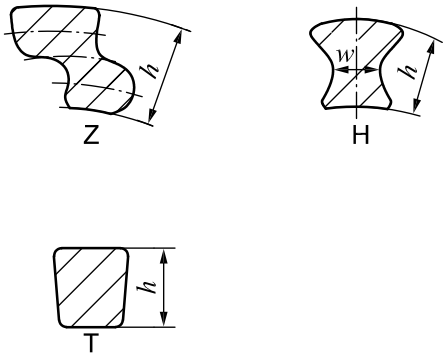


Figure 2 — Typical shaped wire section

Table 1 — Symbols and designations

Symbol	Designation	Unit
d	Diameter of a round wire	mm
h	Characteristic dimension for a shaped wire[a]	mm
w	Minimum narrowing width for a shaped wire	mm
L	Free length between grips	mm
N_t	Number of turns	—

[a] For example, the characteristic dimension for some shaped wires is the height of the cross-section and is usually specified in the relevant standard, as shown in Figure 2.

3 Principle

The test consists of twisting a test piece of wire around its own axis in one direction.

4 Testing equipment

4.1 The jaws shall have a minimum hardness of 55 HRC in jaws, and parallel faces.

The recommended types of jaws are given in Annex A.

4.2 The testing machine shall be constructed so that a change of length between the grips, caused by contraction of the test piece during the test, is not prevented and that an appropriate tensile stress (see 7.1) may be applied to the test piece.

The grips shall be placed in the testing machine in such a way that during testing they remain on the same axis and do not apply any bending force to the test piece.

One of the grips shall be capable of being rotated around the axis of the test piece while the other shall not be subject to any angular deflection, except for such deflection as may be necessary to measure the torque.

The distance between the grips shall be capable of adjustment and measurement for different test piece lengths.

The testing speed shall be adjusted and controlled within 10 % of its nominal value, and the number of turns shall be recorded.

A protective shield shall be provided to protect the operator from flying fragments in cases when the wire breaks into more than two pieces.

5 Test piece

5.1 The length of wire to be used as the test piece shall be as straight as possible.

5.2 If straightening is necessary, it shall be done by a suitable method.

During straightening, the surface of the wire shall not be damaged and the test piece shall not be subjected to any twisting.

Wire with sudden sharp curvature towards the longitudinal neutral axis of cross-section shall not be tested.

Unless otherwise specified, the nominal free length between the grips of round wire and shaped wire shall be as given in Table 2 and Table 3, respectively.

Table 2 — Free length between the grips depending on the nominal diameter of the round wire

Nominal diameter, d, mm	Free length between grips mm, (nominal)[a]
$0{,}1 \leq d < 1$	$200\ d$
$1 \leq d < 5$	$100\ d$
$5 \leq d \leq 10$	$50\ d$
$10 < d \leq 14$	$25\ d$[b]

[a] The free length between the grips shall be a maximum of 500 mm.

[b] Only for steel wires.

Table 3 — Free length between the grips depending on the nominal characteristic dimension of the shaped wire[a]

Type of profile of typical shaped wires	Nominal dimension, h, mm	Free length between grips mm, (nominal)
Z	$2 \leq h < 5$	$100\ h$
	$5 \leq h < 8$	500
H	$2 \leq h < 5$	$100\ h$
	$5 \leq h < 8$	500
T	$2 \leq h < 5$	$100\ h$
	$5 \leq h < 6$	500

[a] Only for steel wires.

6 Testing conditions

In general, the test is carried out at ambient temperature between 10 °C and 35 °C. Tests carried out under controlled conditions, where required, shall be made at a temperature of (23 ± 5) °C.

7 Procedure

7.1 Place the test piece in the testing machine in such a way that its longitudinal axis coincides with the axis of the grips and so that it remains straight during the test. Unless otherwise specified, this may be ensured by applying to the test piece a constant tensile stress not exceeding 2 % of the nominal tensile strength of the wire. For steel wire over 10 mm diameter, the application of tensile stress is not necessary.

7.2 After placing the test piece in the testing machine, rotate one grip at the nominal value of testing speed ±10 % until the test piece breaks or until a specified number of turns is reached. Count the number of complete turns imparted to the wire by the rotating grip.

For the verification of number of turns, a coloured surface line should be drawn.

7.3 Unless otherwise specified in the relevant standard, the nominal values of the testing speed shall be as given in Table 4 for steel, copper and copper alloys, aluminium and aluminium alloys of the diameters given.

Because the simple torsion test is an isothermal test, an essential increasing of temperature of the test piece should be avoided. For wires sensitive to strain rate and wires for which there is a little knowledge of its strain rate behaviour, the temperature increase should be controlled, for example, it should not be higher than 60 °C. For some steel wires which are not sensitive to strain rate, a higher testing speed can be used to increase testing efficiency.