INTERNATIONAL STANDARD

ISO 9649

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Metallic materials — Wire — Reverse torsion test

Matériaux métalliques — Fils — Essai de torsion alternée

Reference number
ISO 9649:1990(E)

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 9649 was prepared by Technical Committee ISO/TC 164, *Mechanical testing of metals.*

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Metallic materials — Wire — Reverse torsion test

1 Scope

This International Standard specifies a method for determining the ability of metallic wire of diameter 0,3 mm to 10,0 mm inclusive to undergo plastic deformation during reverse torsion. This test is used for detecting surface and internal defects in wires.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 7800:1984, *Metallic materials — Wire — Simple torsion test.*

3 Symbols and designations

The symbols used in the reverse torsion testing of wires are shown in figure 1 and defined in table 1.

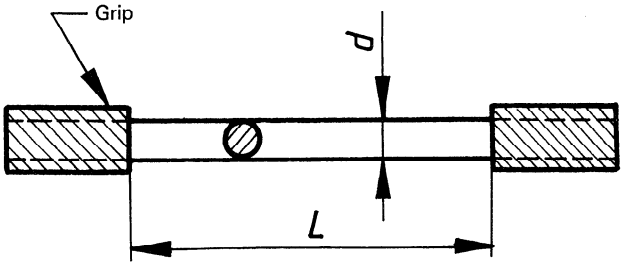

Figure 1

Table 1

Symbol	Designation	Unit
d	Diameter of a round wire	mm
L	Free length between grips	mm
N_t	Number of turns in one direction	—

4 Principle

A test piece of wire is twisted a specified number of times through 360° about its own axis in one direction and the same number of times through 360° in the opposite direction.

5 Testing machine

5.1 The grips shall be of sufficient hardness to provide rigidity and/or resistance to abrasion. The grips shall be arranged 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.

5.2 The machine shall be constructed so that a change of length between grips, caused by the test piece during the test, is not prevented.

5.3 One of the grips shall be capable of being rotated about 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.

5.4 The distance between grips shall be adjustable to accommodate test pieces of different lengths.

5.5 The machine shall be constructed so that an appropriate tensile stress (see 7.2) can be applied to the test piece.

6 Test piece

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

6.2 If straightening is necessary, it shall be done by hand or, if this is not possible, by hammering on a level surface of wood, plastic or copper using a hammer of similar material.

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

6.4 Wire with a localized sharp curvature shall not be used in the test.

6.5 Unless otherwise specified in the relevant standard, the nominal free length between the grips of the machine shall be as given in table 2.

Table 2

Nominal diameter of wire d mm	Free length between grips (nominal)
0,3 $d < 1$	$200d$
1 $d < 5$	$100d$ 1)
5 d	$50d$ 2)

1) $50d$ may be used by special agreement.

2) $30d$ may be used by special agreement.

When testing for surface and internal defects, a fixed free length between grips may be used. This length shall be as specified in the relevant standard and shall be stated in the test report.

7 Procedure

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

7.2 Place the test piece in the grips 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 in the relevant standard, this may be ensured by applying to the test piece a constant tensile stress just sufficient to straighten it, but not exceeding 2 % of the value of the nominal tensile strength of the wire.

7.3 After placing the test piece in the machine, rotate one grip at a speed not exceeding 1 turn per second (0,5 turns per second when the diameter d is 5 mm or greater) through the number of turns specified in the relevant standard in one direction and the same number of turns in the opposite direction. One turn comprises 360°.

After the test, the free length of wire between the grips shall be examined by eye unless otherwise specified in the relevant standard.

7.4 The absence of visible defects is considered evidence that the test piece has satisfied the requirements of the test.

8 Test report

The test report shall include the following information:

a) a reference to this International Standard;

b) all details necessary for the identification of the test piece;

c) the diameter of the test piece;

d) all details regarding test piece preparation (method of straightening);

e) the test conditions (for example, the free length between grips, the tensile stress applied);

f) the test result.

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