



# SLOVENSKI STANDARD

## SIST EN 10218-1:1997

01-december-1997

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### Jeklena žica in žični izdelki - Splošno - 1. del: Preskusne metode

Steel wire and wire products - General - Part 1: Test methods

Stahldraht und Drahterzeugnisse - Allgemeines - Teil 1: Prüfverfahren

Fils et produits tréfilés en acier - Généralités - Partie 1: Méthodes d'essai

Ta slovenski standard je istoveten z: **EN 10218-1:1994**

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#### **ICS:**

77.140.65	Jeklene žice, jeklene vrvi in verige	Steel wire, wire ropes and link chains
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EUROPEAN STANDARD

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NORME EUROPÉENNE

EUROPÄISCHE NORM

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Descriptors: Iron and steel products, wire, steels, tests

English version

**Steel wire and wire products - General - Part 1:  
Test methods**Fils et produits tréfilés en acier -  
Généralités - Partie 1: Méthodes d'essaiStahldraht und Drahterzeugnisse - Allgemeines  
- Teil 1: Prüfverfahren**ITEH STANDARD PREVIEW**  
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This European Standard was approved by CEN on 1994-03-07. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

**CEN**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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## Foreword

The European Committee for Iron and Steel Standardization (ECISS) asked Technical Committee 30 "Steel wire and wire products", (Secretariat UK) to prepare a European Standard on general test methods and general dimensions and tolerances for steel wire and wire products.

The Standard will comprise the following parts :

Part 1: Test methods

Part 2: Wire dimensions and tolerances

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 September 1994, and conflicting national standards shall be withdrawn at the latest by September 1994.

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

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## Introduction

In this part of EN10218, in some cases reference is simply made to other test standards whereas in other cases the test is described in detail. The standard is intended to be referenced in whole or part in steel wire and wire products standards.

## 1 Scope

This Part of EN 10218 specifies the methods for the general testing of steel wire and wire products which have been cold worked, annealed or oil hardened and tempered and/or coated and are of constant cross section, either round, or special section. It includes tensile testing, torsion testing, reverse bend testing, wrapping test, bend test, reverse torsion test, compression test, deep etch test, hardness test, quench hardenability test, fatigue test, wire cast measurement, artificial ageing, decarburization test, non-destructive tests, grain size tests, segregation test, non-metallic inclusion test and chemical analysis.

## 2 Normative references

This Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to EN 10218-1 only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

- EN 10002      **Metallic materials: Tensile testing**  
Part 1 : Method of test (at ambient temperature)  
Part 5 : Method of test (at elevated temperature)
- EN 10003-1    **Metallic materials: Hardness testing - Brinell**  
Part 1 : Method of test
- EN 10109-1    **Metallic materials: Hardness testing**  
Part 1 : Rockwell test (scales A-B-C-D-E-F-G-H-K) and  
Rockwell superficial test (scales 15N, 30N, 45N, 15T, 30T and  
45T)
- EN 10016-1    **Non-alloy steel rod for drawing and/or cold rolling**  
Part 1 : General requirements
- EN 10021      **General technical delivery conditions for steel and iron and  
steel products**
- EURONORM 5<sup>1)</sup>    **Vickers hardness test for steel**
- EURONORM 18<sup>1)</sup>    **Selection and preparation of samples and test pieces for  
steel and iron and steel products**
- EURONORM 103<sup>1)</sup>    **Micrographic determination of ferritic or austenitic grain  
size of steel**
- EURONORM 104<sup>1)</sup>    **Determination of the depth of decarburization of non-alloy  
and low alloy structural steels**

1) It may be agreed at the time of ordering, until this EURONORM has been adopted as a European Standard, that either this EURONORM or a corresponding national standard should be applied.

ISO 7800 <sup>2)</sup>	Metallic materials - Wire - Simple torsion test
ISO 7801 <sup>2)</sup>	Metallic materials - Wire - Reverse bend test
ISO 7802 <sup>2)</sup>	Metallic materials - Wire - Wrapping test
ISO 9649 <sup>2)</sup>	Metallic materials - Wire - Reverse torsion test

### 3 Tensile test

The tensile test shall be in accordance with EN 10002, Part 1 for testing at ambient temperature and Part 5 for testing at elevated temperature with the modifications specified in 3.1 to 3.5.

NOTE: For fine wires 0,5 mm diameter or less, any requirements for elongation values should not be mandatory but for information only.

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### 3.1 Type of test piece

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Test pieces shall be selected in accordance with EURONORM 18 using the full cross section i.e. be an unmachined portion of wire.

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### 3.2 Preparation of test piece

The test piece shall be straightened with care so as not to cause damage. (See EN 10002 : Part 1 and EURONORM 18.)

### 3.3 Cross-sectional area

In EN 10002 : Part 1 the actual dimensions are used for tensile calculations but the nominal dimensions may be used if specified in the product standard or order. For non-circular wire the original cross-sectional area may be determined from the mass of a known length and its appropriate density.

### 3.4 Method of gripping

To avoid breakages of the wire at the gripping zone, when testing the smaller diameters less than or equal to 1 mm, it is recommended the wire ends are wrapped round a circular bar or disc and fastened.

2) The ISO standards are referenced in the absence of European Standards. It is probable the ISO standards could be adopted as European Standards in due course.

### 3.5 Tensile test on knotted wire

The tensile test on knotted wire shall be carried out in accordance with EN 10002 : Part 1 with a simple knot in the middle of the test piece.

### 4 Simple torsion test

The simple torsion test shall be in accordance with ISO 7800. In the event of initial failure a retest shall be carried out (see EN 10021). Where possible the retest shall be conducted at a speed of  $(1 \pm 0,2)$  turns.

Where the fracture in the torsion test is required to be characterized it shall be done on the basis of table 1.

NOTE: For small diameter wires it may not be possible to make a distinction between some of the classes in table 1 (e.g. 2b versus 3b).

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### 5 Reverse bend test (standards.iteh.ai)

The reverse bend test shall be in accordance with ISO 7801 with the following amendment for automatic counters.

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If the testing machine has an automatic counter operating at the limit stops, then the first bend down through 90° counts as one bend and the second bend is represented by the 180° bend in the opposite direction. The last figure obtained before fracture occurs counts as the number of bends.

### 6 Wrapping test

The wrapping test shall be in accordance with ISO 7802 and may be applied to assess coilability, ductility or the adherence of coatings as specified in the relevant product standard.

### 7 Bend test

The bend test comprises bending the wire which is allowed to move freely over a mandrel of specified diameter through a specified angle in one operation at ambient temperature. Details will be given in the relevant product standard.



## 8 Reverse torsion test

The reverse torsion test shall be in accordance with ISO 9649 with the following amendment.

The test shall be used to detect surface defects as well as to assess ductility.

## 9 Compression test

### 9.1 Purpose

The purpose of the test is to detect surface defects. This test is not suitable for wires of less than 4,0 mm diameter.

### 9.2 Principle

A straight test piece of wire equal in length to 1 (or 1,5 times) the diameter of the wire is cut, with cuts at right angles to the wire axis. The test piece is placed on a flat surface of a compression machine and compressed at room temperature in the direction of the wire axis to a specified percentage of its original length. The compressed test piece is examined for surface cracking. The degree of acceptability is specified in the product standard.

## 10 Deep etch test

### 10.1 Purpose

The deep etch test is used for the detection of surface defects.

### 10.2 Principle

A cold test piece is suitably degreased where appropriate. The test piece which has undergone deformation by drawing is washed and dried and in the case of high carbon steel the test piece is stress relieved at 400 °C to 500 °C for 15 min and allowed to cool to ambient temperature before etching. With the exception of test pieces greater than 5,00 mm and test pieces of annealed structures, the test piece is immersed in a solution of 50 % by volume concentrated hydrochloric acid and 50 % by volume of water, at a minimum temperature of 60 °C for a period of time equivalent to 2 s for every 0,025 mm of diameter with a maximum of 5 min. Test pieces greater than 5,00 mm and test pieces of annealed structures may be left in the solution for 10 min.

The test piece is examined for surface defects. To ascertain the depth of defect the test piece is filed until the defect disappears, the difference in thickness before and after filing being recorded as the defect depth. For a definitive assessment of a defect, optical micrographical analysis shall be used.