



# SLOVENSKI STANDARD

## SIST EN 15889:2012

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### Gasilske cevi - Preskusne metode

Fire-fighting hoses - Test methods

Feuerlöschschläuche - Prüfverfahren

Tuyaux de lutte contre l'incendie - Méthodes d'essai

Ta slovenski standard je istoveten z: **EN 15889:2011**

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### **ICS:**

13.220.10	Gašenje požara	Fire-fighting
23.040.70	Gumene cevi in armature	Hoses and hose assemblies

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EUROPEAN STANDARD

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July 2011

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English Version

## Fire-fighting hoses - Test methods

Tuyaux de lutte contre l'incendie - Méthodes d'essai

Feuerlöschschläuche - Prüfverfahren

This European Standard was approved by CEN on 4 June 2011.

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## Foreword

This document (EN 15889:2011) has been prepared by Technical Committee CEN/TC 192 “Fire service equipment”, the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by January 2012, and conflicting national standards shall be withdrawn at the latest by January 2012.

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

This European Standard details hose and hose assembly test methods collated mainly from published EN fire hose standards. Although no technical changes have been introduced, some changes to the format of the test methods had to be made to enable them to be included in this European Standard.

The published EN fire-fighting hose standards will be revised to remove the test method annexes following the publication of 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, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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## 1 Scope

This European standard specifies test methods for lay-flat fire-fighting hoses for fixed systems, semi-rigid fire-fighting hoses for both fixed systems and vehicles and fire-fighting suction hoses for vehicles.

These test methods are required for the standards for fire-fighting hose product standards developed by CEN/TC 192. Consequently, the applicable test methods are selected and the requirements and test values defined in the relevant fire-fighting hose product standards and normatively referenced in those standards.

This European Standard does not cover test methods for lay-flat fire-fighting hoses for vehicles for which no European standard exists.

NOTE Annex R (informative) lists the existing published ISO and EN hose test methods standards that are specified within fire-fighting hose standards.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN ISO 4671, *Rubber and plastics hose and hose assemblies — Methods of measurement of the dimensions of hoses and the lengths of hose assemblies (ISO 4671:2007)*

EN ISO 4672:1999, *Rubber and plastics hoses — Sub-ambient temperature flexibility tests (ISO 4672:1997)*

EN ISO 8033:2006, *Rubber and plastics hose — Determination of adhesion between components (ISO 8033:2006)*

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EN ISO 8330:2008, *Rubber and plastics hoses and hose assemblies — Vocabulary (ISO 8330:2007)*

ISO 188:2007, *Rubber, vulcanized or thermoplastic — Accelerated ageing and heat resistance tests*

ISO 23529, *Rubber — General procedures for preparing and conditioning test pieces for physical test methods*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply, together with those for working pressure, proof pressure and burst pressure as given in EN ISO 8330:2008.

### 3.1

#### lay-flat fire-fighting hose

hose with a soft wall which, when unpressurized internally, collapses to such an extent that the inner faces of the hose make contact and the hose takes up a flat cross-sectional appearance

### 3.2

#### hose coating

thin coating usually applied as a lacquer, which acts as a sealant through which the jacket fibres are likely to protrude through the coating

### 3.3

#### hose cover

cover which completely surrounds the jacket forming a separate component

**EN 15889:2011 (E)****3.4****jacket**

circular woven seamless reinforcement

**3.5****semi-rigid hose**

hose which maintains its round cross-section even when unpressurized

**3.6****suction hose**

hard wall hose which is designed to resist external pressure

**4 Test methods**

The following fire hose test methods are detailed in the annexes:

- Annex A *Test for measurement of hose cover thickness (lay-flat fire-fighting hoses)*
- Annex B *Adhesion test (lay-flat fire-fighting hoses)*
- Annex C *Kink pressure test (lay-flat and semi-rigid fire-fighting hoses)*
- Annex D *Accelerated ageing test*
- Annex E *Surface abrasion resistance test (semi-rigid fire-fighting hoses)*
- Annex F *Point abrasion resistance test (semi-rigid fire-fighting hoses)*
- Annex G *Low temperature flexibility test (lay-flat fire-fighting hoses and semi-rigid fire-fighting hoses)*
- Annex H *Hot surface resistance test (semi-rigid and lay-flat fire-fighting hoses)*
- Annex I *Pressure loss test (semi-rigid fire-fighting hoses)*
- Annex J *Deformation under crushing test (semi-rigid fire-fighting hoses)*
- Annex K *Bending and crush resistance test (semi-rigid fire-fighting hoses)*
- Annex L *Test for fire-fighting hose assemblies*
- Annex M *Pressure impulse test (fire-fighting suction hoses)*
- Annex N *Reinforcement fracture resistance test (type B hoses only) (fire-fighting suction hoses)*
- Annex O *Test for flexibility at ambient temperature (fire-fighting suction hoses)*
- Annex P *Test for vacuum resistance with flexing (fire-fighting suction hoses)*
- Annex Q *Test for resistance to kinking (lay-flat fire-fighting hoses)*
- Annex R *Test methods from other EN and ISO standards*

NOTE The requirements for test methods are stated in the product fire hose standards.



## Annex A (normative)

### Test for measurement of hose cover thickness (lay-flat fire-fighting hoses)

#### A.1 Test piece

Cut a ring sample from the hose and measure the distance between the top of the yarns and the surface of the cover at four equidistant points around the ring using the optical magnifier.

#### A.2 Apparatus

**A.2.1 Optical magnifier**, with a scale graduated in 0,01 mm divisions.

#### A.3 Procedure

Calculate the mean of the four measurements to obtain the cover thickness value. Where the cover is variable or ribbed, the measurements shall be made at the thinnest point.

#### A.4 Test report

The test report shall include the following information:

- full description of the hose tested;
- reference to this test method;
- cover thickness;
- date of the test.

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## Annex B (normative)

### Adhesion test (lay-flat fire-fighting hoses)

#### B.1 Test piece

Cut a ring ( $50 \pm 2$ ) mm wide from the hose at right angles to its longitudinal axis. Cut the ring transversely and open it to form a strip.

Make two parallel cuts at right angle to the hose axis ( $25 \pm 0,5$ ) mm apart, taking care not to cut through the yarns.

Separate a layer for a distance sufficient to enable the separated end to be held in the grips of the test machine (see Figure B.1).

Dimensions in millimetres

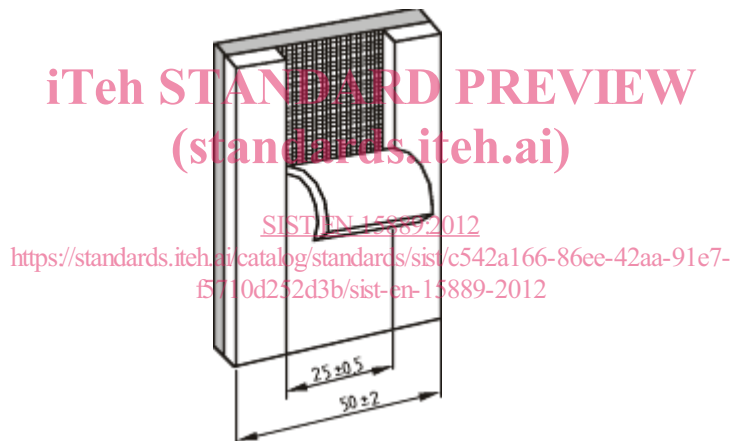


Figure B.1 — Test piece adhesion test

#### B.2 Apparatus

**B.2.1 A tensile testing machine** capable of carrying out the procedure in B.3.

#### B.3 Procedure

When tested in accordance with type 1 of EN ISO 8033:2006 the adhesion between lining and jacket shall be as specified in the relevant fire hose standard.

If an adhesion result is not possible because of tearing due to high adhesion, this shall be accepted as a pass. All adhesions shall be attempted and the results recorded.

#### **B.4 Test report**

The test report shall include the following information:

- full description of the hose tested;
- reference to this test method;
- adhesion value and any evidence of tearing;
- date of the test.

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## Annex C (normative)

### Kink pressure test (lay-flat and semi-rigid fire-fighting hoses)

#### C.1 Test piece

Cut a test piece of 2,0 m length from the hose.

#### C.2 Apparatus

**C.2.1 Source of hydrostatic pressure**, with water as the test medium, capable of maintaining the specified pressure.

#### C.3 Procedure

Connect the test piece to the pressure source and fill with water, expelling all air before securely clamping shut the free end of the hose. Maintain a pressure of 0,07 MPa in the test piece while bending it through 180° at a point approximately midway along its length. Tie the free end of the hose back on itself, as close as possible to the secure end, so as to form a sharp kink, ensuring that the tie does not prevent subsequent expansion of the diameter of the test piece.

Raise the pressure in the test piece to the specified pressure over a period of 60 s. Maintain the pressure for 60 s. Examine the test piece for any sign of leakage or damage prior to releasing the pressure.

#### C.4 Test report

The test report shall include the following information:

- full description of the hose tested;
- reference to this test method;
- any evidence of leakage or damage observed;
- date of the test.

## Annex D (normative)

### Accelerated ageing test

#### D.1 Lay-flat fire-fighting hoses

##### D.1.1 Test piece

Cut four test pieces from the hose each of 1 m in length.

NOTE It is recommended that the test pieces should be taken from the same hose sample from which the test pieces for the burst pressure tests and adhesion tests were taken.

This will allow an exact comparison to the changes before and after the artificial ageing.

##### D.1.2 Apparatus

D.1.2.1 A temperature controlled oven as specified in ISO 188:2007.

##### D.1.3 Procedure

Bend three of the test pieces through 180° at a point approximately midway along their length and tie in this flaked position.

Loosely coil the remaining test piece

Age all four test pieces in air for 14 days at a temperature of  $(70 \pm 1)$  °C in a temperature controlled oven as specified in ISO 188:2007.

After ageing, straighten out the three flaked test pieces and subject them to the burst pressure test as specified.

Subject the remaining test piece to the adhesion test as specified in relevant fire hose standard.

The three test pieces subjected to the burst pressure test shall conform to the requirements of relevant fire hose standard.

The resultant adhesion of the fourth test piece shall be in accordance with the requirements in relevant fire hose standard.

##### D.1.4 Test report

The test report shall include the following information:

- full description of the hose tested;
- reference to this test method;
- burst test value;

**EN 15889:2011 (E)**

- adhesion value and any evidence of tearing;
- date of the test.

**D.2 Semi-rigid hoses****D.2.1 Test piece**

Cut four test pieces from the hose, each of 1 m length.

NOTE It is recommended that the test pieces should be taken from the hose adjacent to the original burst and adhesion test pieces.

**D.2.2 Apparatus**

**D.2.2.1 A temperature controlled oven** as specified in ISO 188:2007.

**D.2.3 Procedure**

Age the test pieces in air for 7 days at a temperature of  $(70 \pm 1)$  °C in a temperature controlled oven as specified in ISO 188:2007.

After ageing, subject three of the test pieces to the burst pressure test as given in the relevant fire hose standard.

Subject the remaining test piece to the adhesion test as given in the relevant fire hose standard.

The three test pieces subjected to the burst pressure test shall conform to the requirements of the relevant fire hose standard.

The resultant adhesion of the fourth test piece shall be in accordance with the requirements in the relevant fire hose standard.

**D.2.4 Test report**

The test report shall include the following information:

- full description of the hose tested;
- reference to this test method;
- burst test value;
- adhesion value and any evidence of tearing;
- date of the test.

## Annex E (normative)

### Surface abrasion resistance test (semi-rigid fire-fighting hoses)

#### E.1 Test pieces

Cut five test pieces of hose, each 0,35 m in length.

#### E.2 Apparatus

**E.2.1** Test machine (see Figure E.1) for abrading the surface of a pressurized rotatable test piece with a laterally moveable abrading strip which is continually renewed.

The driven rotating coupling is fixed in the axial direction whereas the other coupling can be moved axially in a guide.

The abrasion arm is in the form of a rocker pivoted to swivel upwards, and the weight of the arm is such that a force of 105 N acts on the test piece when it is set horizontally. This abrasion arm reciprocates along the hose axis at a rate of between 18 mm/s to 20 mm/s over a distance of 80 mm with the direction of travel being changed automatically. The pause time at the reversal points shall not exceed 0,1 s in each case.

The abrasion arm carries the abrading strip which moves 4 mm along the hose length for each double stroke, and the test piece is supported midway along its length by plain rollers.

**E.2.2** Air pressure vessel with a capacity of at least 2 l, fitted to the test machine to retain the pressure in the event of a loss of water.

**E.2.3** Abrasive material consisting of a roll of corundum twill abrasive cloth measuring 50 mm wide and approximately 50 m long. The abrasive used for this abrasive material shall be synthetic 15, good quality fused aluminium oxide ( $Al_2O_3$ ) with a minimum  $Al_2O_3$  content with mass fraction of 70 %. It shall have a grain size of 60P as specified in the Grain Size Standard (43-1984 rev 1993) of the Federation of European Producers of Abrasive Products (FEPA).