SLOVENSKI STANDARD
SIST EN 13765:2018

01-oktober-2018

Nadomešča:
SIST EN 13765:2011+A1:2015

Plastomerne večslojne (nevulkanizirane) cevi in cevni priključki za pretok ogljikovodikov, topil in kemikalij - Specifikacija

Thermoplastic multi-layer (non-vulcanized) hoses and hose assemblies for the transfer of hydrocarbons, solvents and chemicals - Specification

Thermoplastische, mehrlagige (nicht vulkanisierte) Schläuche und Schlauchleitungen für die Förderung von Kohlenwasserstoffen, Lösungsmitteln und Chemikalien - Spezifikation

Tuyaux et flexibles thermoplastique multicouches (non vulcanisés) pour le dépotage d'hydrocarbures, solvants et produits chimiques - Spécification

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83.140.40	Gumene cevi	Hoses

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EUROPEAN STANDARD
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English Version

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This European Standard was approved by CEN on 23 February 2018.

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

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European foreword

This document (EN 13765:2018) has been prepared by Technical Committee CEN/TC 218 “Rubber and plastic hoses and hose assemblies”, 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of an identical text or by endorsement, at the latest by December 2018, and conflicting national standards shall be withdrawn at the latest by December 2018.

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

This document supersedes EN 13765:2010+A1:2015.

The main changes compared to the previous edition are as follows:

— normative references updated (Clause 2);

— lower min. and/or higher max. temperature upon agreement with the manufacturer added (Clause 4);

— electrical resistance requirement between end fittings modified (Clause 7);

— marking of the hose and hose assembly updated (Clause 10);

— tolerances on test force for crush recovery test added (Annex D);

— requirements for the sequence of hydrostatic tests added (Annex H);

— requirements for type and routine tests (Annex K) and batch tests (Annex L) for hoses and hose assemblies updated;

— bibliography added.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This document specifies requirements for four types of thermoplastic multi-layer (non-vulcanized) hoses and hose assemblies for carrying hydrocarbons, solvents and chemicals. It specifies bore sizes from 25 mm to 300 mm, working pressures from 4 bar[1)] to 14 bar and working temperatures from −30 °C to 150 °C.

Type 1 hoses are suitable for vapour applications. Types 2 to 4 hoses are suitable for liquid applications.

NOTE 1 The attention of users is drawn to Annex A concerning the selection of the material for the inner wall of layers and any polymeric coating of the internal wire helix related to the chemical(s) to be conveyed by the hoses and/or hose assemblies.

This document does not apply to hoses and hose assemblies for:

Aircraft ground fuelling and defuelling	(EN ISO 1825);
Fuel dispensing	(EN 1360);
Oil burners	(EN ISO 6806);
Liquefied petroleum gas and liquefied natural gas	(EN 13766);
Fire fighting	(EN ISO 14557);
Offshore liquefied natural gas	(EN 1474–2);
Refrigeration circuits	(—).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 590, *Automotive fuels — Diesel — Requirements and test methods*

EN 10088-3:2014, *Stainless steels — Part 3: Technical delivery conditions for semi-finished products, bars, rods, wire, sections and bright products of corrosion resisting steels for general purposes*

EN ISO 1043-1, *Plastics — Symbols and abbreviated terms — Part 1: Basic polymers and their special characteristics (ISO 1043-1)*

EN ISO 1402:2009, *Rubber and plastics hoses and hose assemblies — Hydrostatic testing (ISO 1402:2009)*

EN ISO 2411, *Rubber- or plastics-coated fabrics — Determination of coating adhesion (ISO 2411)*

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

1) 1 bar = 0,1 MPa.

EN ISO 7233:2016, *Rubber and plastics hoses and hose assemblies — Determination of resistance to vacuum (ISO 7233:2016)*

EN ISO 7326, *Rubber and plastics hoses — Assessment of ozone resistance under static conditions (ISO 7326)*

EN ISO 8031:2009, *Rubber and plastics hoses and hose assemblies — Determination of electrical resistance and conductivity (ISO 8031:2009)*

EN ISO 8330:2014, *Rubber and plastics hoses and hose assemblies — Vocabulary (ISO 8330:2014)*

EN ISO 10619-1, *Rubber and plastics hoses and tubing — Measurement of flexibility and stiffness — Part 1: Bending tests at ambient temperature (ISO 10619-1)*

EN ISO 10619-2, *Rubber and plastics hoses and tubing — Measurement of flexibility and stiffness — Part 2: Bending tests at sub-ambient temperatures (ISO 10619-2)*

ISO 209, *Aluminium and aluminium alloys — Chemical composition*

ISO 1817:2015, *Rubber, vulcanized or thermoplastic — Determination of the effect of liquids*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 8330:2014 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

4 Classification

Hoses shall be classified according to working pressure and working temperature range as given in Table 1.

Table 1 — Pressure and temperature range

	Type 1	**Type 2**	**Type 3**	**Type 4**
Maximum working pressure (bar)	4	10	14	14
Proof pressure (bar)	6	15	21	21
Minimum burst pressure (bar)	16	40	56	56
Vacuum rating (bar)	0,5	0,9	0,9	0,9
Working temperature range (°C)	−20 to +60	−30 to +80	−30 to +80	−30 to +150
NOTE 1 bar = 0,1 MPa.				

Upon agreement with the manufacturer, lower min. and/or higher max. temperatures are allowed depending on the materials used and the compatibility at those temperatures with the fluid conveyed. Other properties and requirements mentioned in this standard still have to be met.

5 Materials and construction

5.1 General

Hoses shall be constructed as shown in Figure 1 and shall consist of the following:

— an internal wire helix (see 5.2);

— a multi-ply wall of layers of films and fabrics made of thermoplastics that in combination give the required properties and provide a complete seal (see also Annex A);

— a cover consisting of a fabric with abrasion resistant polymeric coating;

— an external wire helix (see 5.2).

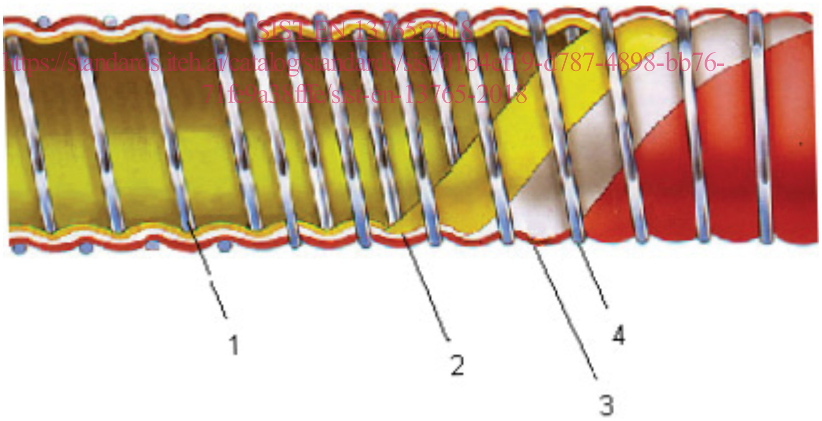
5.2 Internal and external wire

Wire shall be chosen in accordance with its chemical resistance from one of the following materials:

— stainless steel wire conforming to EN 10088-3:2014, Table 4, numbers 1.4306, 1.4401, 1.4404 or 1.4436;

— carbon steel wire conforming to Annex B and either galvanized in accordance with Annex C or sheathed in a polymeric material of a minimum wall thickness of 0,5 mm, resistant to liquid hydrocarbon or liquid chemicals as agreed between purchaser and manufacturer (see Annex A);

— aluminium wire conforming to ISO 209.



Key

1 internal wire

2 film

3 fabric

4 external wire

Figure 1 — Section of a typical thermoplastic multi-layer hose

The manufacturer should be consulted where a polymeric coated internal wire is being considered for use with low conductivity hydrocarbons or chemicals.

6 Dimensions

6.1 Internal diameters, with tolerances and minimum bend radii

When measured in accordance with EN ISO 4671, the values of the internal diameters of the hose shall conform to Table 2. When tested by the method described in EN ISO 10619-1 the values of the minimum bend radius shall be as given in Table 2. The hose shall show no sign of permanent deformation of the cross section, i.e. kinking.

Table 2 — Dimensions and minimum bend radii

Dimensions in millimetres

Internal diameter	Tolerance	Minimum bend radii			
		Type 1	Type 2	Type 3	Type 4
25	±1	125	125	200	200
32	±1	150	150	200	200
38	±1	150	150	200	200
40	±1	150	150	200	200
50	±1	200	200	225	225
65	±2	200	200	225	225
75	±2	280	280	300	300
80	±2	300	300	350	350
100	±2	400	400	400	400
125	±2	500	500	500	—
150	±2	575	575	575	—
200	±3	800	800	800	—
250	±3	1 000	1 000	1 000	—
300	±3	1 200	1 200	1 200	—

6.2 Tolerance on length

When tested in accordance with EN ISO 4671, the tolerance on the measured length of delivered hose assemblies shall be +2 % to –1 %.

7 Performance requirements of hoses and hose assemblies

WARNING — Persons using this European Standard should be familiar with normal laboratory practice. This standard does not purport to address all the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate health and safety practices and to ensure compliance with any national regulatory conditions.

7.1 Cover

When tested in accordance with EN ISO 2411, the adhesion between the fabric used for the outer cover and its abrasion resistant coating shall be no less than 1,5 kN/m.

7.2 Hoses

When tested in accordance with the methods given in Table 3, the physical properties of the hoses shall conform to Table 3.

Table 3 — Physical properties of hoses

Property	Unit	Requirements	Method(s)
Proof pressure	bar	No leakage or other signs of damage at pressure given in Table 1.	EN ISO 1402 with pressure increase not less than 1,7 bar/min
Change in length at proof pressure (max.)	%	10	EN ISO 1402:2009, 8.2 with the initial hose length measured when the hose is pressurized to 0,7 bar for 2 min
Twist at proof pressure (max.)	°/m	10	EN ISO 1402:2009, 8.2 with the initial reading taken when the hose is pressurized to 0,7 bar for 2 min
Burst pressure	bar	≥ values in Table 1	EN ISO 1402
Bend	—	No leakage or visible damage when the hose is bent to the radius given in Table 2 and subjected to proof pressure.	EN ISO 10619-1
Vacuum	bar	No damage after 30 min when subjected to values in Table 1.	EN ISO 7233:2016, method B
Crush recovery (max.)	%	3	Annex D
Fuel resistance	bar	No leakage at proof pressure	Annex E
Ozone resistance 72 h at 40 °C	—	No cracking observed at ×2 magnification	EN ISO 7326
Thermal ageing	—	No leakage at proof pressure given in Table 1.	Annex F
Flammability	—	See Annex G.	Annex G
Low temperature flexibility	—	Test at minimum temperature given in Table 1	EN ISO 10619-2

7.3 End fittings

End fittings shall be made from materials depending on their chemical resistance to the product conveyed.

For all types of end fittings, the part of the fitting that enters the hose and forms the means by which the fitting is connected to the hose shall be provided with scrolls or protrusions on the surface that correspond to the pitch of the internal helix wire of the hose.

7.4 Hose assemblies

Hose assemblies shall be fitted with end fittings as described in 7.3.

End fittings shall be attached to the hose by one of the following methods:

a) by the use of a seal and a metal ferrule which is swaged or crimped;

b) by the use of a thermoset resin or multi-components adhesive, e.g. epoxy and a metal ferrule that is swaged or crimped.

When tested in accordance with the methods given in Table 4, hose assemblies shall conform to Table 4.

Table 4 — Physical properties of hose assemblies

Property	Unit	Requirements	Method(s)
Proof pressure	bar	No leakage or other signs of weakness at pressure given in Table 1 [a]	EN ISO 1402 with a pressure increase not less than 1,7 bar/min
Bend	—	No leakage or visible damage when the hose is bent to the radius given in Table 2 and subjected to proof pressure	EN ISO 10619-1
Series of hydrostatic tests	bar % °/m	≥ burst pressure given in Table 1 [b] change in length given in Table 3, twist as given in Table 3	Annex H
Security of end fitting	bar	No leakage at proof pressure given in Table 1 [a]	Annex I and EN ISO 1402
Electrical resistance between end fittings	Ω	≤ 100 Ω /assembly	EN ISO 8031:2009, 4.8
Burst pressure	bar	≥ value given in Table 1 [b]	EN ISO 1402
Leak tightness	—	No leakage of air when subjected to 3,5 bar for 5 min	Annex J

[a] If the maximum working pressure of the fittings is lower than the maximum working pressure of the hose, the proof pressure of the hose assembly shall be reduced to 1,5 times the maximum working pressure of the fittings.

[b] If the maximum working pressure of the fittings is lower than the maximum working pressure of the hose, the burst pressure of the hose assembly shall be reduced to 4 times the maximum working pressure of the fittings.

7.5 Electrical continuity

There shall be electrical continuity between both internal and external wires and the end fittings. Where a wire is sheathed in polymeric material the sheath shall be stripped back for some of the length that engages with the fittings or the ferrule to ensure continuity.

Manufacturers shall demonstrate by testing or calculation that the measured overall electrical resistance of the hose assembly incorporates both internal and external wires being part of the circuit.

For the transfer of non-conductive fluids the use of a hose with a non-polymeric coated internal wire should be considered.