



SLOVENSKI STANDARD
oSIST prEN 12115:2019

01-november-2019

**Gumene in plastomerne cevi ter cevni priključki za tekoče in plinaste kemikalije -
Specifikacija**

Rubber and thermoplastics hoses and hose assemblies for liquid or gaseous chemicals -
Specification

Gummi- und Kunststoffschläuche und -schlauchleitungen für flüssige oder gasförmige
Chemikalien - Anforderungen

Tuyaux et assemblages flexibles en caoutchouc et en matériaux thermoplastiques pour
substances chimiques liquides ou gazeuses - Spécifications

Ta slovenski standard je istoveten z: prEN 12115

ICS:

83.140.40 Gumene cevi Hoses

oSIST prEN 12115:2019 **en,fr,de**

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 12115

September 2019

ICS 23.040.70

Will supersede EN 12115:2011

English Version

Rubber and thermoplastics hoses and hose assemblies for liquid or gaseous chemicals - Specification

Tuyaux et assemblages flexibles en caoutchouc et en
matériaux thermoplastiques pour substances
chimiques liquides ou gazeuses - Spécifications

Gummi- und Kunststoffschläuche und -
schlauchleitungen für flüssige oder gasförmige
Chemikalien - Anforderungen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 218.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents	Page
European foreword.....	4
Introduction	5
1 Scope.....	6
2 Normative references.....	7
3 Terms and definitions	8
4 Classification.....	8
5 Couplings and end fittings	8
6 Materials and construction.....	8
6.1 General.....	8
6.2 Lining.....	8
6.3 Cover.....	9
6.4 Reinforcement.....	9
6.5 Helical wires.....	9
7 Dimensions and tolerances, typical masses.....	9
7.1 Diameters, thickness, vacuum stability, bend radii and resistance to vacuum.....	9
7.2 Concentricity.....	10
7.3 Length of hose assemblies	10
8 Physical properties of materials used for hoses.....	10
8.1 General.....	10
8.2 Materials used for the lining	11
8.3 Material of the helix	12
8.4 Materials of the end fittings and couplings.....	12
9 Performance requirements of hoses and hose assemblies.....	12
10 Electrical properties	13
11 Frequency of testing.....	14
12 Type tests	14
13 Test report.....	14
14 Marking.....	15
14.1 Hoses.....	15
14.2 Hose fittings	15
14.3 Identification of hose assemblies	15
15 Storage and admissible storage time.....	16
Annex A (normative) Test frequency for type tests and routine tests.....	17
Annex B (informative) Production acceptance tests.....	18
Annex C (informative) Couplings and fittings.....	19
Annex D (normative) Crush recovery test (for SD hoses only).....	20
Annex E (normative) Flammability test.....	22
Annex F (informative) Resistance to chemicals conveyed.....	24

Annex G (informative) Environmental checklist..... 45
Bibliography 47

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 12115:2021

<https://standards.iteh.ai/catalog/standards/sist/d3112eb7-08fe-4268-823b-077c7ed6643b/sist-en-12115-2021>

prEN 12115:2019 (E)**European foreword**

This document (prEN 12115:2019) has been prepared by Technical Committee CEN/TC 218 “Rubber and plastics hoses and hose assemblies”, the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 12115:2011.

In comparison with EN 12115:2011 the following changes have been made:

- the scope now excludes hose assemblies for anhydrous ammonia (EN ISO 5771);
- the normative references have been updated;
- in subclause 14.3, “Identification of hose assemblies”, a permission has been added that bands may be replaced by permanently adhered labelling bearing the same information, e.g. coloured labels at the coupling;
- a warning has been added at the beginning of informative Annex F, “Resistance to chemicals conveyed” to explicitly point out that the Annex has not been changed compared to EN 12115:2011;
- an environmental checklist (informative Annex G) has been added;
- the document has been editorially revised.

[SIST EN 12115:2021](https://standards.iteh.ai/catalog/standards/sist/d3112eb7-08fe-4268-823b-077c7ed6643b/sist-en-12115-2021)

<https://standards.iteh.ai/catalog/standards/sist/d3112eb7-08fe-4268-823b-077c7ed6643b/sist-en-12115-2021>

Introduction

This document has been prepared to provide minimum acceptable requirements for the satisfactory performance of flexible rubber and thermoplastics hoses and hose assemblies with unspecified reinforcement and linings of different types of synthetic rubbers and thermoplastics, for each chemical substance conveyed.

A list of hose lining material resistant to specific chemical substances, identified by CAS number, is given as Annex F (informative). This list is for informational purposes only.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 12115:2021

<https://standards.iteh.ai/catalog/standards/sist/d3112eb7-08fe-4268-823b-077c7ed6643b/sist-en-12115-2021>

prEN 12115:2019 (E)**1 Scope**

This document specifies requirements for two types of hose assemblies (Types D and SD) and four grades based on electrical properties with hoses made of rubber or thermoplastics and hose fittings made of metal designed to convey liquid or gaseous chemical substances, hereinafter termed the “chemicals conveyed”.

The hose assemblies are intended for use with chemicals conveyed in the temperature range of -20 °C to $+65\text{ °C}$ at a working pressure $\leq 10\text{ bar}^{1)}$.

NOTE 1 This document sets out requirements for these hose assemblies to ensure that users are not exposed to danger from fire or explosion and that the environment is protected against contamination or damage.

NOTE 2 Other temperatures and working pressures than those given above can be agreed with the manufacturer, provided that the marking on the hose (see 14.1) states this and the requirements of Table 5 and all the other requirements are met.

NOTE 3 Other diameters than those given in this document can be agreed with the manufacturer.

NOTE 4 This document also provides guidance on the storage of hose assemblies (Clause 15).

NOTE 5 The attention of users is drawn to Annex F concerning the selection of lining material related to the chemical(s) to be conveyed by the hoses and/or hose assemblies.

This document does not apply to hose assemblies for:

- aircraft refuelling (EN ISO 1825);
- fuel dispensing (EN 1360);
- oil burners (EN ISO 6806);
- refrigerant circuits;
- fuel truck delivery (EN 1761);
- liquid petroleum gases (LPG) (EN 1762, EN 16436-2);
- fire-fighting (EN ISO 14557);
- oil suction and discharge (EN 1765);
- rotary drilling (EN ISO 6807);
- fuel dispensing with vapour recovery systems (EN 13483);
- anhydrous ammonia (EN ISO 5771).

This document does not apply to multilayer hose assemblies (EN 13765 and EN 13766).

1) 1 bar = 0,1 MPa.

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 10244-2, *Steel wire and wire products - Non-ferrous metallic coatings on steel wire - Part 2: Zinc or zinc alloy coatings*

EN 10270-1, *Steel wire for mechanical springs — Part 1: Patented cold drawn unalloyed spring steel wire*

EN 10270-2, *Steel wire for mechanical springs - Part 2: Oil hardened and tempered spring steel wire*

EN ISO 1402, *Rubber and plastics hoses and hose assemblies - Hydrostatic testing (ISO 1402)*

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)*

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

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 8033, *Rubber and plastics hoses - Determination of adhesion between components (ISO 8033)*

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 10619-2:2018, *Rubber and plastics hoses and tubing - Measurement of flexibility and stiffness - Part 2: Bending tests at sub-ambient temperatures (ISO 10619-2:2017)*

ISO 37, *Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties*

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

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

ISO 4649:2017, *Rubber, vulcanized or thermoplastic — Determination of abrasion resistance using a rotating cylindrical drum device*

BS 3592-1:1986, *Steel wire for hose reinforcement — Specification for coated round and flat steel wire for rubber hose reinforcement*

prEN 12115:2019 (E)

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>

NOTE In this document the word “fitting” has been used; this is, in some cases, interchangeable with the word “coupling”.

4 Classification

Hoses and hose assemblies for this application shall be divided into two types, according to their duty requirements:

- Type D: hoses and hose assemblies for delivery duty only;
- Type SD: hoses and hose assemblies for suction and delivery duty.

Hoses and hose assemblies for this application shall be divided into four grades:

- Grade M: electrically bonded;
- Grade Ω : electrically conductive; see EN ISO 8031:2009, Annex A for new recommended marking to indicate conductive lining, conductive cover or conductive lining and cover;
- Grade M/T: electrically bonded and with an electrical resistance through the hose wall not exceeding $10^9 \Omega$;
- Grade Ω /T: electrically conductive and with an electrical resistance through the hose wall not exceeding $10^9 \Omega$.

5 Couplings and end fittings

Hoses shall be fitted with end fittings and couplings to form hose assemblies. Examples are given in Annex C.

6 Materials and construction

6.1 General

Hose Type D shall consist of a lining, reinforcement and a cover.

Hose Type SD shall consist of a lining, reinforcement and a cover, and in addition incorporate one or more helixes.

6.2 Lining

The lining shall be resistant to the chemical substances conveyed. The lining shall be uniform in quality and thickness and shall be free from porosity, air holes, foreign inclusions and other defects which could impair the expected use.

6.3 Cover

The cover shall be resistant to mechanical damage, wear and environmental effects due to weather and short-term chemical exposure.

6.4 Reinforcement

The reinforcement shall consist of a textile material which is resistant to the medium conveyed.

6.5 Helical wires

The helix or helixes shall be fully embedded into the hose wall so that contact with the medium conveyed is avoided.

7 Dimensions and tolerances, typical masses

7.1 Diameters, thickness, vacuum stability, bend radii and resistance to vacuum

The inside and outside diameters of the hoses, the minimum thickness of lining and cover and the minimum bend radius shall conform to the values given in Table 1 or Table 2 (depending on the type).

The Type D hoses shall be able to withstand an internal vacuum as specified in Table 1 (vacuum stability) without collapse or changes in diameter and length in excess of the values specified in Table 5.

Table 1 — Dimension requirements, Type D hoses

Nominal bore	Inside diameter mm	Tolerance mm	Outside diameter mm	Tolerance mm	Minimum thickness mm		Min. bend radius ^b mm	Vacuum stability bar			
					lining ^a	cover					
13	13,0	±0,5	23,0	±1,0	2,0	1,6	90	-0,5			
19	19,0		31,0				125				
25	25,0		37,0				150				
32	32,0		44,0				175				
38	38,0		51,0				225				
50	50,0	±0,7	66,0	±1,2	2,0	2,0	275	-0,3			
51	51,0		67,0				275				
63	63,0	±0,8	79,0				±1,6	2,0	2,0	300	—
75	75,0		91,0							350 ^c	
76	76,0		92,0							350 ^c	
100	100,0		116,0	450 ^c							
101,5	101,5		118,0	450 ^c							

^a The dimensions for the minimum lining thickness do not apply to hoses made from materials PE-X/UPE and fluoro-plastics. The thickness for these materials shall be 0,4 mm.

^b The bend radii specified do not apply to hoses made from PE-X/UPE and fluoro-plastics where the value shall be 1,5 × the values shown above.

^c Only applies to operation at not less than 1 bar, otherwise the hose will kink.

The Type SD hoses shall be able to withstand an internal vacuum as specified in Table 2 (resistance to vacuum) and shall conform to the requirements specified in Table 5.

Table 2 — Dimension requirements, Type SD hoses

Nominal bore	Inside diameter mm	Tolerance mm	Outside diameter mm	Tolerance mm	Minimum thickness mm		Min. bend radius ^b mm	Resistance to vacuum bar
					lining ^a	cover		
19	19,0	±0,5	31,0	±1,0	1,6	1,6	125	-0,8
25	25,0		37,0				150	
32	32,0		44,0				175	
38	38,0		51,0				225	
50	50,0	±0,7	66,0	±1,2	1,7	1,7	275	
51	51,0		67,0				275	
63	63,0	±0,8	79,0	±1,2	1,8	1,7	300	
75	75,0		91,0				350	
76	76,0		92,0				350	
100	100,0		116,0	±1,6		2,0	450	
101,5	101,5		118,0				450	

^a The dimensions for the minimum lining thickness do not apply to hoses made from materials PE-X/UPE and fluoro-plastics. The thickness for these materials shall be 0,4 mm.

^b The bend radii specified do not apply to hoses made from PE-X/UPE and fluoro-plastics where the value shall be 1,5 × the values shown above.

7.2 Concentricity

When determined in accordance with EN ISO 4671, the concentricity, based on a total indicator reading between the internal diameter and the outside surface of the cover, shall be ≤ 1,0 mm for hoses ≤ 51 nominal bore and ≤ 1,5 mm for hoses > 51 nominal bore.

7.3 Length of hose assemblies

The length of the hose assembly shall be the intended installed length measured from sealing surfaces of the end fittings.

For hose assembly lengths ≤ 1 000 mm the tolerance shall be $\begin{matrix} +15 \\ -10 \end{matrix}$ mm.

For hose assembly lengths > 1 000 mm the tolerance shall be $\begin{matrix} +1,5 \\ -1,0 \end{matrix}$ %.

8 Physical properties of materials used for hoses

8.1 General

The physical properties of the materials used for the lining and cover shall conform to the values given in Table 3, when tested in accordance with the methods listed in Table 3. Tests shall be carried out either on samples taken from the hose or from separately vulcanized sheets (to the same degree as the hose).

The cover is not intended to be in contact with the chemical conveyed. Whenever such contact occurs the cover of the hose should be examined for harmful effects.

Table 3 — Physical properties of materials

Item	Property	Unit	Requirement		Test method
			lining	cover	
1	Tensile strength min.	MPa	8,0	8,0	ISO 37 (dumbbell test pieces)
2	Elongation at break				
2.1	Fluro-rubber (FKM) min.	%	150	150	ISO 37 (dumbbell test pieces)
2.2	Other materials, see Table 4		250	250	
3	Ageing				
3.1	Tensile strength change max.	% from the un-aged value	—	15	ISO 188 (air oven method) 7 days at (70 ± 1) °C
3.2	Elongation at break change		—	20	
4	Abrasion resistance				
4.1	black filled compound max	mm ³	—	200	ISO 4649:2017 Method A
4.2	non-black filled compound, coloured		—	350	

8.2 Materials used for the lining

The lining shall be made from the range of materials given in Table 4.

NOTE The characteristics within a material group can vary, e.g. dependent upon the type of polymer, ratio of the mixture and vulcanization method.

Table 4 — Material groups for hose lining

Polymer ^a reference	Material for hose lining and typical applications		Recommended colour coding on hose cover
NBR 1	Acrylonitrile butadiene rubbers	Hoses for mineral oil products of all types less than 50 % aromatic	Yellow
NBR 2		Hoses for aromatic and chlorinated hydrocarbons and solvents	Blue
NBR 3		Hoses for oily foodstuffs	White
NR	Isoprene rubber (natural rubber), e.g. for potable alcohol		No recommended colour
IIR	Isobutene/Isoprene rubber (butyl rubber)		
EPDM	Terpolymers made from ethylene, propylene and a diene with an unsaturated part portion of the diene in the side chain		Lilac
CSM	Chlorosulfonated polyethylene		Green
FKM	Rubbers with fluoro, fluoroalkyl or fluoroalkoxy groups on the polymer chain (fluoro-rubber)		Green and white
PE-X/UPE	Cross-linked polyethylene/ultra-high molecular polyethylene		Blue and white
b	Fluoro-plastics (e.g. PTFE, PFA, FEP...)		Blue and white and a third colour
<p>^a For alphabetic abbreviations see ISO 1629.</p> <p>^b No reference is given. Details of materials and their resistance against the chemical conveyed shall be agreed from manufacturer's information, see Annex F.</p>			

prEN 12115:2019 (E)

Other materials may be agreed between the manufacturers and user, but all requirements of this document shall be met.

8.3 Material of the helix

The helix or helixes shall consist of galvanized hard or mild steel wire, in accordance with EN 10270-1 or EN 10270-2 (galvanized to EN 10244-2), or to BS 3592-1:1986. Alternatively, the helix or helixes may, when required, consist of stainless steel wire, in accordance with EN 10088-3:2005, steel numbers 1.4306, 1.4401, 1.4404 or 1.4436.

8.4 Materials of the end fittings and couplings

The material of end fittings and couplings, either metal or plastics, shall be chemically resistant to the substance conveyed. Information concerning suitability of various metals is given in Annex F.

9 Performance requirements of hoses and hose assemblies

The physical properties of the finished hose and hose assemblies shall conform to the values given in Table 5, when tested in accordance with the appropriate methods given in Table 5.

Table 5 — Performance requirements of hoses and hose assemblies

Property	Unit	Requirement	Test method
Proof test pressure	—	No leakage or other signs of weakness at $1,5 \times$ the working pressure	EN ISO 1402
Change in length — at proof test pressure — at $-0,8$ respectively $-0,9$ bar vacuum	%	maximum allowed: Type D 0 to +8 Type SD 0 to +10 Type SD -2 %	EN ISO 1402
Twist at proof test pressure	$^{\circ}/m$	maximum 8	EN ISO 1402
Resistance to vacuum; Vacuum according to Table 2 for 10 min	—	No failure, no collapse, no blisters or delamination of lining (Type SD)	EN ISO 7233
Vacuum stability Vacuum according to Table 1 for 10 min	%	No changes in diameter and/or length > -2 % (Type D)	EN ISO 7233
Burst pressure	bar	minimum four times the working pressure	EN ISO 1402
Adhesion between components, dry	N/mm	minimum 2,4	EN ISO 8033
Crush recovery, Type SD only (peak compressive strength test)	%	maximum 3	Annex D

Property	Unit	Requirement	Test method
Ozone resistance	—	No cracking observed under $\times 2$ magnification	EN ISO 7326, with relative humidity $(55 \pm 10) \%$, ozone concentration (50 ± 5) pphm ^a , elongation 20 %. Test duration: (72_{-2}^0) h. Test temperature: $(40 \pm 2) ^\circ\text{C}$
Flammability test	—	a) Burning with a naked flame to cease within 20 s of removal of the burner; b) No further glowing visible 2 min after removal of the burner; c) Hose shall show no sign of leakage.	Annex E
Electrical properties	Ω	10^2 /assembly-M-grade 10^6 /assembly- Ω -grade	EN ISO 8031:2009, Clause 4
		10^9 /hose wall-T-grade	EN ISO 8031:2009, 4.9
Deformation of the external hose diameter during bending test (at min. bending radius with, for Type D only, an internal pressure of 0,7 bar)	%	10	EN ISO 10619-1
Flexibility at $-20 ^\circ\text{C}$	—	No permanent deformation or visible structural damage	EN ISO 10619-2:2018, Method B

^a The rubber industry expresses ozone concentration as parts per hundred million parts of air (pphm), a dimensionless quantity equivalent to $1 \times 10^{-6} \%$.

10 Electrical properties

The electrical resistance of hoses and hose assemblies can be obtained by two methods:

- a) Incorporating two low resistance bonding wires into the hose construction. These shall be spirally applied and shall be positioned in such a way to cross uniformly.

When attaching fittings to these hoses, the bonding wires shall be folded into the hose bore, securely positioned between the lining and the fitting tail, and extended a minimum of one third of the length of the fitting tail into the bore.

When tested in accordance with EN ISO 8031, the resistance along the bonding wires, in the case of hoses, or the resistance between fittings, in the case of hose assemblies, shall not exceed $10^2 \Omega$ per length. When obtaining electrical continuity by this method the hose shall be marked with the symbol "M".