SLOVENSKI STANDARD
SIST EN 12115:2021

01-marec-2021

Nadomešča:
SIST EN 12115:2011

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: **EN 12115:2021**

ICS:

83.140.40	Gumene cevi	Hoses

SIST EN 12115:2021 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 12115

January 2021

ICS 23.040.70

Supersedes 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 European Standard was approved by CEN on 13 December 2020.

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 CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists 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.

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

This document (EN 12115:2021) 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 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 July 2021, and conflicting national standards shall be withdrawn at the latest by July 2021.

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 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.

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, 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 the United Kingdom.

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.

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 °C at a working pressure ≤ 10 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 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 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 8031:2020, *Rubber and plastics hoses and hose assemblies - Determination of electrical resistance and conductivity (ISO 8031:2020)*

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*

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 https://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 8031:2020, 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 Ω;

— Grade Ω/T: electrically conductive and with an electrical resistance through the hose wall not exceeding 10^9 Ω.

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.

An environmental checklist is given in Annex G.

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	−0,4
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				300	—
75	75,0		91,0				350 [c]	
76	76,0		92,0				350 [c]	
100	100,0		116,0	±1,6			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 $^{+15}_{-10}$ mm.

For hose assembly lengths > 1 000 mm the tolerance shall be $^{+1,5}_{-1,0}$ %.

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 lining	Requirement cover	Test method
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	min.	%	250	250	ISO 37 (dumbbell test pieces)
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	max.	% from the un-aged value	—	20	ISO 188 (air oven method) 7 days at (70 ± 1) °C
4	Abrasion resistance					
4.1	black filled compound	max.	mm^3	—	200	ISO 4649:2017 Method A
4.2	non-black filled compound, coloured	max.	mm^3	—	350	ISO 4649:2017 Method A

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	Acrylonitrile butadiene rubbers	Hoses for aromatic and chlorinated hydrocarbons and solvents	Blue
NBR 3	Acrylonitrile butadiene rubbers	Hoses for oily foodstuffs	White
NR	Isoprene rubber (natural rubber), e.g. for potable alcohol		No recommended colour
IIR	Isobutene/Isoprene rubber (butyl rubber)		Lilac
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

[a] For alphabetic abbreviations, see ISO 1629.

[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.

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