

SVENSK STANDARD

SS-EN 16643:2016



Fastställt/Approved: 2016-08-30
Publicerad/Published: 2016-09-06
Utgåva/Edition: 1
Språk/Language: engelska/English
ICS: 13.220.40; 23.040.70; 75.160.20

Slang och slangställ av gummi och plast – Icke bunden fluorplastfodrad (t ex PTFE) slang och slangställ för kemikalier i vätske- eller gasform – Specifikation

Rubber and plastics hoses and hose assemblies – Non-bonded fluoroplastic lined (e.g. PTFE) hoses and hose assemblies for liquid and gaseous chemicals – Specification

This preview is downloaded from www.sis.se. Buy the entire standard via <https://www.sis.se/std-8022166>

Standarder får världen att fungera

SIS (Swedish Standards Institute) är en fristående ideell förening med medlemmar från både privat och offentlig sektor. Vi är en del av det europeiska och globala nätverk som utarbetar internationella standarder. Standarder är dokumenterad kunskap utvecklad av framstående aktörer inom industri, näringsliv och samhälle och befrämjar handel över gränser, bidrar till att processer och produkter blir säkrare samt effektiviserar din verksamhet.

Delta och påverka

Som medlem i SIS har du möjlighet att påverka framtida standarder inom ditt område på nationell, europeisk och global nivå. Du får samtidigt tillgång till tidig information om utvecklingen inom din bransch.

Ta del av det färdiga arbetet

Vi erbjuder våra kunder allt som rör standarder och deras tillämpning. Hos oss kan du köpa alla publikationer du behöver – allt från enskilda standarder, tekniska rapporter och standardpaket till handböcker och onlinetjänster. Genom vår webbtjänst e-nav får du tillgång till ett lättnavigerat bibliotek där alla standarder som är aktuella för ditt företag finns tillgängliga. Standarder och handböcker är källor till kunskap. Vi säljer dem.

Utveckla din kompetens och lyckas bättre i ditt arbete

Hos SIS kan du gå öppna eller företagsinterna utbildningar kring innehåll och tillämpning av standarder. Genom vår närhet till den internationella utvecklingen och ISO får du rätt kunskap i rätt tid, direkt från källan. Med vår kunskap om standarders möjligheter hjälper vi våra kunder att skapa verklig nytta och lönsamhet i sina verksamheter.

Vill du veta mer om SIS eller hur standarder kan effektivisera din verksamhet är du välkommen in på www.sis.se eller ta kontakt med oss på tel 08-555 523 00.



Standards make the world go round

SIS (Swedish Standards Institute) is an independent non-profit organisation with members from both the private and public sectors. We are part of the European and global network that draws up international standards. Standards consist of documented knowledge developed by prominent actors within the industry, business world and society. They promote cross-border trade, they help to make processes and products safer and they streamline your organisation.

Take part and have influence

As a member of SIS you will have the possibility to participate in standardization activities on national, European and global level. The membership in SIS will give you the opportunity to influence future standards and gain access to early stage information about developments within your field.

Get to know the finished work

We offer our customers everything in connection with standards and their application. You can purchase all the publications you need from us - everything from individual standards, technical reports and standard packages through to manuals and online services. Our web service e-nav gives you access to an easy-to-navigate library where all standards that are relevant to your company are available. Standards and manuals are sources of knowledge. We sell them.

Increase understanding and improve perception

With SIS you can undergo either shared or in-house training in the content and application of standards. Thanks to our proximity to international development and ISO you receive the right knowledge at the right time, direct from the source. With our knowledge about the potential of standards, we assist our customers in creating tangible benefit and profitability in their organisations.

If you want to know more about SIS, or how standards can streamline your organisation, please visit www.sis.se or contact us on phone +46 (0)8-555 523 00



Europastandarden EN 16643:2016 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN 16643:2016.

Denna standard ersätter SS 155480:2012, utgåva 2.

The European Standard EN 16643:2016 has the status of a Swedish Standard. This document contains the official English version of EN 16643:2016.

This standard supersedes the Swedish Standard SS 155480:2012, edition 2.

© Copyright/Upphovsrätten till denna produkt tillhör SIS, Swedish Standards Institute, Stockholm, Sverige. Användningen av denna produkt regleras av slutanvändarlicensen som återfinns i denna produkt, se standardens sista sidor.

© Copyright SIS, Swedish Standards Institute, Stockholm, Sweden. All rights reserved. The use of this product is governed by the end-user licence for this product. You will find the licence in the end of this document.

Uppllysningar om sakinnehållet i standarden lämnas av SIS, Swedish Standards Institute, telefon 08-555 520 00. Standarder kan beställas hos SIS Förlag AB som även lämnar allmänna uppllysningar om svensk och utländsk standard.

Information about the content of the standard is available from the Swedish Standards Institute (SIS), telephone +46 8 555 520 00. Standards may be ordered from SIS Förlag AB, who can also provide general information about Swedish and foreign standards.

Denna standard är framtagen av kommittén för Gummi och gummiprodukter, SIS/TK 154.

Har du synpunkter på innehållet i den här standarden, vill du delta i ett kommande revideringsarbete eller vara med och ta fram andra standarder inom området? Gå in på www.sis.se - där hittar du mer information.

EUROPEAN STANDARD

EN 16643

NORME EUROPÉENNE

EUROPÄISCHE NORM

August 2016

ICS 23.040.70

English Version

Rubber and plastics hoses and hose assemblies - Non-bonded fluoroplastic lined (e.g. PTFE) hoses and hose assemblies for liquid and gaseous chemicals - Specification

Tuyaux et flexibles en caoutchouc et en matières plastiques - Tuyaux non-liés revêtus de fluoroplastique (par exemple PTFE) pour substances chimiques liquides ou gazeuses - Spécifications

Gummi- und Kunststoffschläuche und -schlauchleitungen - Fluorkunststoffbeschichtete (z. B. PTFE) Nicht-Verbundschläuche und -schlauchleitungen für flüssige und gasförmige Chemikalien - Anforderungen

This European Standard was approved by CEN on 15 June 2016.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, 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: Avenue Marnix 17, B-1000 Brussels

Contents

Page

European foreword.....	5
Introduction	6
1 Scope.....	7
2 Normative References	7
3 Terms and definitions	8
4 Classification.....	8
5 Hose assembly designs.....	9
6 Materials and construction.....	9
6.1 General.....	9
6.2 Lining.....	9
6.3 Helix wire (optional).....	9
6.4 Electrical bonding wires (optional).....	9
6.5 Braid reinforcement	9
6.6 Cover (optional).....	9
7 Dimensions and tolerances	10
7.1 Diameters, thickness, bend radii, resistance to vacuum and lowest permitted maximum working pressure requirements	10
7.2 Concentricity.....	18
7.3 Length of hose assemblies	18
7.3.1 General.....	18
7.3.2 Type SE and Type SC hose assemblies	18
7.3.3 Type C hose assemblies.....	18
8 Physical properties of materials used for hoses and hose assemblies.....	18
8.1 General.....	18
8.2 Materials used for the lining	19
8.3 Materials used for the helix wire.....	19
8.4 Materials used for the electrical bonding wires	19
8.5 Materials used for the over-braid reinforcement	19
8.6 Materials used for the cover.....	20
8.7 Materials used for end fittings and couplings.....	20
9 Performance requirements of hoses and hose assemblies.....	20
10 Electrical properties	22
10.1 General.....	22
10.2 Electrical bonding.....	22
10.3 Static-dissipative lining and/or static-dissipative cover.....	22
11 Frequency of testing.....	22
12 Type tests	23
13 Test report.....	23
14 Marking.....	23
14.1 Hoses.....	23
14.2 Hose assemblies.....	23

15	Storage and admissible storage time	24
Annex A (normative)	Test frequency for type tests and routine tests	25
Annex B (informative)	Production acceptance tests.....	27
Annex C (normative)	Proof pressure test for fluoroplastic lining	28
Annex D (informative)	Couplings and fittings.....	29
D.1	General	29
D.2	Fluoroplastic lined end fittings	29
Annex E (normative)	Yield orientation index	30
Annex F (normative)	Weep test.....	31
F.1	General	31
F.2	Test pieces.....	31
F.3	Apparatus.....	31
F.4	Test method.....	31
Annex G (informative)	Resistance to chemicals conveyed	32
Annex H (informative)	Permeability to gas.....	33
H.1	General	33
H.2	Test pieces.....	33
H.3	Apparatus	33
H.4	Test method.....	33
Annex I (normative)	Flame resistance test	36
I.1	Test pieces.....	36
I.2	Apparatus	36
I.3	Test method.....	36
Annex J (normative)	Hose flexibility - Rolling U test	38
J.1	General	38
J.2	Test pieces.....	38
J.3	Apparatus	38
J.4	Test method.....	38
Annex K (informative)	Environmental checklist.....	41
Bibliography	43

Tables

Table 1	— Dimension requirements, Type SE lining hoses without and with cover.....	11
Table 2	— Maximum working pressure requirements, Type SE lining hoses without and with cover for two typical braid reinforcements	12
Table 3	— Dimension requirements, Type SC lining hoses without and with cover	13
Table 4	— Maximum working pressure requirements, Type SC lining hoses without and with cover for three typical braid reinforcements.....	14
Table 5	— Dimension requirements for manufacturing method 1, Type C lining hoses without and with cover.....	15
Table 6	— Dimension requirements for manufacturing method 2, Type C lining hoses without and with cover.....	16

Table 7 — Maximum working pressure requirements, Type C lining hoses without and with cover for three typical braid reinforcements	17
Table 8 — Physical properties of fluoroplastic lining.....	19
Table 9 — Performance requirements of hoses and hose assemblies.....	21
Table A.1 — Test frequency for type tests and routine tests.....	25
Table B.1 — Production acceptance tests.....	27
Table H.1 — Helium test pressures and average helium permeation rates for Type SC hose linings.....	34
Table J.1 — Rolling U test movement.....	38
Table K.1 — Environmental checklist.....	42
 Figures	
Figure H.1 — Arrangement for helium permeation test.....	35
Figure I.1 — Arrangement for flammability test.....	37
Figure J.1 — Rolling U test piece	39
Figure J.2 — Typical arrangement of Rolling U test equipment.....	40

European foreword

This document (EN 16643:2016) 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 February 2017, and conflicting national standards shall be withdrawn at the latest by February 2017.

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.

Annexes A, C, E, F, I and J are normative. Annexes B, D, G, H and K are informative.

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.

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, 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 non-bonded flexible fluoroplastic lined hoses and hose assemblies with various types of reinforcement, for each chemical substance conveyed.

1 Scope

This European Standard specifies requirements for three types of non-bonded fluoroplastic lined hoses and hose assemblies with convoluted or smooth linings designed to convey liquid or gaseous chemical substances, hereinafter termed the “chemicals conveyed”. These hoses and hose assemblies can be used for pharmaceutical, biotechnology and industrial applications as detailed in Clause 5.

The hose assemblies are intended for use with chemicals conveyed in the temperature range of -70°C to $+260^{\circ}\text{C}$ and for a working pressure up to 205 bar¹⁾.

NOTE 1 This standard sets out requirements for these hoses and 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 working pressures than those given above can be agreed with the manufacturer provided the physical properties of the hose assembly materials conform to Clause 8, the hose and hose assembly performance requirements conform to Clause 9 and the hose assembly electrical properties conform to Clause 10.

NOTE 3 Other diameters than those given in this standard can be agreed with the manufacturer provided the physical properties of the hose assembly materials conform to Clause 8, the hose and hose assembly performance requirements conform to Clause 9 and the hose assembly electrical properties conform to Clause 10.

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

NOTE 5 The attention of users is drawn to Annex G concerning the working temperature range which can be affected by the chemical(s) to be conveyed in the hoses and hose assemblies.

NOTE 6 The attention of users is drawn to Annex G concerning the selection of materials for lining, helix wire (if applicable), electrical bonding wire (if applicable), braid reinforcement and cover (if applicable) related to the chemical(s) to be conveyed by the hoses and hose assemblies.

2 Normative References

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

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

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

¹⁾ 1 bar = 0,1 MPa.