



**SLOVENSKI STANDARD**  
**oSIST prEN 14585-1 rev:2022**  
**01-junij-2022**

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**Valoviti kovinski cevni sestavi za uporabo v tlačnih cevovodih**

Corrugated metal hose assemblies for pressure applications

Gewellte Metallschlauchleitungen für Druckerwendungen

Tuyauteries métalliques flexibles onduleuses pour applications sous pression

Ta slovenski standard je istoveten z: **prEN 14585-1 rev**

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**ICS:**

77.140.75

Jeklene cevi in cevni profili  
za posebne namene

Steel pipes and tubes for  
specific use

**oSIST prEN 14585-1 rev:2022**

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English Version

## Corrugated metal hose assemblies for pressure applications

Tuyauteries métalliques flexibles onduleuses pour applications sous pression

Gewellte Metallschlauchleitungen für Druckanwendungen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 342.

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.

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## European foreword

This document (prEN 14585-1:2022) has been prepared by Technical Committee CEN/TC 342 “Metal hose, hose assemblies, bellows and expansion joints”, the secretariat of which is held by SNV.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 14585-1:2006, CEN/TR 14585-2:2006, CEN/TR 14585-3:2017.

This document has been prepared under a standardization request given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 2014/68/EU [1].

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

This standard has been produced to address the specific needs of corrugated metal hose assemblies for pressure applications. For applications outside the scope of EU Directive 2014/68/EU, refer to EN ISO 10380:2012.

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**prEN 14585-1:2022 (E)****Introduction**

Corrugated metal hose assemblies are used as components in piping.

The requirements of this standard impact designers, manufacturers, suppliers and importers of corrugated metal hose assemblies for pressure applications.

The unique nature of a corrugated metal hose assembly is characterized by:

- the opposing requirements of pressure resistance and flexibility;
- the interactive role of its pressure bearing parts: corrugated metal hose, braid, end fittings and its permanent joints.

As a general rule PED [1] Annex I, Clause 2.2.2 limits the experimental design method for piping to  $PS \cdot DN$  less than 3000. Validation tests shall however support design of corrugated metal hose assemblies for all practically achievable values of  $PS \cdot DN$ .

Regarding sound engineering practice (SEP), the manufacturer is responsible for its application based on relevant standards or other professional codes. Corrugated metal hose assemblies according to SEP are to be designed, manufactured, verified and delivered with instructions for use in order to ensure their safety during their intended life, when used in foreseeable or reasonably foreseeable conditions.

NOTE 1 EN ISO 10380:2012 or relevant professional codes answer sound engineering practice requirements.

NOTE 2 See also PED Guidelines I-01 [5] and I-09 [6].

For corrugated metal hose assemblies designed and manufactured according to this European Standard, the risk analysis is already undertaken, see Annex E.

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## 1 Scope

This document specifies the requirements for design, manufacture and installation of corrugated metal hose assemblies for pressure applications, i.e. maximum allowable pressure PS greater than 0,5 bar.

## 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 764-4:2014, *Pressure equipment - Part 4: Establishment of technical delivery conditions for metallic materials*

EN 764-5:2014, *Pressure equipment - Part 5: Inspection documentation of metallic materials and compliance with the material specification*

EN 1092-1:2018, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated — Part 1: Steel flanges*

EN 1562:2019, *Founding - Malleable cast irons*

EN 1591-1:2013, *Flanges and their joints - Design rules for gasketed circular flange connections - Part 1: Calculation*

EN 1593:1999<sup>1</sup>, *Non destructive testing — Leak testing — Bubble emission techniques*

EN 1652:1997, *Copper and copper alloys - Plate, sheet, strip and circles for general purposes*

EN 1653:1997<sup>2</sup>, *Copper and copper alloys — Plate, sheet and circles for boilers, pressure vessels and hot water storage units* <https://standards.iteh.ai/catalog/standards/sist/09303dfe-66f1-4b2f-9a2b-0fba00e325f7/osist-pren-14585-1-rev-2022>

EN 1779:1999<sup>3</sup>, *Non destructive testing — Leak testing - Criteria for method and technique selection*

EN 1982:2017, *Copper and copper alloys - Ingots and castings*

EN ISO 6892-1:2019, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature (ISO 6892-1:2019)*

EN ISO 7369:2020, *Pipework - Metal hoses and hose assemblies - Vocabulary (ISO 7369:2020)*

EN ISO 9445-1:2010, *Continuously cold-rolled stainless steel - Tolerances on dimensions and form - Part 1: Narrow strip and cut lengths (ISO 9445-1:2009)*

EN ISO 9445-2:2010, *Continuously cold-rolled stainless steel - Tolerances on dimensions and form - Part 2: Wide strip and plate/sheet (ISO 9445-2:2009)*

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<sup>1</sup> Document impacted by A1:2003.

<sup>2</sup> Document impacted by A1:2000.

<sup>3</sup> Document impacted by A1:2003.

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EN ISO 9606-1:2017, *Qualification testing of welders - Fusion welding - Part 1: Steels (ISO 9606-1:2012 including Cor 1:2012 and Cor 2:2013)*

EN ISO 9606-4:1999, *Approval testing of welders - Fusion welding - Part 4: Nickel and nickel alloys (ISO 9606-4:1999)*

EN ISO 9712:2012, *Non-destructive testing - Qualification and certification of NDT personnel (ISO 9712:2012)*

EN 10028-2:2017, *Flat products made of steels for pressure purposes - Part 2: Non-alloy and alloy steels with specified elevated temperature properties*

EN 10028-4:2017, *Flat products made of steels for pressure purposes - Part 4: Nickel alloy steels with specified low temperature properties*

EN 10028-7:2016, *Flat products made of steels for pressure purposes — Part 7: Stainless steels*

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 10204:2004, *Metallic products - Types of inspection documents*

EN 10216-1:2013, *Seamless steel tubes for pressure purposes - Technical delivery conditions - Part 1: Non-alloy steel tubes with specified room temperature properties*

EN 10216-2:2013+A1:2019, *Seamless steel tubes for pressure purposes — Technical delivery conditions — Part 2: Non-alloy and alloy steel tubes with specified elevated temperature properties*

EN 10216-3:2013, *Seamless steel tubes for pressure purposes - Technical delivery conditions - Part 3: Alloy fine grain steel tubes*

EN 10216-4:2013, *Seamless steel tubes for pressure purposes - Technical delivery conditions - Part 4: Non-alloy and alloy steel tubes with specified low temperature properties*

EN 10216-5:2021, *Seamless steel tubes for pressure purposes — Technical delivery conditions — Part 5: Stainless steel tubes*

EN 10217-3:2019, *Welded steel tubes for pressure purposes - Technical delivery conditions - Part 3: Electric welded and submerged arc welded alloy fine grain steel tubes with specified room, elevated and low temperature properties*

EN 10217-4:2019, *Welded steel tubes for pressure purposes - Technical delivery conditions - Part 4: Electric welded non-alloy steel tubes with specified low temperature properties*

EN 10217-5:2019, *Welded steel tubes for pressure purposes - Technical delivery conditions - Part 5: Submerged arc welded non-alloy and alloy steel tubes with specified elevated temperature properties*

EN 10217-7:2021, *Welded steel tubes for pressure purposes — Technical delivery conditions — Part 7: Stainless steel tubes*

EN 10222-2:2017+A1:2021, *Steel forgings for pressure purposes — Part 2: Ferritic and martensitic steels with specified elevated temperature properties*

- EN 10222-3:2017, *Steel forgings for pressure purposes - Part 3: Nickel steels with specified low temperature properties*
- EN 10222-5:2017, *Steel forgings for pressure purposes - Part 5: Martensitic, austenitic and austenitic-ferritic stainless steels*
- EN 10253-2:2021, *Butt-welding pipe fittings — Part 2: Non alloy and ferritic alloy steels with specific inspection requirements*
- EN 10253-4:2008, *Butt-welding pipe fittings - Part 4: Wrought austenitic and austenitic-ferritic (duplex) stainless steels with specific inspection requirements*
- EN ISO 10380:2012, *Pipework - Corrugated metal hoses and hose assemblies (ISO 10380:2012)*
- EN 12164:2016, *Copper and copper alloys - Rod for free machining purposes*
- EN 12165:2016, *Copper and copper alloys - Wrought and unwrought forging stock*
- EN 12166:2016, *Copper and copper alloys - Wire for general purposes*
- EN 12167:2016, *Copper and copper alloys - Profiles and bars for general purposes*
- EN 12168:2016, *Copper and copper alloys - Hollow rod for free machining purposes*
- EN 12449:2016+A1:2019, *Copper and copper alloys — Seamless, round tubes for general purposes*
- EN 13134:2000, *Brazing — Procedure approval*
- EN 13184:2001<sup>4</sup>, *Non-destructive testing — Leak testing — Pressure change method*
- EN 13445-3:2021, *Unfired pressure vessels - Part 3: Design*
- EN 13480-2:2017, *Metallic industrial piping - Part 2: Materials*
- EN 13480-3:2017, *Metallic industrial piping - Part 3: Design and calculation*
- EN ISO 148-1:2016, *Metallic materials - Charpy pendulum impact test - Part 1: Test method (ISO 148-1:2016)*
- EN ISO 13585:2012, *Brazing - Qualification test of brazers and brazing operators (ISO 13585:2012)*
- EN ISO 14732:2013, *Welding personnel - Qualification testing of welding operators and weld setters for mechanized and automatic welding of metallic materials (ISO 14732:2013)*
- EN ISO 15610:2003, *Specification and qualification of welding procedures for metallic materials - Qualification based on tested welding consumables (ISO 15610:2003)*
- EN ISO 15613:2004, *Specification and qualification of welding procedures for metallic materials - Qualification based on pre-production welding test (ISO 15613:2004)*

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<sup>4</sup> Document impacted by A1:2003.

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EN ISO 15614-1:2017, *Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys (ISO 15614-1:2017, Corrected version 2017-10-01)*

EN ISO 17637:2016, *Non-destructive testing of welds - Visual testing of fusion-welded joints (ISO 17637:2016)*

EN ISO 20485:2018, *Non-destructive testing - Leak testing - Tracer gas method (ISO 20485:2017)*

**3 Terms and definitions**

For the purposes of this document, the terms and definitions in EN ISO 7369:2020 and the following apply.

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

**3.1****metal hose assembly**

assembly of a corrugated metal hose with its end fittings

**3.2****maximum allowable pressure  $P_S$** 

maximum pressure at the operating temperature for which the metal hose assembly is designed

Note 1 to entry See also 6.2.1.

**3.3****maximum allowable pressure at 20°C  $P_{S20}$** 

equivalent maximum pressure at ambient temperature for which the metal hose assembly is designed

**3.4****maximum/minimum allowable temperature  $T_S$** 

maximum and minimum temperature for which the metal hose assembly is designed

Note 1 to entry See also 6.2.1.

**3.5****nominal pressure  $P_N$** 

dimensionless alphanumeric designation which is a convenient rounded number commonly used for reference purposes of piping components and stock parts; for this European Standard  $P_N$  represents the maximum allowable pressure at 20°C as specified by the metal hose assembly manufacturer

**3.6****test pressure  $P_T$** 

pressure at which the metal hose assembly is proof tested (normally at ambient temperature)

**3.7****main pressure bearing parts**

parts, such as corrugated metal hose, braid, pipe ends, the failure of which may result in a sudden discharge of pressure energy

**3.8****pressure bearing parts**

parts, such as swivel nuts, flanges, threaded end fittings, that are not main pressure bearing parts defined in 3.7 and the failure of which may not lead to a sudden discharge of pressure energy

**3.9****attachments to pressure parts**

parts, such as ferrules, that are directly welded to parts defined in 3.7 or 3.8

**3.10****other parts**

parts, such as external protection, anti-kink device, braid protecting spiral, which are not parts according to 3.7 to 3.9

**3.11****experimental tests (Type testing)**

tests made to develop an experimental design method

**3.12****category**

classification of pressure equipment according to ascending level of hazard

Note 1 to entry See Annex A.

**3.13****equipment manufacturer**

natural or legal person responsible for the values of the parameters *PS* and *TS*

Note 1 to entry This may be the manufacturer or planner of the piping for which the metal hose assembly is designed.

**3.14****hose manufacturer**

natural or legal person responsible for the design and the manufacture of the corrugated metal hose and/or the metal hose assembly

**3.15****purchaser**

person or organization that orders products in accordance with this European Standard. The purchaser is not necessarily, but may be, a manufacturer of pressure equipment in accordance with the EU Directive listed in Annex ZA. Where a purchaser has responsibilities under this EU Directive, this European Standard will provide a presumption of conformity with the essential requirements of the Directive so identified in Annex ZA

**3.16****hydraulic forming (longitudinal welded)**

corrugating a tube by pressurizing the inside against external tooling which allows this corrugated tube to be axially shortened during the process

**3.17****roll forming (longitudinal welded)**

corrugating a tube by rolling from the outside to the inside and allowing or forcing this corrugated tube to be axially shortened during the process

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**prEN 14585-1:2022 (E)****3.18****helical crest welded (resistance welded)**

profiling a strip, rolling it over helically and finally welding the overlaps

**3.19****strand**

group of parallel wires used for plain braid or wires woven together to form a braided strand

**3.20****braided braid**

braid that is manufactured from previously braided strands

**3.21****operating instructions**

written procedure provided by the manufacturer which include all information regarding installation, operation, safety and maintenance of the equipment within the manufacturer's scope of supply

**4 Classification**

For the application of this European Standard, hose assemblies are divided into groups according to ascending level of hazard: SEP, Category I, and Categories II and III.

The grouping is, according to the requirements of PED [1], depending on their nominal diameter DN, their maximum allowable pressure PS, and on the type of fluid they convey.

According to the conformity assessment tables of the PED (see also Annex A) the different levels of hazard lead to:

- SEP, covering the field of sound engineering practice according to Article 4, Clause 3 of PED; i.e. smallest level of hazard with no CE marking;
- Category I, covering metal hose assemblies designed for a mean level of hazard and being CE marked;
- Categories II and III, covering metal hose assemblies designed for higher levels of hazard and being CE marked.

**5 Materials****5.1 General requirement**

Materials for the manufacture of hose assemblies including filler metal shall be selected on the basis of their suitability for fabrication, e.g. forming, joining, etc. (see Clause 7), and for the conditions under which they will be used.

Materials used for hose assemblies according to Categories I to III shall fulfil the additional requirements specified in 5.6.

When combining different materials, special care shall be taken regarding compatibility with each other.

**5.2 Suitable materials**

Materials suitable for hoses assemblies are given as follows:

- a) Materials suitable for corrugated metal hoses and their temperature limits are given in Table 1;
- b) Materials suitable for braid, end fittings, and additional parts are given in Table 2.

Table 1 — Materials for corrugated metal hoses and their temperature limits

Material			Temperature °C		Document
Type	Number	Steel name	Minimum	Maximum	
stainless austenitic steels	1.4306	X2CrNi19-11	- 273 <sup>a</sup>	550	EN 10028-7:2007
	1.4401	X5CrNiMo17-12-2	- 196 <sup>a</sup>	550	
	1.4404	X2CrNiMo17-12-2	- 273 <sup>a</sup>	550	
	1.4435	X2CrNiMo18-14-3	- 273 <sup>a</sup>	550	
	1.4539	X1NiCrMoCu25-20-5	- 196 <sup>a</sup>	550	
	1.4541	X6CrNiTi18-10	- 273 <sup>a</sup>	550	
	1.4547	X1CrNiMoCuN20-18-7	- 196 <sup>a</sup>	500	
	1.4571	X6CrNiMoTi17-12-2	- 273 <sup>a</sup>	550	
heat resistant austenitic steels	1.4876	X10NiCrAlTi32-21 X10NiCrAlTi32-21 (H)	- 196	600 (900) <sup>b</sup>	See Annex C
Nickel alloys	2.4360	NiCu30Fe	- 196	425	See Annex C
	2.4610	NiMo16Cr16Ti	- 196	400	EAM-0526-28
	2.4816	NiCr15Fe	- 10	450	EAM-0526-43-1, EAM-0526-43-2
			(- 273) <sup>c</sup>	(900) <sup>b</sup>	See Annex C
	2.4819	NiMo16Cr15W	- 196	400	EAM-0526-18
	2.4856	NiCr22Mo9Nb	- 196 (- 273) <sup>c</sup>	450 (900) <sup>b</sup>	EAM-0526-40 See Annex C
	2.4858	NiCr21Mo	- 10	540	See Annex C

a minimum temperature in accordance with EN 13445-2:2021, Annex B or EN 13480-2:2017, Annex B.

b special care should be exercised due to the risk of embrittlement when using the materials at elevated temperatures above 550 °C. See 6.2.2 for details.

c See 5.6.3 a) for details.