SLOVENSKI STANDARD
SIST EN 12285-1:2018

01-november-2018

Nadomešča:
SIST EN 12285-1:2003

V delavnici izdelani rezervoarji iz jekla - 1. del: Ležeči enoplaščni in dvoplaščni valjasti rezervoarji za podzemno skladiščenje vnetljivih in nevnetljivih tekočin, ki onesnažujejo vodo in ki se ne uporabljajo za ogrevanje in hlajenje stavb

Workshop fabricated steel tanks - Part 1: Horizontal cylindrical single skin and double skin tanks for the underground storage of flammable and nonflammable water polluting liquids other than for heating and cooling of buildings

Werksgefertigte Tanks aus Stahl - Teil 1: Liegende zylindrische ein- und doppelwandige Tanks zur unterirdischen Lagerung von brennbaren und nicht brennbaren wassergefährdenden Flüssigkeiten

Réservoirs en acier fabriqués en atelier - Partie 1 : Réservoirs horizontaux cylindriques à simple et double paroi pour le stockage enterré de liquides inflammables et non inflammables polluant l'eau en dehors du chauffage et du refroidissement des bâtiments

Ta slovenski standard je istoveten z: **EN 12285-1:2018**

ICS:

13.300	Varstvo pred nevarnimi izdelki	Protection against dangerous goods
23.020.10	Nepremične posode in rezervoarji	Stationary containers and tanks

SIST EN 12285-1:2018 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 12285-1

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ICS 13.300; 23.020.10

Supersedes EN 12285-1:2003

English Version

Workshop fabricated steel tanks - Part 1: Horizontal cylindrical single skin and double skin tanks for the underground storage of flammable and nonflammable water polluting liquids other than for heating and cooling of buildings

Réservoirs en acier fabriqués en atelier - Partie 1 : Réservoirs horizontaux cylindriques à simple ou double paroi pour le stockage enterré de liquides inflammables et non inflammables polluant l'eau en dehors du chauffage et du refroidissement des bâtiments

Werksgefertigte Tanks aus Stahl - Teil 1: Liegende, zylindrische, ein- und doppelwandige Tanks zur unterirdischen Lagerung von brennbaren und nicht brennbaren wassergefährdenden Flüssigkeiten, die nicht für das Heizen und Kühlen von Gebäuden vorgesehen sind

This European Standard was approved by CEN on 15 February 2018.

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.

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

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

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European foreword

This document (EN 12285-1:2018) has been prepared by Technical Committee CEN/TC 265 “Metallic tanks for the storage of liquids”, 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 January 2019, and conflicting national standards shall be withdrawn at the latest by April 2020.

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, together with prEN 12285-3:2016, supersedes EN 12285-1:2003.

Compared to EN 12285-1:2003, this document has been revised as follows:

— exclusion of tanks covered by the Mandate M/131;

— old Clause 3, Terms and definitions has been combined with old Clause 4, Symbols and abbreviations;

— old Clause 5, Designation and purchaser's specification has been combined with new Clause 7, Classification and designation;

— old Clause 6, Materials, Clause 7, Design, Clause 8, Fabrication and Clause 10, Handling and installation have been replaced by new Clause 4, Product characteristics;

— old Clause 9, Testing has now become Clause 5, Testing, assessment and sampling methods;

— old Clause 11, Marking of the tank and manufacturer's statement has now been combined with new Clause 8, Marking, labelling and packaging.

The informative Annexes A and B give further guidance: A on transport, storage and installation procedures and B on the liquid-material combinations to be chosen. Annex C provides guidance on environmental aspects.

This European Standard *Workshop fabricated steel tanks* consists of 3 parts:

— *Part 1: Horizontal cylindrical single skin and double skin tanks for the underground storage of flammable and nonflammable water polluting liquids other than for heating and cooling of buildings*;

— *Part 2: Horizontal cylindrical single skin and double skin tanks for the aboveground storage of flammable and non-flammable water polluting liquids*;

— *Part 3: Horizontal cylindrical single skin and double skin tanks for the underground storage of flammable and nonflammable water polluting liquids for heating and cooling of buildings*.

According to the CEN-CENELEC Internal Regulations, the national standards organizations 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 the product characteristics and test methods for workshop fabricated cylindrical, horizontal steel tanks, single (type S) and double skin (type D) intended to be used for the underground storage of water polluting liquids (both flammable and non-flammable) and installed in industrial processes or in petrol stations at normal ambient temperature conditions (−20 °C to +50 °C) within the following limits:

— from 800 mm up to 3 000 mm nominal diameter and;

— up to a maximum overall length of 6 times the nominal diameter;

— with an operating pressure (Po) of maximum 50 kPa (0,5 bar(g)) and minimum – 5 kPa (–50 mbar(g)) and;

— for double skin tanks with a vacuum leak detection system where the kinematic viscosity does not exceed 5×10^{-3} m^2/s.

Tanks designed to this standard allow for an earth cover of up to 1,5 m. If there are imposed traffic loads or a greater earth cover, calculation is expected to be carried out.

This document is not applicable to tanks used for storage and/or supply of fuel/gas for building heating/cooling systems, and of hot or cold water not intended for human consumption, nor to loads and special measures necessary in areas subject to risk of earthquakes.

Guidance on installation of tanks is presented in Annex A, which does not include special measures that might be necessary in areas subject to flooding.

This document is not applicable for the storage of liquids having dangerous goods classes listed in Table 1 because of the special dangers involved.

Table 1 — List of dangerous goods which are not covered by this standard

UN-classification	Type of dangerous goods
Class 1	Explosives
Class 4.2	Substances liable to spontaneous combustion
Class 4.3	Substances which in contact with water emit flammable gases
Class 5.2	Organic peroxides
Class 6.2	Infectious substances
Class 7	Radioactive substances, hydrocyanic or hydrocyanic solvent liquids, metal carbons, hydrofluoric acid, bromide liquids

NOTE The classifications referred to are those adopted by the United Nations Committee of Experts on the Transport of Dangerous Goods (not to be interpreted as tank classes described in 6.2).

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 10025-2:2004, *Hot rolled products of structural steels – Part 2: Technical delivery conditions for non-alloy structural steels*

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

EN 13160-1, *Leak detection systems – Part 1: General Principles*

EN 13160-2, *Leak detection systems – Part 2: Requirements and test/assessment methods for pressure and vacuum systems*

EN 13160-3, *Leak detection systems – Part 3: Requirements and test/assessment methods for liquid systems for tanks*

EN 22768 (all parts), *General tolerances (ISO 2768 series)*

EN ISO 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel – Part 1: Bolts, screws and studs with specified property classes - Coarse thread and fine pitch thread (ISO 898-1)*

EN ISO 12944-7, *Paints and varnishes - Corrosion protection of steel structures by protective paint systems – Part 7: Execution and supervision of paint work (ISO 12944-7)*

EN ISO 13920, *Welding - General tolerances for welded constructions - Dimensions for lengths and angles - Shape and position (ISO 13920)*

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions 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

3.1.1
tank
workshop fabricated cylindrical containment for the storage of liquids

Note 1 to entry: Tanks are made of steel plates, equipped with dished ends and consist of one or more compartments.

3.1.2
underground tank
tank which is totally or partially imbedded in the ground

3.1.3
compartment
single fluid storage space within a tank

3.1.4
explosion pressure shockproof tank
tank which is designed to withstand an internal explosion without leakage

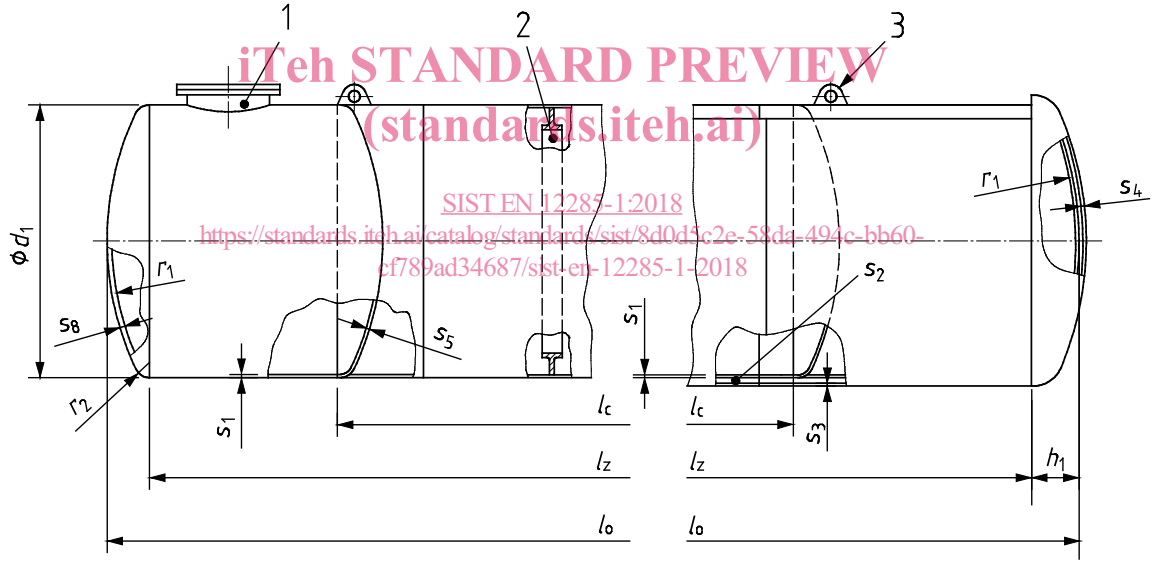
Note 1 to entry: Permanent deformations are permissible.

3.1.5
single skin tank
impermeable containment consisting of a self contained/ self supported tank of single containment

Note 1 to entry: A single skin tank also constitutes the inner skin of a double skin tank.

Note 2 to entry: See Figure 1.

Tank type S (single skin) **Tank type D** (double skin)



Key
1 for manway detail see Figure 3
2 for example for stiffening ring see Figure 4
3 lifting lug

Figure 1 — Example of tank symbols

3.1.6
double skin tank
impermeable self contained tank with outer skin welded around the inner tank

Note 1 to entry: See Figure 1.

3.1.7
operating pressure
***p*o**
pressure bar(g) inside the tank above the liquid during operating conditions

3.1.8
prototype tank test pressure
***p*t1**
pressure bar(g) to which the tank or compartment is subjected for testing

3.1.9
prototype interstitial space test pressure
***p*t2**
pressure bar(g) to which the interstitial space between the skins is subjected for testing

Note 1 to entry: Only applicable for double skin tanks.

3.1.10
tank leak tightness test pressure
***p*t3**
pressure bar(g) to which the tank or compartment is subjected to leak testing

3.1.11
interstitial space leak tight test pressure
pt_4
pressure bar(g) to which the interstitial space is subjected to leak testing

3.1.12
nominal volume
storage capacity for which the tank is designed

3.1.13
actual volume
volume which is equal to or greater than the nominal volume

3.2 Symbols and abbreviations

For the purpose of this standard the following symbols apply.

Dimensions in millimetres

a	dimension for welding (See Figure 2)
d_1	external nominal diameter of the tank
d_2	internal diameter of the manway
d_3	diameter of the manway cover and corresponding flange
h_1	length of the straight flange of the dished end
K_p	pitch circle diameter of manway bolts
l_c	length of the compartment of a tank without dished ends

NOTE 1 For a single compartment tank Lc = Lz

l_o	overall length of the tank
l_Z	length of the tank without dished ends
NOTE 2	For a single compartment tank Lc = Lz
p_t	test pressure
p_{t1}	test pressure for prototype test of tank
p_{t2}	test pressure of prototype test of interstitial space
p_{t3}	test pressure of leak tightness test of tank
p_{t4}	test pressure of leak tightness test of interstitial space
r_1	crown radius of dished ends
r_2	knuckle radius of dished ends
s_1	nominal thickness of shell (single walled tank) and inner shell (double walled tank)
s_2	interstitial space
s_3	nominal thickness of outer shell
s_4	nominal thickness of outer dished ends
s_5	nominal thickness of compartment dished ends
s_6	nominal thickness of manway flange and cover
s_7	plate thickness of manway body
s_8	nominal thickness of inner dished ends
γ	incline angle for T-joint welding

4 Product characteristics

4.1 General

The tank material shall be suitable for long term contact with the stored media. Guidelines on material specifications in relation to stored media are provided in Annex B.

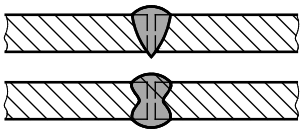
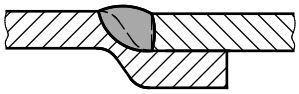
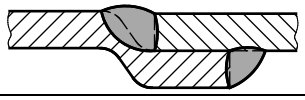
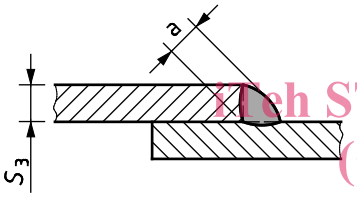
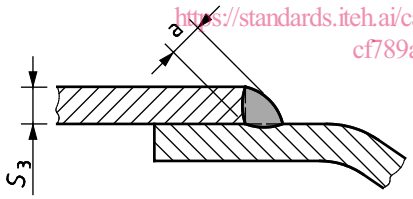
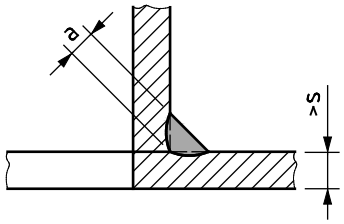
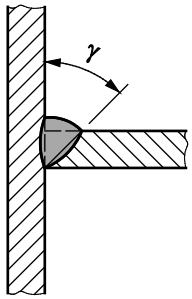
The safe working capacity of the tank should usually not exceed 97 % of the nominal volume at normal operating temperatures.

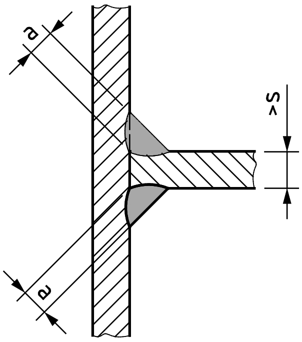
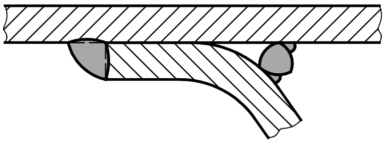
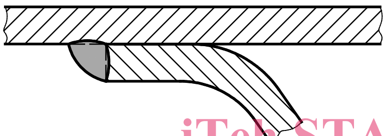
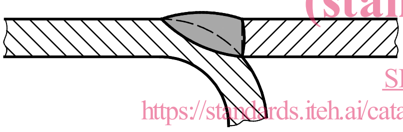
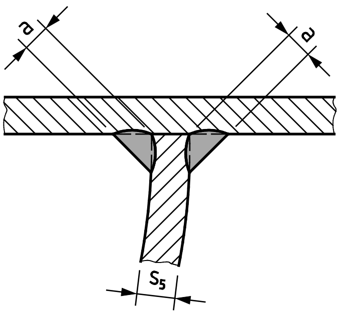
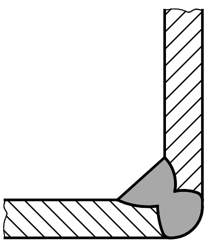
4.2 Welding

4.2.1 Types of joints

The welding related to the different types of joints is given in Table 2. The types of welded joints shall be in accordance with Table 2.

Table 2 — Types of welded joints

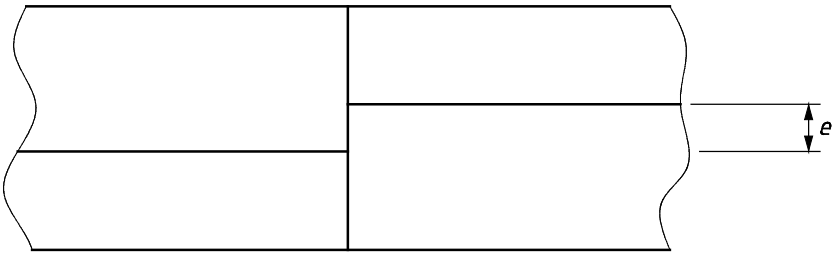
Number	Types of joints	Applicable welding class of tanks and liquid (liquid touched wall)
1	Square butt joint 	Plate misalignment shall not exceed 0,3 s_1 respectively 0,3 s_3 or 2 mm For all classes
2a	Joggled butt joint 	For class A and hydrocarbon liquids For double and single skin tanks Not permissible with inner coating
2b	Joggled butt joint 	For class A, B and C
3a	Overlap joint 	For class A, B and C For outer skin a = 0,7 s_3
3b	Overlap joint 	For class A, B and C For outer skin on outer dished end a = 0,7 s_3
4	Fillet weld in T-joint 	For class A, B and C For nozzles in the outer skin a = 0,7 s_{min} s_{min}: thickness of the thinner plate
5	Fillet weld (full penetration) in T-joint 	For class A, B and C For manways, nozzles and inspection covers γ = 45°

6	Double fillet weld in T-joint 	For class A, B and C For manways, nozzles and stiffening rings $a = 0,7\ s_{min}$ s_{min} = thickness of the thinner plate
7a	Fillet weld in overlap joint 	For class A, B and C For compartment dished ends with knuckle radius
7b	Fillet weld in overlap joint 	For class A, B and C For compartment dished ends with knuckle radius Not permissible with inner coating
8	Butt joint 	For class A and B For compartment dished ends with knuckle radius Not permissible with inner coating
9	Double fillet weld in T-joint 	For class A and B For compartment dished ends without knuckle radius a = 0,7 s_5
10	Corner and fillet weld 	For class A and B For set-on manways and nozzles

4.2.2 Shell plate arrangement

Cross seams shall not be used. Longitudinal welds shall not be used in the bottom half of the tank.

Shell plate joints shall be offset, having a minimum distance *e* of five times the wall thickness but not less than 25 mm as shown in Figure 2.



Key

e minimum distance

Figure 2 — Shell-plate arrangement for inner and outer skin

4.2.3 Consumables

All welding rods/wires and other consumables shall be compatible with the basic material.

4.2.4 Interstitial space

The interstitial space gap should be as small as practically possible but suitable for the leak detection system to function.

There shall be at least two sockets for the leak detection system and these shall be located at the highest practical point of the cylindrical part of the interstitial space.

The interstitial space shall be connected to a leak detection system in order to monitor the integrity of the tank permanently; the leak detection systems shall fulfil the requirements of EN 13160-1, and EN 13160-2 or EN 13160-3.

4.3 Load bearing capacity

When tested in accordance with 5.2, the maximum out of roundness of the completed tank after manufacture shall not exceed 1,5 % of the diameter.

The tolerance on the overall length of the tank shall be ± 1 % of the real length stated by the manufacturer.

4.4 Additional requirements

4.4.1 Manways and inspection covers

With the exception of cases where inspection covers are not allowed, the tanks shall be equipped with at least one inspection cover per compartment. In cases where inspection covers are not allowed, the tanks shall have one manway of at least d_2 = 600 mm. No part of a compartment shall be more than 10 m from a manway. Single skin tanks shall always have a manway.

Manways, inspection covers, nozzles and/or flanges shall be of set-through or set-on-type and flanges shall be welded in accordance with Table 2.

For the dimensions of the manways and their components see Table 3.

Gaskets shall be provided and shall be suitable for their purpose.

Table 3 — Dimensions of manway components

Inside diameter d_2 mm	Plate thickness of manway body s_7 mm	Diameter of manway cover and corresponding flange d_3 mm	Pitch circle diameter K_p mm	Bolt hole diameter mm	Flange thickness and cover thickness s_6 mm		Bolts	
					Class A	Class B and C	Thread size	Number
600[a]	6	720	680	18	12	16	M16	32
800	7	920	880		12	20		44
1000[b]	7	1 120	1 080		—	20		48

[a] If a manway is required and no specification is given by the purchaser this diameter shall be used.

[b] For tanks of class C inside diameters of the manway (d2) exceeding 800 mm is not permitted.

Instead of the manway covers shown in the Figure 3 and dimensioned in Table 3, pressed parts of manways (covers and/or nozzles) may be used in class A tanks with a plate thickness at least equal to the thickness of the inner tank s_1. A ribbed or pressed manway cover shall withstand the test pressure p_{t1}.

The gasket shall be in one piece.

For inspection covers for tanks of class A with $d_1 \leq 1250$ mm and tanks of classes B and C with $d_1 \leq 1000$ mm, the diameter of the inspection cover shall not be larger than 300 mm and not smaller than 120 mm, and the thickness of the inspection cover shall be equal to the minimum thickness of the inner tank.

4.4.2 Structural bolts

Structural bolts used shall be in accordance with EN ISO 898-1, with a property class being at least 6.8.

4.4.3 Tank fittings, pipes and nozzles

Materials used for the fabrication of tank accessories shall be compatible with the tank material, if welded to the tank.

All tank fittings, pipes and nozzles, shall be situated on the manway cover or above the maximum fill level of 97 % of the tank capacity, (that is, the safe working volume).

For tanks of class C only the set-through manways shall be used. For set-through manways a vent of a minimum of 10 mm diameter or equivalent opening shall be provided in the manway at the highest practical point in accordance with Figure 3, item 4.

With the exception of nozzles for leak detection systems, there shall be no penetration of the outer skin. Fittings and all other openings shall have a minimum distance of 50 mm to welded seams.