



# SLOVENSKI STANDARD

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**Cisterne za prevoz nevarnega blaga - Kovinske cisterne pod tlakom -  
Konstruiranje in izdelava**

Tanks for the transport of dangerous goods - Metallic pressure tanks - Design and construction

Tanks für die Beförderung gefährlicher Güter - Metallische Drucktanks - Auslegung und Bau

Citernes destinées au transport de matières dangereuses - Citernes métalliques sous pression - Conception et fabrication

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**Ta slovenski standard je istoveten z: EN 14025:2023**

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**ICS:**

13.300	Varstvo pred nevarnimi izdelki	Protection against dangerous goods
23.020.20	Posode in vsebniki, montirani na vozila	Vessels and containers mounted on vehicles

**SIST EN 14025:2024**

**en,fr,de**



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## Tanks for the transport of dangerous goods - Metallic pressure tanks - Design and construction

Citernes pour le transport de matières dangereuses -  
Citernes métalliques sous pression - Conception et  
construction

Tanks für die Beförderung gefährlicher Güter -  
Metallische Drucktanks - Auslegung und Bau

This European Standard was approved by CEN on 4 September 2023.

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

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## European foreword

This document (EN 14025:2023) has been prepared by Technical Committee CEN/TC 296 “Tanks for the transport of dangerous goods”, the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by May 2024, and conflicting national standards shall be withdrawn at the latest by May 2024.

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 14025:2018.

This document will be submitted for reference in:

- the RID and
- the technical annexes of the ADR

NOTE These regulations take precedence over any clause of this standard. It is emphasized that RID/ADR are being revised regularly at intervals of two years which may lead to temporary non-compliances with the clauses of this document.

Compared with EN 14025:2018 the following significant changes apply:

- a) change of the Scope;
- b) Normative references were updated;
- c) references regarding RID/ADR were updated according to the drafting rules for standard candidates;
- d) 3.2 was updated and  $P$  has been replaced by  $p$  in the whole document;
- e) a paragraph regarding material characteristics was added to 4.1;
- f) Notes have been added to 5.3;
- g) a paragraph regarding coatings was added to 6.1.1;
- h) a note regarding liquefied and compressed gases was added to 6.1.2;
- i) a note was added to 6.3.3.4.2;
- j) Figure 8 and corresponding subfigures were changed;
- k) 6.3.5.2.6 has been revised;
- l) 6.3.5.2.7 has been updated;
- m) the value of the diameter of openings was changed in 6.3.5.3.3;
- n) 6.5 was updated;
- o) a new paragraph was added to 7.4.1.2;
- p) Annex A have been revised;
- q) Figure A.1 was changed according to the new calculations with the changed value of  $E$ ;

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- r) the value of E was changed in A.2;
- s) B.3 was updated

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

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, Türkiye and the United Kingdom.

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## 1 Scope

This document specifies the minimum requirements for the design and construction of metallic pressure tanks for the transport of dangerous goods by road and rail and sea. This document includes requirements for openings, closures and structural equipment; it does not cover requirements of service equipment. For tanks for the transport of cryogenic liquids, EN 13530-1 and EN 13530-2 apply.

This document is applicable to liquefied gases including LPG; however for a dedicated LPG standard see EN 12493.

NOTE 1 The Design and construction of pressure tanks according to the Scope of this document are primarily subject to the requirements of RID/ADR see Subsections 6.8.2.1, 6.8.3.1 and 6.8.5, as well as Chapter 3.2, Table A, columns 12 and 13, to Chapter 4.3 and Subsection 6.8.2.4 of ADR, as relevant. For the structural equipment conforming to the requirements of RID/ADR see Subsections 6.8.2.2 and 6.8.3.2, as relevant. The definitions of RID/ADR, Subsection 1.2.1, are referred to. For portable tanks see also RID/ADR, Chapter 4.2 and Sections 6.7.2 and 6.7.3, as well as Chapter 3.2, Table A, Columns 10 and 11.

NOTE 2 This document is not applicable to gravity-discharge tanks according to RID/ADR 6.8.2.1.14 (a).

If not otherwise specified, provisions which take up the whole width of the page apply to all kind of tanks. Provisions contained in a single column apply only to:

tanks according to RID/ADR Chapter 6.8 (left-hand column);	portable tanks according to RID/ADR Chapter 6.7 (right-hand column).
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## 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 1591-1, *Flanges and their joints - Design rules for gasketed circular flange connections - Part 1: Calculation*

EN 12972, *Tanks for transport of dangerous goods - Testing, inspection and marking of metallic tanks*

EN 13094:2020+A1:2022, *Tanks for the transport of dangerous goods - Metallic gravity-discharge tanks - Design and construction*

EN 13445-2, *Unfired pressure vessels - Part 2: Materials*

EN 13445-3:2021, *Unfired pressure vessels - Part 3: Design*

EN 13445-4, *Unfired pressure vessels - Part 4: Fabrication*

EN 13445-8, *Unfired pressure vessels - Part 8: Additional requirements for pressure vessels of aluminium and aluminium alloys*

EN ISO 3834-1, *Quality requirements for fusion welding of metallic materials - Part 1: Criteria for the selection of the appropriate level of quality requirements (ISO 3834-1)*

EN ISO 3834-2, *Quality requirements for fusion welding of metallic materials - Part 2: Comprehensive quality requirements (ISO 3834-2)*

EN ISO 9606-1, *Qualification testing of welders - Fusion welding - Part 1: Steels (ISO 9606-1)*

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EN ISO 9606-2, *Qualification test of welders - Fusion welding - Part 2: Aluminium and aluminium alloys (ISO 9606-2)*

EN ISO 14732, *Welding personnel - Qualification testing of welding operators and weld setters for mechanized and automatic welding of metallic materials (ISO 14732)*

EN ISO 15607, *Specification and qualification of welding procedures for metallic materials - General rules (ISO 15607)*

EN ISO 15609-1, *Specification and qualification of welding procedures for metallic materials - Welding procedure specification - Part 1: Arc welding (ISO 15609-1)*

EN ISO 15609-3, *Specification and qualification of welding procedures for metallic materials - Welding procedures specification - Part 3: Electron beam welding (ISO 15609-3)*

EN ISO 15609-4, *Specification and qualification of welding procedures for metallic materials - Welding procedure specification - Part 4: Laser beam welding (ISO 15609-4)*

EN ISO 15613, *Specification and qualification of welding procedures for metallic materials - Qualification based on pre-production welding test (ISO 15613)*

EN ISO 15614-1, *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)*

EN ISO 15614-2, *Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 2: Arc welding of aluminium and its alloys (ISO 15614-2:2005)*

ISO 1496-3, *Series 1 freight containers — Specification and testing — Part 3: Tank containers for liquids, gases and pressurized dry bulk*

ISO 7005-1, *Pipe flanges — Part 1: Steel flanges for industrial and general service piping systems*

ISO 9016:2022, *Destructive tests on welds in metallic materials — Impact tests — Test specimen location, notch orientation and examination*

### **3 Terms, definitions and symbols**

#### **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 <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

##### **3.1.1**

##### **pressure tank**

tank as defined in the international regulations for the transport of dangerous goods by road or rail having a maximum working pressure exceeding 50 kPa (0,5 bar)

### 3.2 Symbols

The following general symbols are used throughout the text. They are listed in alphabetical order and special symbols are explained with the relevant formulae. Additional symbols used in the text are explained in:

RID/ADR Chapter 6.8

RID/ADR Chapter 6.7

$A_1$	minimum elongation at fracture of the metal chosen under tensile stress in %	
$D$	internal diameter of shell in mm	
$D_c$	mean diameter of the cylindrical part of the shell at the junction of a cone in mm	
$D_e$	outside diameter of the cylindrical part of the shell or the straight flange of the dished end in mm	
$D_i$	inside diameter of the cylindrical part of the shell or the straight flange of dished end in mm	
$d_i$	inside diameter of an opening in mm	
$E$	Young's modulus in N/mm <sup>2</sup>	
$e$	minimum required wall thickness of the shell in mm	
$e_0$	minimum shell thickness for mild steel in mm <sup>1</sup> ,	
$e_1$	minimum shell thickness for the metal chosen in mm	
$e_k$	wall thickness of a conical part of a shell in mm	
$e_R$	wall thickness of a hemispherical end in mm	
$f_d$	nominal design stress (allowable stress) in N/mm <sup>2</sup>	
$h$	inside height of an ellipsoidal dished end in mm	
$K$	shape factor of ellipsoidal ends	
$MWP$	maximum working pressure, in MPa	$MAWP$ maximum allowable working pressure, in MPa
$p$	design pressure, in MPa	
$p_{dyn}$	equivalent dynamic pressure in MPa	
$p_{test}$	test pressure, in MPa	
$p_{vap}$	vapour pressure at 50 °C or at the design temperature, whichever is the higher; to be taken as the numerical value of the absolute pressure	$P_{vap1}$ vapour pressure of the substance at 65 °C (according to RID/ADR, Subsection 6.7.2.1) $P_{vap2}$ vapour pressure of the non-refrigerated liquefied gas depends on the portable tank type (according to RID/ADR, Subsection 6.7.3.1)
$P_c$	calculation pressure in MPa as specified in RID/ADR, Subsection 6.8.2.1.14	
$P_T$	test pressure in MPa	

<sup>1</sup> See RID/ADR, Subsections 6.8.2.1.18 and 6.8.2.1.19

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$R$	inside spherical radius of the central part of a torispherical end in mm
$R_e$	guaranteed (upper) minimum yield strength or guaranteed minimum 0,2 % proof strength, in N/mm <sup>2</sup> (for austenitic steel the 1 % proof strength may be chosen)
$R_{e,t}$	guaranteed (upper) minimum yield strength or guaranteed minimum 0,2 % proof strength, at the relevant design temperature, in N/mm <sup>2</sup> (for austenitic steel the 1 % proof strength at the relevant design temperature may be chosen)
$R_m$	guaranteed minimum tensile strength, in N/mm <sup>2</sup>
$R_{m1}$	minimum tensile strength of the metal chosen in N/mm <sup>2</sup>
$R_{m,t}$	guaranteed minimum tensile strength at the relevant design temperature, in N/mm <sup>2</sup>
$r$	inner knuckle radius, in mm
$S$	safety factor
$\lambda$	welding coefficient
$\sigma$	permissible stress in N/mm <sup>2</sup> , as defined in RID/ADR, Subsection 6.8.2.1.16

**4 Materials****4.1 General**

The tank shell shall be fabricated from metallic materials which shall be resistant to brittle fracture and of adequate impact strength within the design temperature range. The material shall be suitable for forming.

EN 13445-2 and EN 13445-8 apply, whilst the minimum material requirements given in RID/ADR, Chapter 6.8 and Chapter 6.7, are fulfilled.

Material characteristics shall be certified or attested as defined in Clause 7.1.3 even in temperature where needed. This includes the usage of 15 % increased strength values when using austenitic steels.

Aluminium may only be used for the shells of portable tanks when indicated in a portable tank special provision assigned to a specific substance in RID/ADR, Chapter 3.2, Table A, Column 11 or when approved by the competent authority.

NOTE For aluminium and aluminium alloys, see also EN 14286.

RID/ADR restrict the use of materials with respect to the maximum yield and tensile strength of fine-grained steel for welded shells, maximum ratios of yield/tensile strength for welded steel shells and of the minimum elongation at fracture for welded fine-grained other steel and aluminium shells. Welded shells shall be fabricated from a material which has been shown to have acceptable welding characteristics.

## 4.2 Compatibility

Shells, fittings, equipment and pipework which are in contact with the substance(s) intended to be carried shall be constructed from materials which are:

- a) substantially immune to attack by the substance(s) intended to be transported; or
- b) properly passivated or neutralized by chemical reaction; or
- c) lined with corrosion-resistant material directly bonded to the shell or attached by equivalent means.

For further information on material properties see

RID/ADR, Subsection 6.8.2.1.9

RID/ADR, Subsections 6.7.2.2 and 6.7.3.2

Gaskets shall be made of materials not subject to attack by the substances intended to be transported. The materials of the tank, including any devices, gaskets, linings and accessories, shall not adversely affect the substances intended to be transported in the tank.

Guidelines on material specifications in relation to the substances to be transported may be taken from EN 12285-1:2003, Annex B.

## 5 Design

### 5.1 General

Tanks shall be designed to withstand without loss of contents the:

- 1) operating conditions including static and dynamic forces in normal conditions of carriage. In addition, the design of portable tanks shall account for the effects of fatigue, caused by repeated application of these loads through the expected life of the portable tank;
- 2) test conditions;
- 3) explosion-pressure-shock resistant condition (if required) (see Annex B);

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under consideration of Clause 6.

If sudden temperature differences are to be expected during filling or discharge of the tank the buckling effect of one sided expansion or contraction should be taken into account.

### 5.2 Minimum shell thickness

The shell thickness will not be less than that given in:

RID/ADR, Subsections 6.8.2.1.17 to 6.8.2.1.18,  
see Figure 1 of this standard

RID/ADR, Subsections 6.7.2.4 or 6.7.3.4,  
see Figure 2 of this standard

**EN 14025:2023 (E)****5.3 Reduction of shell thickness**

The reduction of the minimum shell thickness (see Figure 1) is allowed if protection of the shell against damage through lateral impact or overturning is provided (see 5.4 and RID/ADR, Subsections 6.8.2.1.19 to 6.8.2.1.20 and 6.8.2.1.21 respectively) whilst the minimum requirements given in RID/ADR, Subsection 6.8.2.1.17 are met.

For shells of tanks according to RID no reduction of the minimum wall thickness due to protection is allowed.

When additional protection against shell damage is provided as described in 5.4, portable tanks with test pressure less than 2,65 bar may have the minimum shell thickness reduced, in proportion to the protection provided

NOTE 1 For further information, see RID/ADR, Subsections 6.7.2.4.3 to 6.7.2.4.5

NOTE 2 For vacuum operated waste tanks, see RID/ADR Subsection 6.10.1.2.1.

**5.4 Protection of the shell****5.4.1** When required by 5.3 shells of:

tank containers

portable tanks

are protected against damage if one of the following measures is provided:

- structure, in which the shell is supported by a complete skeleton including longitudinal and transverse structural members. This structure shall conform to the requirements of ISO 1496-3;
- double wall construction, where the aggregate thickness of the outer metal wall and the shell itself is not less than the minimum shell thickness prescribed in:

RID/ADR, Subsection 6.8.2.1.18 and the shell wall thickness is not less than the minimum shell thickness prescribed in RID/ADR, Subsection 6.8.2.1.19;

RID/ADR, Subsections 6.7.2.4.1 and 6.7.2.4.2 and the shell wall thickness is not less than the minimum shell thickness prescribed in RID/ADR, Subsections 6.7.2.4.3 and 6.7.2.4.4;

- “sandwich” construction, which means shells made with double walls having an intermediate layer of rigid solid materials (e.g. foam, at least 50 mm thick), where the outer wall has a thickness of at least 0,5 mm of steel, 0,8 mm of aluminium or 2 mm of a plastics material reinforced with glass fibre. For other layer materials (e.g. mineral wool, at least 100 mm thick), the outer wall has a thickness of at least 0,8 mm of austenitic steel. Other combinations of materials used to provide protection against damage shall be shown to have equivalent strength. One method of comparing the strength of sheets of materials is given in EN 13094: 2020+A1:2022, Annex B.

**5.4.2** For shells of road tank vehicles see also EN 13094: 2020+A1:2022, 6.8.2.