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

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This standard includes the English version of the European Standard.

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

Citernes pour le transport de matières dangereuses - Citernes métalliques à vidange par gravité - Conception et construction

Tanks für die Beförderung gefährlicher Güter - Metalltanks mit Entleerung durch Schwerkraft - Auslegung und Bau

This European Standard was approved by CEN on 1 June 2020 and includes Amendment 1 approved by CEN on 28 April 2022.

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European foreword

This document (EN 13094:2020+A1:2022) 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of an identical text or by endorsement, at the latest by November 2022, and conflicting national standards shall be withdrawn at the latest by November 2022.

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 includes Amendment 1 approved by CEN on 28 April 2022.

This document supersedes ▌A1⟩ EN 13094:2020 ⟨A1▌.

The start and finish of text introduced or altered by amendment is indicated in the text by tags ▌A1⟩ ⟨A1▌.

Compared with EN 13094:2015, the following are the principal changes that have been made:

a) changes to reflect the change in scope from low pressure to gravity-discharge applications;

b) updates to the normative references;

c) changes to the terms, definitions, symbols and abbreviations;

d) simplification of service equipment requirements by reference to regulatory requirements;

e) clarification of impact strength required at lower design temperatures;

f) new requirements on the cross-sectional shapes of shells for non-circular cross-sections, sumps and other external projections and cut-outs within the contour of a side or bottom of the shell;

g) clearer requirements on design verification;

h) expansion of provisions for the dynamic conditions used for tank design;

i) provisions for pressure conditions revised to reflect the change in scope;

j) clarification that maximum stress refers to maximum membrane stress;

k) expansion of requirements on shell thickness to clarify and include cut-outs;

l) addition of preferred location of tank top service equipment;

m) partial easing of restriction on longitudinal partitions;

n) additional requirements on pipes passing through the shell;

o) general revisions on the protection of service equipment mounted on the top of the tank;

p) new requirements for electrical bonding and earthing;

q) changes to the assessment criteria for welds not covered by either Annex D or EN 14025;

r) [A1] examination and testing of welds referred to EN 12972:2018;

NOTE 1 Acceptable equivalent requirements for the examination and testing of welds are given in subclause 7.4.4 of this document.

s) manufacturing tolerances referred to EN 12972:2018 [A1];

t) new requirements for minimum shell marking;

u) tank plate requirements addressed by reference to regulatory requirements;

v) clarification and revision of the application of the different methods of design verification in Annex A;

w) addition of finite element analysis as a method of measurement of specific resilience in Annex B;

x) changes to clarify the informative examples of welding details in Annex D; and

y) an addition to the bibliography.

This document has been submitted for reference in:

— the RID; and

— the technical annexes of the ADR.

NOTE 2 These regulations take precedence over any clause of this document. 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."

[A1] *deleted text* [A1]

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, Turkey and the United Kingdom.

1 Scope

This document specifies requirements for the design and construction of metallic gravity-discharge tanks intended for the carriage of substances having a vapour pressure not exceeding 110 kPa (1,1 bar) (absolute pressure) at 50 °C.

NOTE 1 Gravity-discharge tanks have no maximum working pressure. However, during operation, pressure in the shell may occur, for example due to flow restrictions in vapour recovery systems or opening pressures of breather devices. It is important that these operating pressures do not exceed the test pressure of the tank or 0,5 bar, whichever is the highest.

This document specifies requirements for openings, closures, pipework, mountings for service equipment and structural equipment.

NOTE 2 This document does not specify requirements for items of service equipment other than pipes passing through the shell.

This document is applicable to aircraft refuelers that are used on public roads. It is also applicable to inter-modal tanks (e.g. tank containers and tank swap bodies) for the transport of dangerous goods by road and rail.

NOTE 3 This document is not applicable to fixed rail tank wagons.

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 10204, *Metallic products - Types of inspection documents*

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

▌A1⟩ EN 12972:2018 ⟨A1▐, *Tanks for transport of dangerous goods - Testing, inspection and marking of metallic tanks*

EN 13317, *Tanks for transport of dangerous goods - Service equipment for tanks - Manhole cover assembly*

EN 14025, *Tanks for the transport of dangerous goods - Metallic pressure tanks - Design and construction*

EN 13445-3:2014, *Unfired pressure vessels - Part 3: Design*

EN 14564, *Tanks for transport of dangerous goods - Terminology*

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 5817, *Welding - Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) - Quality levels for imperfections (ISO 5817)*

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

EN ISO 7500-1, *Metallic materials - Calibration and verification of static uniaxial testing machines - Part 1: Tension/compression testing machines - Calibration and verification of the force-measuring system (ISO 7500-1)*

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

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

EN ISO 10042, *Welding - Arc-welded joints in aluminium and its alloys - Quality levels for imperfections (ISO 10042)*

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 15609-2, *Specification and qualification of welding procedures for metallic materials - Welding procedure specification - Part 2: Gas welding (ISO 15609-2)*

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

EN ISO 15614 (all parts), *Specification and qualification of welding procedures for metallic materials - Welding procedure test (ISO 15614, all parts)*

EN ISO 17635, *Non-destructive testing of welds - General rules for metallic materials (ISO 17635)*

EN ISO 17636-1, *Non-destructive testing of welds - Radiographic testing - Part 1: X- and gamma-ray techniques with film (ISO 17636-1)*

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

EN ISO 17640, *Non-destructive testing of welds - Ultrasonic testing - Techniques, testing levels, and assessment (ISO 17640)*

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