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Vitreous and porcelain enamels — Design of bolted steel tanks for the storage or treatment of water or municipal or industrial effluents and sludges

Émaux vitrifiés — Conception de réservoirs en acier boulonnés pour le stockage ou le traitement des eaux ou des effluents d'eaux usées urbains ou industriels

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 107, *Metallic and other inorganic coatings,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 262, *Metallic and other inorganic coatings, including for corrosion protection and corrosion testing of metals and alloys*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 28765:2016), which has been technically revised.

The main changes are as follows:

— the normative references have been updated;

— the terms and definitions have been updated;

— additional information relating to tank installation requirements, foundation requirements, tank roof openings and tank disinfection requirements have been added;

— additional tank applications have been added to the application guide along with their associated quality requirements.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Vitreous and porcelain enamels — Design of bolted steel tanks for the storage or treatment of water or municipal or industrial effluents and sludges

1 Scope

This document specifies the requirements for the design and use of vitreous enamel coated bolted cylindrical steel tanks for the storage or treatment of water or municipal or industrial effluents and sludges.

It is applicable to the design of the tank and any associated roof and gives guidance on the requirements for the design of the foundation.

It is applicable where:

a) the tank is cylindrical and is mounted on a load-bearing base substantially at or above ground level;

b) the product of the tank diameter in metres and the wall height in metres lies within the range 5 to 500;

c) the tank diameter does not exceed 100 m and the total wall height does not exceed 50 m;

d) the stored material has the characteristics of a liquid, exerting a negligible frictional force on the tank wall; the stored material can be undergoing treatment as part of a municipal or industrial effluent treatment process;

e) the internal pressure in the headspace above the liquid does not exceed 50 kPa and the internal partial vacuum above the liquid does not exceed 10 kPa;

f) the walls of the tank are vertical;

g) the floor of the tank is substantially flat at its intersection with the wall; the floor of the tank can have a rise or fall built in to allow complete emptying of the tank contents, the slope of which does not exceed 1:100;

h) there is negligible inertial and impact load due to tank filling;

i) the minimum thickness of the tank shell is 1,5 mm;

j) the material used for the manufacture of the steel sheets is carbon steel (tanks constructed of sheets made from aluminium or stainless steel are outside the scope of this document);

k) the temperature of the tank wall during operation is within the range −50 °C to +100 °C under all operating conditions.

This document also gives details of procedures to be followed during installation on site and for inspection and maintenance of the installed tank.

It does not apply to chemical-reaction vessels.

It does not cover resistance to fire.

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.

ISO 2178, *Non-magnetic coatings on magnetic substrates — Measurement of coating thickness — Magnetic method*

ISO 2746:2015, *Vitreous and porcelain enamels — High voltage test*

ISO 2859-1, *Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

ISO 4532, *Vitreous and porcelain enamels — Determination of the resistance of enamelled articles to impact — Pistol test*

ISO 6370-2, *Vitreous and porcelain enamels — Determination of the resistance to abrasion — Part 2: Loss in mass after sub-surface abrasion*

ISO 6769, *Vitreous and porcelain enamels — Determination of surface scratch hardness according to the Mohs scale*

ISO 8289-1:2020, *Vitreous and porcelain enamels — Low-voltage test for detecting and locating defects — Part 1: Swab test for non-profiled surfaces*

ISO 15686-1, *Buildings and constructed assets — Service life planning — Part 1: General principles and framework*

ISO 19496-1, *Vitreous and porcelain enamels — Terminology — Part 1: Terms and definitions*

ISO 28706-1:2008, *Vitreous and porcelain enamels — Determination of resistance to chemical corrosion — Part 1: Determination of resistance to chemical corrosion by acids at room temperature*

ISO 28706-2:2017, *Vitreous and porcelain enamels — Determination of resistance to chemical corrosion — Part 2: Determination of resistance to chemical corrosion by boiling acids, boiling neutral liquids, alkaline liquids and/or their vapours*

ISO 28706-3:2017, *Vitreous and porcelain enamels — Determination of resistance to chemical corrosion — Part 3: Determination of resistance to chemical corrosion by alkaline liquids using a hexagonal vessel or a tetragonal glass bottle*

ISO 28706-4:2016, *Vitreous and porcelain enamels — Determination of resistance to chemical corrosion — Part 4: Determination of resistance to chemical corrosion by alkaline liquids using a cylindrical vessel*

ISO 28763:2019, *Vitreous and porcelain enamels — Regenerative, enamelled and packed panels for air-gas and gas-gas heat exchangers — Specifications*

EN 1998-4, *Eurocode 8 — Design of structures for earthquake resistance — Part 4: Silos, tanks and pipelines*

EN 10209:2013, *Cold rolled low carbon steel flat products for vitreous enamelling — Technical delivery conditions*

ANSI/AWWA D 103, *Factory-Coated Bolted Steel Tanks for Water Storage*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 19496-1 and the following apply.