



**NSAI**  
Standards

Irish Standard  
I.S. EN ISO 28765:2016

Vitreous and porcelain enamels - Design of bolted steel tanks for the storage or treatment of water or municipal or industrial effluents and sludges (ISO 28765:2016)

## I.S. EN ISO 28765:2016

*Incorporating amendments/corrigenda/National Annexes issued since publication:*

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard — national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation — recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

*This document replaces/revises/consolidates the NSAI adoption of the document(s) indicated on the CEN/CENELEC cover/Foreword and the following National document(s):*

*NOTE: The date of any NSAI previous adoption may not match the date of its original CEN/CENELEC document.*

*This document is based on:*

EN ISO 28765:2016

*Published:*

2016-02-10

*This document was published under the authority of the NSAI and comes into effect on:*

2016-02-28

ICS number:

25.220.50

NOTE: If blank see CEN/CENELEC cover page

NSAI  
1 Swift Square,  
Northwood, Santry  
Dublin 9

T +353 1 807 3800  
F +353 1 807 3838  
E standards@nsai.ie  
W NSAI.ie

Sales:  
T +353 1 857 6730  
F +353 1 857 6729  
W standards.ie

Údarás um Chaighdeáin Náisiúnta na hÉireann

## National Foreword

I.S. EN ISO 28765:2016 is the adopted Irish version of the European Document EN ISO 28765:2016, Vitreous and porcelain enamels - Design of bolted steel tanks for the storage or treatment of water or municipal or industrial effluents and sludges (ISO 28765:2016)

This document does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

**Compliance with this document does not of itself confer immunity from legal obligations.**

*In line with international standards practice the decimal point is shown as a comma (,) throughout this document.*

This page is intentionally left blank

EUROPEAN STANDARD

EN ISO 28765

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 2016

ICS 25.220.50

Supersedes EN ISO 28765:2011

English Version

## Vitreous and porcelain enamels - Design of bolted steel tanks for the storage or treatment of water or municipal or industrial effluents and sludges (ISO 28765:2016)

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 (ISO 28765:2016)

Emails und Emailierungen - Gestaltung von verschraubten Stahlbehältern für die Speicherung oder Behandlung von Wasser oder kommunalen und industriellen Abwässern und Abwasserschläm (ISO 28765:2016)

This European Standard was approved by CEN on 19 December 2015.

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.

CEN members are the national standards bodies of 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, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

**EN ISO 28765:2016 (E)**

<b>Contents</b>	<b>Page</b>
<b>European foreword.....</b>	<b>3</b>

## **European foreword**

This document (EN ISO 28765:2016) has been prepared by Technical Committee ISO/TC 107 "Metallic and other inorganic coatings" in collaboration with Technical Committee CEN/TC 262 "Metallic and other inorganic coatings" 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 August 2016, and conflicting national standards shall be withdrawn at the latest by August 2016.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 28765:2011.

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, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

### **Endorsement notice**

The text of ISO 28765:2016 has been approved by CEN as EN ISO 28765:2016 without any modification.

This page is intentionally left blank



# INTERNATIONAL STANDARD

**ISO**  
**28765**

Second edition  
2016-01-15

---

---

## **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*



Reference number  
ISO 28765:2016(E)

© ISO 2016

**ISO 28765:2016(E)**



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2016, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Ch. de Blandonnet 8 • CP 401  
CH-1214 Vernier, Geneva, Switzerland  
Tel. +41 22 749 01 11  
Fax +41 22 749 09 47  
copyright@iso.org  
www.iso.org

# Contents

	Page
<b>Foreword</b> .....	<b>v</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>2</b>
<b>4 Symbols and abbreviated terms</b> .....	<b>4</b>
<b>5 Units</b> .....	<b>5</b>
<b>6 Information and requirements to be agreed and documented</b> .....	<b>6</b>
6.1 General.....	6
6.2 Information to be provided by the purchaser.....	6
6.3 Information to be provided by the designer.....	7
<b>7 Applicable standards</b> .....	<b>7</b>
<b>8 Loads</b> .....	<b>7</b>
8.1 General.....	7
8.2 Contents.....	8
8.2.1 General.....	8
8.2.2 Freeboard.....	8
8.2.3 Hydrostatic pressure.....	8
8.2.4 Axial wall forces.....	8
8.2.5 Filling and discharging.....	8
8.3 Tank structure.....	9
8.4 Roof.....	9
8.5 Equipment loads.....	9
8.5.1 General.....	9
8.5.2 Static load.....	9
8.5.3 Dynamic load.....	9
8.6 Access.....	9
8.7 Environmental.....	10
8.7.1 General.....	10
8.7.2 Seismic action.....	10
8.7.3 Wind.....	10
8.7.4 Snow.....	10
8.7.5 Ice.....	10
8.8 Ancillary items.....	10
<b>9 Design</b> .....	<b>10</b>
9.1 General.....	10
9.2 Steel.....	11
9.2.1 Specification.....	11
9.2.2 Effects of the enamelling process.....	11
9.3 Tank.....	11
9.3.1 Load factors.....	11
9.3.2 Tank walls.....	12
9.3.3 Tank roof.....	15
9.3.4 Attachment of walls to floor.....	15
9.3.5 Tank floor.....	15
9.3.6 Ancillary items.....	16
9.3.7 Cathodic protection.....	16
9.4 Openings.....	16
9.4.1 Access manway.....	16
9.4.2 Pipe connections.....	16
9.4.3 Overflows.....	16
9.4.4 Reinforcement of manways and pipe connections in the tank shell.....	17

## ISO 28765:2016(E)

	9.4.5	Connections in the roof.....	17
9.5		Effects of accidents.....	17
	9.5.1	Risk assessment.....	17
	9.5.2	Explosions.....	17
	9.5.3	Uncontrolled fluctuation in input stream characteristics.....	18
<b>10</b>		<b>Vitreous-enamel coating.....</b>	<b>18</b>
	10.1	Vitreous enamel.....	18
	10.2	Coating.....	18
	10.3	Vitreous-enamel quality.....	18
		10.3.1 Preparation and test frequency.....	18
		10.3.2 Inspection.....	18
		10.3.3 On-site rectification.....	19
	10.4	Protection during shipping.....	23
	10.5	Maintenance.....	23
<b>11</b>		<b>Installation.....</b>	<b>23</b>
	11.1	General guidance.....	23
	11.2	Foundations.....	23
	11.3	Inspection of the vitreous-enamel coating at the construction site.....	23
<b>12</b>		<b>Disinfection.....</b>	<b>23</b>
		<b>Bibliography.....</b>	<b>24</b>

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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](http://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](http://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 on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 107, *Metallic and other inorganic coatings*.

This second edition cancels and replaces the first edition (ISO 28765:2008), which has been technically revised.



# 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 International Standard establishes 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 applies to the design of the tank and any associated roof and gives guidance on the requirements for the design of the foundation.

It applies 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 may 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 may 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 International Standard);
- k) the temperature of the tank wall during operation is within the range  $-50\text{ °C}$  to  $+100\text{ °C}$  under all operating conditions.

This International Standard 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, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

- 
- [Looking for additional Standards? Visit Intertek Inform Infostore](#)
  - [Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation](#)
-