

Vitreous and porcelain enamels - Glass-lined apparatus for process plants - Part 1: Quality requirements for apparatus, components, appliances and accessories (ISO 28721-1:2019)

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

See Eesti standard EVS-EN ISO 28721-1:2019 sisaldab Euroopa standardi EN ISO 28721-1:2019 ingliskeelset teksti.	This Estonian standard EVS-EN ISO 28721-1:2019 consists of the English text of the European standard EN ISO 28721-1:2019.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 16.10.2019.	Date of Availability of the European standard is 16.10.2019.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile [standardiosakond@evs.ee](mailto:standardiosakond@evs.ee).

ICS 25.220.50

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:  
Koduleht [www.evs.ee](http://www.evs.ee); telefon 605 5050; e-post [info@evs.ee](mailto:info@evs.ee)

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:

Homepage [www.evs.ee](http://www.evs.ee); phone +372 605 5050; e-mail [info@evs.ee](mailto:info@evs.ee)

EUROPEAN STANDARD

**EN ISO 28721-1**

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2019

ICS 25.220.50

Supersedes EN ISO 28721-1:2011

English Version

**Vitreous and porcelain enamels - Glass-lined apparatus for  
process plants - Part 1: Quality requirements for  
apparatus, components, appliances and accessories (ISO  
28721-1:2019)**

Émaux vitrifiés - Appareils émaillés pour les  
installations industrielles - Partie 1: Exigences de  
qualité relatives aux appareillages, composants,  
appareils et accessoires (ISO 28721-1:2019)

Emails und Emailierungen - Emailierte Apparate für  
verfahrenstechnische Anlagen - Teil 1:  
Qualitätsanforderungen für Apparate, Apparateile,  
Einbau- und Zubehörteile (ISO 28721-1:2019)

This European Standard was approved by CEN on 15 September 2019.

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, 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 United Kingdom.



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

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

## European foreword

This document (EN ISO 28721-1:2019) 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, including for corrosion protection and corrosion testing of metals and alloys" 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 April 2020, 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 supersedes EN ISO 28721-1:2011.

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, 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.

## Endorsement notice

The text of ISO 28721-1:2019 has been approved by CEN as EN ISO 28721-1:2019 without any modification.

# Contents

	Page
<b>Foreword</b> .....	<b>iv</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 Requirements</b> .....	<b>2</b>
4.1 General.....	2
4.2 Design and quality of enamel finish.....	2
4.3 Surface.....	2
4.4 Defects.....	2
4.4.1 General.....	2
4.4.2 Defects unacceptable in the finished product.....	2
4.4.3 Repairable defects.....	3
4.4.4 Vessels and columns.....	4
4.4.5 Accessories.....	4
4.4.6 Fittings and pump components.....	4
4.5 Coating thickness.....	4
4.6 General tolerances.....	4
4.7 Finish.....	4
<b>5 Testing</b> .....	<b>5</b>
5.1 General.....	5
5.2 Visual examination.....	5
5.3 High-voltage test.....	5
5.4 Testing for cracks.....	5
5.5 Coating thickness measurement.....	5
5.6 Measurement of dimensions.....	6
5.7 Determination of the concentricity of agitators and pump rotors.....	6
5.7.1 General.....	6
5.7.2 Agitators.....	6
5.7.3 Pump rotors.....	6
5.8 Performance testing.....	6
5.9 Completeness check.....	7
<b>6 Manufacturing stages and inspections</b> .....	<b>7</b>
<b>7 Repairing defects</b> .....	<b>7</b>
7.1 Repairing with plugs.....	7
7.2 Removing impurities.....	9
<b>8 Test report</b> .....	<b>9</b>
<b>9 Packaging and transportation</b> .....	<b>10</b>
<b>10 Inspection at delivery</b> .....	<b>10</b>
<b>Annex A (informative) Examples of test reports</b> .....	<b>11</b>
<b>Bibliography</b> .....	<b>18</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 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](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 107, *Metallic and other inorganic coatings*.

This second edition cancels and replaces the first edition (ISO 28721-1:2008), which has been technically revised. The main changes compared with the previous edition are as follows:

- the normative references have been updated;
- the subclause for “High-voltage test” (5.3) has been revised;
- the 7 kV test voltage for conductive or dissipative enamel according to 5.3 has been added to [Clause 10](#).

A list of all parts in the ISO 28721 series can be found on the ISO website.

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](http://www.iso.org/members.html).

# Vitreous and porcelain enamels — Glass-lined apparatus for process plants —

## Part 1: Quality requirements for apparatus, components, appliances and accessories

### 1 Scope

This document specifies the quality requirements for apparatus, components, appliances and accessories of glass-lined steel (including semi-crystallized enamel coatings) and glass-lined steel castings used for process plants. It specifies the quality requirements and the tests to be carried out by the manufacturer as well as the actions to be taken to repair defects.

It is also applicable to glass-lined pumps, pump components and fittings.

It does not apply to glass-lined flanged steel pipes or glass-lined flanged steel fittings.

NOTE 1 Provisions for glass-lined flanged steel pipes and glass-lined flanged steel fittings are given in ISO 28721-4.

The test methods specified cover checking the enamel, the dimensional accuracy and the performance of apparatus and components.

This document is applicable to new apparatus and components as well as used items that have been re-enamelled.

It does not contain requirements regarding the chemical or physical properties of vitreous and porcelain enamels.

NOTE 2 Examples of test reports are given in [Annex A](#).

### 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 780, *Packaging — Distribution packaging — Graphical symbols for handling and storage of packages*

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

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

ISO 28721-2, *Vitreous and porcelain enamels — Glass-lined apparatus for process plants — Part 2: Designation and specification of resistance to chemical attack and thermal shock*

ISO 28721-3, *Vitreous and porcelain enamels — Glass-lined apparatus for process plants — Part 3: Thermal shock resistance*

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