



**SLOVENSKI STANDARD**  
**oSIST prEN ISO 16961:2014**  
**01-januar-2014**

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**Petrokemična industrija ter industrija za predelavo nafte in zemeljskega plina -  
Notranji premazi in obloge jeklenih rezervoarjev za shranjevanje (ISO/DIS  
16961:2013)**

Petroleum, petrochemical and natural gas industries - Internal coating and lining of steel storage tanks (ISO/DIS 16961:2013)

Erdöl-, petrochemische und Erdgasindustrie - Innere Schutzbeschichtungen und Auskleidungen für überirdische Stahltanklager (ISO/DIS 16961:2013)

Industries du pétrole, de la pétrochimie et du gaz naturel - Revêtement de protection interne et doublure des réservoirs de stockage hors-sol en acier (ISO/DIS 16961:2013)

**Ta slovenski standard je istoveten z: prEN ISO 16961**

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**ICS:**

25.220.99	Druge obdelave in prevleke	Other treatments and coatings
75.200	Oprema za skladiščenje nafte, naftnih proizvodov in zemeljskega plina	Petroleum products and natural gas handling equipment

**oSIST prEN ISO 16961:2014**

**en**



# DRAFT INTERNATIONAL STANDARD

## ISO/DIS 16961

ISO/TC 67

Secretariat: NEN

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## Petroleum, petrochemical and natural gas industries - Internal coating and lining of steel storage tanks

*Industries du pétrole, de la pétrochimie et du gaz naturel - Revêtement de protection interne et doublure des réservoirs de stockage hors-sol en acier*

ICS: 75.200

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#### ISO/CEN PARALLEL PROCESSING

This draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

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## 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO/DIS 16961 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Working Group 11.

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## Introduction

This International standard is based on GSO 2057 – 2010 (E). The objective of this international Standard is to define minimum technical requirements for the corrosion protection by coating and lining of internal surfaces of steel storage tanks. Also, to provide technical guidance for developing local standards and specifications and to ensure compliance in coating and lining material selection and performance with contract requirements.

Users of this International Standard should be aware that, further or differing requirements may be needed for individual applications. This International Standard is not limiting the contractor and/ or manufacturer from proposing or the company from accepting, alternative engineering solutions for the individual application. This may be particularly applicable where there is innovative or developing technology. Where an alternative is proposed, the specification issuer should identify any deviations from this International Standard and provide details.

Annexes A, B, C and D of this International Standard are informative only.

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# Petroleum, petrochemicals and natural gas industries — Internal coating and lining of steel storage tanks

## 1 Scope

This International Standard specifies the minimum requirements for surface preparation, materials, application, inspection and testing of internal coating lining systems that are intended to be applied on internal surfaces of steel storage tanks of crude oil, hydrocarbons and water for corrosion protection.

It covers both new construction and maintenance works of tank internal coating and lining as well as the repair of defective and deteriorated system.

This International Standard also provides the minimum requirements for shop performance testing of the coated/lined samples and the criteria for their approval.

## 2 Conformance

### 2.1 Rounding

Unless otherwise stated in this International Standard, to determine conformance with the specified requirements, observed or calculated values shall be rounded to the nearest unit in the last right-hand place of figures used in expressing the limiting value, in accordance with ISO 80000-1:2009, Annex B, Rule A.

NOTE For the purpose of this provision, the rounding method of ASTM E29-08 is equivalent to ISO 80000-1:2009, Annex B, Rule A.

### 2.2 Compliance to standard

A quality system should be applied to assist compliance with the requirements of this International Standard. ISO/TS 29001 gives sector-specific guidance on quality management systems.

The applicator shall be responsible for complying with all of the applicable requirements of this International Standard. It shall be permissible for the purchaser to make any investigations necessary in order to be assured of compliance by the applicator and to reject any material that does not comply.

## 3 Normative references

The following referenced documents are indispensable for the application 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.

API RP 652, *Lining of Aboveground Petroleum Storage Tank Bottoms*

API STD 653, *Tank Inspection, Repair, Alteration and Reconstruction*

API STD 2015, *Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks*

API STD 2217A, *Guidelines for Safe Work in Inert Confined Spaces in the Petroleum and Petrochemical Industries*

ASTM C868-02 (2008), *Standard Test Method for Chemical Resistance of Protective Linings*

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ASTM D412, *Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers — Tension*

ASTM D610, *Standard Practice for Evaluating Degree of Rusting on Painted Steel Surfaces*

ASTM D714, *Standard Test Method for Evaluating Degree of Blistering of Paints*

ASTM D790, *Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials*

ASTM D870, *Standard Practice for Testing Water Resistance of Coatings Using Water Immersion*

ASTM D2583, *Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor*

ASTM D4060, *Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser*

ASTM D4417, *Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel*

ASTM D4541, *Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers*

ASTM D5420, *Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact)*

ASTM F21, *Standard Test Method for Hydrophobic Surface Films by the Atomizer Test*

ASTM G42, *Standard Test Method for Cathodic Disbonding of Pipeline Coatings Subjected to Elevated Temperatures*

EN 10204, *Metallic materials — Types of inspection documents*

EN 14020 (all parts), *Reinforcements — Specification for textile glass roving's*

ISO 2812-1, *Paints and varnishes — Determination of resistance to liquids — Part 1: Immersion in liquids other than water*

ISO 3233 (all parts), *Paints and varnishes — Determination of the percentage volume of non-volatile matter*

ISO 4624, *Paints and varnishes — Pull-off Test*

ISO 8501-1, *Preparation of steel substrates before application of paints and related products — Visual Assessment of surface cleanliness — Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings*

ISO 8502-2, *Preparation of steel substrates before application of paints and related products — Tests for the assessment of surface cleanliness — Part 2: Laboratory determination of chloride on cleaned surfaces*

ISO 8502-3, *Preparation of steel substrates before application of paints and related products — Tests for the assessment of surface cleanliness — Part 3: Assessment of dust on steel surfaces prepared for painting (pressure-sensitive tape method)*

ISO 8502-11, *Preparation of steel substrates before application of paints and related products — Tests for the assessment of surface cleanliness — Part 11: Field method for the turbid metric determination of water-soluble sulphate*

ISO 10474, *Steel and steel products — Inspection documents*

ISO 11124 (all parts), *Preparation of steel substrates before application of paints and related products — Specifications for metallic blast-cleaning abrasives*

ISO 11126 (all parts), *Preparation of steel substrates before application of paints and related products — Specifications for non-metallic blast-cleaning abrasives*

ISO 11127-7, *Preparation of steel substrates before application of paints and related products — Test methods for non-metallic blast-cleaning abrasives — Part 7: Determination of water-soluble chlorides*

ISO 19840, *Paints and varnishes — Corrosion protection of steel structures by protective paint systems — Measurement of and acceptance criteria for, the thickness of dry films on rough surfaces*

ISO 80000-1:2009, *Quantities and units — Part 1: General*

NACE RP0287, *Field Measurement of Surface Profile of Abrasive Blast-Cleaned Steel Surfaces Using a Replica Tape*

NACE SP0188, *Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates*

NACE TM0174, *Standard Test Method — Laboratory Methods for the Evaluation of Protective Coatings and Lining Materials on Metallic Substrates in Immersion Service*

OSHA 29 CFR 1910, *General Industry Regulations*

SSPC-Guide 12, *Guide for Illumination of Industrial Painting Projects*

SSPC-Guide 15, *Field Methods for Retrieval and Analysis of Soluble Salts on Steel and Other Nonporous Substrates*

SSPC-PA 2, *Steel Structure Painting Council Surface Preparation Specifications Measurement of Dry Coating Thickness with Magnetic Gages*

## 4 Terms, definitions and abbreviated terms

### 4.1 Terms and definitions

For the purpose of this document, the following terms and definitions apply.

#### 4.1.1 application procedure specification

##### APS

document describing procedures, methods, equipment and tools used for coating application

#### 4.1.2

##### applicator

organization, contractor or subcontractor having the technical capability, knowledge, equipment, qualified personnel that is approved by the client for the coating processes as required by this International Standard

#### 4.1.3

##### C glass

glass fiber that provides greater resistance to chemicals and is used in advanced composites, mainly used in the form of surface tissue in the outer layer of laminates used in chemical and water pipes and tanks

#### 4.1.4

##### caulking

the process of applying a 98 % to 100 % solid catalyzed epoxy material (Caulking compound) on tank internal surfaces to fill pores/pits or to cover weld seams, lap joints, large projections, connections, etc.

Note 1 to entry: This is to provide a uniform gradual transition and smooth surfaces.

**ISO/DIS 16961****4.1.5****client**

the party or organization for which professional services are rendered or person that receives a product

**4.1.6****coat**

paint, varnish or lacquer applied to surface in a single application (one layer) to form an evenly distributed film when dry

**4.1.7****contractor**

vendor company or business that agrees to furnish materials and/or perform specific project/services to Client

**4.1.8****curing**

chemical process of developing the intended properties of a coating/polymerized product in the lining system, generally due to a reaction between two or more chemicals (e.g., resin and curing compound)

**4.1.9****dew-point**

the temperature of a given air/water vapour mixture at which condensation starts, since, at that temperature, its maximum water content saturation is reached

**4.1.10****dry abrasive blasting**

surface preparation method that uses an abrasive propelled by air pressure, centrifugal force, to clean and provide a surface profile

**4.1.11****dry film thickness****DFT**

the thickness of a coat of paint, layer of tape or coating system in its fully cured condition

Note 1 to entry: The dry film thickness of coating is measured by film thickness calibrated gauge and expressed in mils or microns (1000 microns are equivalent to 40 mils).

**4.1.12****E glass**

glass containing not more than 1 % by mass of alkali (calculated as Na<sub>2</sub>O) and used for the manufacture of glass fibre

**4.1.13****epoxy**

resin containing epoxide functional groups that allow for curing by polymerization with a variety of curing agents

**4.1.14****fiberglass lining**

cold curing epoxy resin linings to repair and/or add strength to tank bottoms with fibre mat

Note 1 to entry: Examples are pure epoxies, phenolic epoxies, polyesters, vinyl esters being chemically cured with curing agents.

**4.1.15****fiberglass reinforced plastic****FRP**

resin linings, usually polyester, vinyl ester or epoxies, into which layers of fiberglass are incorporated to enhance the lining's structural capability, corrosion and chemical resistance performance