

**SLOVENSKI STANDARD  
SIST EN ISO 21809-1:2012****01-januar-2012**

---

**Naftna industrija in industrija zemeljskega plina - Zunanje prevleke za cevovode, zakopane v zemljo ali potopljene v vodo, v sistemih cevovodnega transporta - 1. del: Poliolefinske prevleke (3-slojni PE in 3-slojni PP) (ISO 21809-1:2011)**

Petroleum and natural gas industries - External coatings for buried or submerged pipelines used in pipeline transportation systems - Part 1: Polyolefin coatings (3-layer PE and 3-layer PP) (ISO 21809-1:2011)

Erdöl und Erdgasindustrie - Umhüllungen für erd- und wasserverlegte Rohrleitungen in Transportsystemen - Teil 1: Polyolefinumhüllungen (3-Lagen-PE und 3-Lagen-PP) (ISO 21809-1:2011)

Industries du pétrole et du gaz naturel - Revêtements externes des conduites enterrées et immergées utilisées dans les systèmes de transport par conduites - Partie 1: Revêtements à base de polyoléfines (PE tri couche et PP tri couche) (ISO 21809-1:2011)

**Ta slovenski standard je istoveten z: EN ISO 21809-1:2011**

---

**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

**SIST EN ISO 21809-1:2012****en,fr**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN ISO 21809-1:2012

<https://standards.iteh.ai/catalog/standards/sist/0a928cd1-51d0-4481-97ab-2478854ca87c/sist-en-iso-21809-1-2012>

EUROPEAN STANDARD

EN ISO 21809-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

July 2011

ICS 75.200

English Version

Petroleum and natural gas industries - External coatings for buried or submerged pipelines used in pipeline transportation systems - Part 1: Polyolefin coatings (3-layer PE and 3-layer PP) (ISO 21809-1:2011)

Industries du pétrole et du gaz naturel - Revêtements externes des conduites enterrées ou immergées utilisées dans les systèmes de transport par conduites - Partie 1: Revêtements à base de polyoléfines (PE tricouche et PP tricouche) (ISO 21809-1:2011)

Erdöl und Erdgasindustrie - Umhüllungen für erd- und wasserlegte Rohrleitungen in Transportsystemen - Teil 1: Polyolefinumhüllungen (3-Lagen-PE und 3-Lagen-PP) (ISO 21809-1:2011)

This European Standard was approved by CEN on 30 June 2011.

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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



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

Management Centre: Avenue Marnix 17, B-1000 Brussels

**Contents**

Page

Foreword.....3

**iTeh STANDARD PREVIEW  
(standards.iteh.ai)**

[SIST EN ISO 21809-1:2012](https://standards.iteh.ai/catalog/standards/sist/0a928cd1-51d0-4481-97ab-2478854ca87c/sist-en-iso-21809-1-2012)

<https://standards.iteh.ai/catalog/standards/sist/0a928cd1-51d0-4481-97ab-2478854ca87c/sist-en-iso-21809-1-2012>

## Foreword

This document (EN ISO 21809-1:2011) has been prepared by Technical Committee ISO/TC 67 "Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries" in collaboration with Technical Committee ECISS/TC 110 "Steel tubes, and iron and steel fittings" the secretariat of which is held by UNI..

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 January 2012, and conflicting national standards shall be withdrawn at the latest by January 2012.

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.

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

**iTeh STANDARD PREVIEW**  
Endorsement notice  
(standards.iteh.ai)

The text of ISO 21809-1:2011 has been approved by CEN as a EN ISO 21809-1:2011 without any modification.

[SIST EN ISO 21809-1:2012](https://standards.iteh.ai/catalog/standards/sist/0a928cd1-51d0-4481-97ab-2478854ca87c/sist-en-iso-21809-1-2012)

<https://standards.iteh.ai/catalog/standards/sist/0a928cd1-51d0-4481-97ab-2478854ca87c/sist-en-iso-21809-1-2012>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN ISO 21809-1:2012

<https://standards.iteh.ai/catalog/standards/sist/0a928cd1-51d0-4481-97ab-2478854ca87c/sist-en-iso-21809-1-2012>

INTERNATIONAL  
STANDARDISO  
21809-1First edition  
2011-07-01

---

---

**Petroleum and natural gas industries —  
External coatings for buried or  
submerged pipelines used in pipeline  
transportation systems —**

Part 1:

**Polyolefin coatings (3-layer PE and  
3-layer PP)****(standards.iteh.ai)***Industries du pétrole et du gaz naturel — Revêtements externes des  
conduites enterrées ou immergées utilisées dans les systèmes de  
transport par conduites —*[https://standards.iteh.ai/catalog/standards/sist/0a928cd1-51d0-4481-97ab-](https://standards.iteh.ai/catalog/standards/sist/0a928cd1-51d0-4481-97ab-2478)*Partie 1: Revêtements à base de polyoléfines (PE tricouche et  
PP tricouche)*Reference number  
ISO 21809-1:2011(E)

© ISO 2011

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN ISO 21809-1:2012](https://standards.iteh.ai/catalog/standards/sist/0a928cd1-51d0-4481-97ab-2478854ca87c/sist-en-iso-21809-1-2012)

<https://standards.iteh.ai/catalog/standards/sist/0a928cd1-51d0-4481-97ab-2478854ca87c/sist-en-iso-21809-1-2012>



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2011

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland



## Contents

Page

Foreword .....	v
Introduction.....	vi
<b>1</b> <b>Scope</b> .....	<b>1</b>
<b>2</b> <b>Conformance</b> .....	<b>1</b>
<b>2.1</b> <b>Rounding</b> .....	<b>1</b>
<b>2.2</b> <b>Compliance to standard</b> .....	<b>1</b>
<b>3</b> <b>Normative references</b> .....	<b>1</b>
<b>4</b> <b>Terms and definitions</b> .....	<b>3</b>
<b>5</b> <b>Symbols and abbreviated terms</b> .....	<b>6</b>
<b>5.1</b> <b>Symbols</b> .....	<b>6</b>
<b>5.2</b> <b>Abbreviations</b> .....	<b>6</b>
<b>6</b> <b>Information supplied by the purchaser</b> .....	<b>7</b>
<b>6.1</b> <b>General information</b> .....	<b>7</b>
<b>6.2</b> <b>Additional information</b> .....	<b>7</b>
<b>7</b> <b>Coating classification</b> .....	<b>8</b>
<b>7.1</b> <b>General</b> .....	<b>8</b>
<b>7.2</b> <b>Coating classes</b> .....	<b>8</b>
<b>7.3</b> <b>Coating thickness classes</b> .....	<b>8</b>
<b>8</b> <b>Coating materials</b> .....	<b>9</b>
<b>8.1</b> <b>Composition of the coating system</b> .....	<b>9</b>
<b>8.2</b> <b>Qualification of the coating materials</b> .....	<b>9</b>
<b>8.3</b> <b>Batch certificate</b> .....	<b>11</b>
<b>8.4</b> <b>Storage and handling of coating materials</b> .....	<b>13</b>
<b>9</b> <b>Coating system qualification</b> .....	<b>13</b>
<b>9.1</b> <b>General</b> .....	<b>13</b>
<b>9.2</b> <b>Application procedure specification</b> .....	<b>13</b>
<b>9.3</b> <b>Procedure qualification trial</b> .....	<b>15</b>
<b>9.4</b> <b>Inspection and testing plan</b> .....	<b>15</b>
<b>10</b> <b>Application of the coating system</b> .....	<b>15</b>
<b>10.1</b> <b>Surface preparation</b> .....	<b>15</b>
<b>10.2</b> <b>Coating application</b> .....	<b>16</b>
<b>10.3</b> <b>Cutback</b> .....	<b>16</b>
<b>11</b> <b>Inspection and testing</b> .....	<b>17</b>
<b>11.1</b> <b>General</b> .....	<b>17</b>
<b>11.2</b> <b>Retesting</b> .....	<b>18</b>
<b>12</b> <b>Coating repairs</b> .....	<b>19</b>
<b>13</b> <b>Marking</b> .....	<b>19</b>
<b>13.1</b> <b>General</b> .....	<b>19</b>
<b>13.2</b> <b>Required markings</b> .....	<b>19</b>
<b>14</b> <b>Handling and storage in the applicators facilities</b> .....	<b>19</b>
<b>14.1</b> <b>Handling</b> .....	<b>19</b>
<b>14.2</b> <b>Storage</b> .....	<b>20</b>
<b>15</b> <b>Test reports and certificate of compliance</b> .....	<b>20</b>

## ISO 21809-1:2011(E)

<b>Annex A</b> (normative) <b>Inspection of thickness</b> .....	<b>21</b>
<b>Annex B</b> (normative) <b>Holiday detection test</b> .....	<b>22</b>
<b>Annex C</b> (normative) <b>Peel strength test</b> .....	<b>23</b>
<b>Annex D</b> (normative) <b>Thermal analysis of epoxy and cured epoxy coating film</b> .....	<b>28</b>
<b>Annex E</b> (normative) <b>Impact test</b> .....	<b>33</b>
<b>Annex F</b> (normative) <b>Indentation test</b> .....	<b>35</b>
<b>Annex G</b> (normative) <b>UV ageing test and thermal ageing test</b> .....	<b>36</b>
<b>Annex H</b> (normative) <b>Cathodic disbondment test</b> .....	<b>39</b>
<b>Annex I</b> (normative) <b>Flexibility test</b> .....	<b>43</b>
<b>Annex J</b> (normative) <b>Gel time of the epoxy powder</b> .....	<b>45</b>
<b>Annex K</b> (normative) <b>Total volatile/moisture content of the epoxy powder — Mass loss</b> .....	<b>47</b>
<b>Annex L</b> (normative) <b>Procedure qualification trial, inspection and testing plan and daily log</b> .....	<b>49</b>
<b>Annex M</b> (normative) <b>Hot water immersion test</b> .....	<b>50</b>
<b>Annex N</b> (normative) <b>Density of epoxy powder</b> .....	<b>52</b>
<b>Bibliography</b> .....	<b>54</b>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN ISO 21809-1:2012](https://standards.iteh.ai/catalog/standards/sist/0a928cd1-51d0-4481-97ab-2478854ca87c/sist-en-iso-21809-1-2012)

<https://standards.iteh.ai/catalog/standards/sist/0a928cd1-51d0-4481-97ab-2478854ca87c/sist-en-iso-21809-1-2012>

## 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 21809-1 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Subcommittee SC 2, *Pipeline transportation systems*.

ISO 21809 consists of the following parts, under the general title *Petroleum and natural gas industries — External coatings for buried or submerged pipelines used in pipeline transportation systems*:

- *Part 1: Polyolefin coatings (3-layer PE and 3-Layer PP)*
- *Part 2: Fusion-bonded epoxy coatings*
- *Part 3: Field joint coatings*
- *Part 4: Polyethylene coatings (2-layer PE)*
- *Part 5: External concrete coatings*

A Part 6 dealing with multilayer fusion-bonded epoxy coatings (FBE), a Part 7 dealing with liquid coatings, a Part 8 dealing with thermal insulation coatings, and a Part 9 dealing with epoxy polyamide powder coatings (2-layer) are under preparation.

## Introduction

It is necessary that users of this part of ISO 21809 be aware that further or differing requirements can be required for individual applications. This part of ISO 21809 is not intended to inhibit a vendor from offering, or the purchaser from accepting, alternative equipment or engineering solutions for the individual application. This can be particularly applicable where there is innovative or developing technology. Where an alternative is offered, it is the responsibility of the vendor to identify any variations from this part of ISO 21809 and provide details.

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN ISO 21809-1:2012](https://standards.iteh.ai/catalog/standards/sist/0a928cd1-51d0-4481-97ab-2478854ca87c/sist-en-iso-21809-1-2012)

<https://standards.iteh.ai/catalog/standards/sist/0a928cd1-51d0-4481-97ab-2478854ca87c/sist-en-iso-21809-1-2012>

# Petroleum and natural gas industries — External coatings for buried or submerged pipelines used in pipeline transportation systems —

## Part 1: Polyolefin coatings (3-layer PE and 3-layer PP)

### 1 Scope

This part of ISO 21809 specifies requirements of plant-applied external three-layer polyethylene- and polypropylene-based coatings for corrosion protection of welded and seamless steel pipes for pipeline transportation systems in the petroleum and natural gas industries in accordance with ISO 13623.

NOTE Pipes coated in accordance with this part of ISO 21809 are considered suitable for further protection by means of cathodic protection.

### 2 Conformance

#### 2.1 Rounding

Unless otherwise stated in this part of ISO 21809, 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.

NOTE For the purpose of this provision, the rounding method of ASTM E29 is equivalent to ISO 80000-1.

#### 2.2 Compliance with standard

A quality system and an environmental management system should be applied to assist compliance with the requirements of this part of ISO 21809.

NOTE ISO/TS 29001 gives sector-specific guidance on quality management systems and ISO 14001 gives guidance on the selection and use of an environmental management system.

The applicator shall be responsible for complying with all the applicable requirements of this part of ISO 21809. The purchaser shall be allowed to make any investigations necessary to ensure compliance by the applicator and to reject any material and/or coating 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.

ISO 179-1, *Plastics — Determination of Charpy impact properties — Part 1: Non-instrumented impact test*

**ISO 21809-1:2011(E)**

ISO 179-2, *Plastics — Determination of Charpy impact properties — Part 2: Instrumented impact test*

ISO 306, *Plastics — Thermoplastic materials — Determination of Vicat softening temperature (VST)*

ISO 527-2, *Plastics — Determination of tensile properties — Part 2: Test conditions for moulding and extrusion plastics*

ISO 527-3, *Plastics — Determination of tensile properties — Part 3: Test conditions for films and sheets*

ISO 868, *Plastics and ebonite — Determination of indentation hardness by means of a durometer (Shore hardness)*

ISO 1133, *Plastics — Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics*

ISO 1183 (all parts), *Plastics — Methods for determining the density of non-cellular plastics*

ISO 1872-2, *Plastics — Polyethylene (PE) moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties*

ISO 1873-2, *Plastics — Polypropylene (PP) moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties*

ISO 2808, *Paints and varnishes — Determination of film thickness*

ISO 2811 (all parts), *Paint and varnishes — Determination of density*

ISO 3251, *Paints, varnishes and plastics — Determination of non-volatile matter content*

ISO 4892-2:2006, *Plastics — Methods of exposure to laboratory light sources — Part 2: Xenon-arc lamps*

ISO 8130-2, *Coating powders — Part 2: Determination of density by gas comparison pycnometer (referee method)*

ISO 8130-3, *Coating powders — Part 3: Determination of density by liquid displacement pycnometer*

ISO 8501-1:2007 *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 8502-3, *Preparation of steel substrates before application of paints and related products — Test for the assessment of surface cleanliness — Part 3: Assessment of dust on steel surfaces prepared for painting (pressure-sensitive tape method)*

ISO 8502-6, *Preparation of steel substrates before application of paints and related products — Test for the assessment of surface cleanliness — Part 6: Extraction of soluble contaminant for analysis — The Bresle method*

ISO 8502-9, *Preparation of steel substrates before application of paints and related products — Tests for the assessment of surface cleanliness — Part 9: Field method for the conductometric determination of water-soluble salts*

ISO 8503-4, *Preparation of steel substrates before application of paints and related products — Surface roughness characteristics of blast-cleaned steel substrates — Part 4: Method for the calibration of ISO surface profile comparators and for the determination of surface profile — Stylus instrument procedure*

ISO 8503-5, *Preparation of steel substrates before application of paints and related products — Surface roughness characteristics of blast-cleaned steel substrates — Part 5: Replica tape method for the determination of the surface profile*

ISO 10474:1991, *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 11127-6, *Preparation of steel substrates before application of paints and related products — Test methods for non-metallic blast cleaning abrasives — Part 6: Determination of water-soluble contaminants by conductivity measurement*

ISO 11357 (all parts), *Plastics — Differential scanning calorimetry (DSC)*

ISO 13623, *Petroleum and natural gas industries — Pipeline transportation systems*

ISO 15512, *Plastics — Determination of water content*

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

AS 3894-6, *Site testing of protective coatings — Determination of residual contaminants*

ASTM D792<sup>1)</sup>, *Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement*

ASTM D1505, *Standard Test Method for Density of Plastics by the Density-Gradient Technique*

ASTM D1693, *Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics*

ASTM D4138, *Standard Practice for Measurement of Dry Film Thickness of Protective Coating Systems by Destructive, Cross-Sectioning Means*

ASTM D4940, *Standard Test Method for Conductimetric Analysis of Water Soluble Ionic Contamination of Blasting Abrasives*

EN 10204:2004<sup>2)</sup>, *Metallic materials — Types of inspection documents*

SSPC-AB 1, *Mineral and Slag Abrasives*

SSPC-AB 2, *Cleanliness of Recycled Ferrous Metallic Abrasives*

SSPC-AB 3, *Ferrous Metallic Abrasive*

SSPC-SP 1<sup>3)</sup>, *Solvent Cleaning*

## 4 Terms and definitions

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

### 4.1

#### **adhesion**

bond between coating and substrate after environmental testing

1) American Society for Testing and Materials, 100 Harbour Drive, West Conshohocken, PA 19428-2959, USA.

2) CEN, European Committee for Standardization, Central Secretariat, Rue de Stassart 36, B-1050, Brussels, Belgium.

3) Society for Protective Coatings, 40 24th Street, 6th Floor, Pittsburg, PA 15222-4656, USA.