



International  
Standard

**ISO 21809-2**

**Oil and gas industries including  
lower carbon energy — External  
coatings for buried or submerged  
pipelines used in pipeline  
transportation systems —**

**Part 2:  
Single-layer fusion-bonded epoxy  
coatings**

*Industries du pétrole et du gaz, y compris les énergies à faible  
teneur en carbone — Revêtements externes des conduites  
enterrées ou immergées utilisées dans les systèmes de transport  
par conduites —*

*Partie 2: Revêtements monocouche à base de résine époxydique  
appliquée par fusion*

**Third edition  
2026-02**

**iTeh Standards**  
**(<https://standards.itih.ai>)**  
**Document Preview**

ISO 21809-2:2026

<https://standards.itih.ai/catalog/standards/iso/7225a455-85f9-42b8-9cf8-ab5a55580ae5/iso-21809-2-2026>



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2026

All rights reserved. Unless otherwise specified, or required in the context of its implementation, 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  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

## 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>6</b>
4.1 Symbols	6
4.2 Abbreviated terms	6
<b>5 General requirements</b>	<b>7</b>
5.1 Rounding	7
5.2 Conformity to requirements	7
<b>6 Information supplied by the purchaser</b>	<b>7</b>
6.1 General information	7
6.2 Additional information	8
<b>7 Coating classification</b>	<b>8</b>
<b>8 Qualification processes</b>	<b>9</b>
8.1 General	9
8.2 Qualification scheme	9
8.3 Coating qualification (CQ)	10
8.3.1 General	10
8.3.2 Properties of epoxy powder	11
8.3.3 Requirements for epoxy powder	12
8.3.4 Repair material	13
<b>9 Application of coating</b>	<b>13</b>
9.1 General	13
9.2 Surface preparation	14
9.2.1 Initial evaluation and surface preparation	14
9.2.2 Abrasive blast cleaning	14
9.2.3 Surface dust contamination	14
9.2.4 Surface cleanliness and pretreatment	14
9.3 Coating application and curing temperature	15
9.3.1 General	15
9.3.2 Recycled powder	15
9.4 Coating thickness	15
9.5 Cutback	15
<b>10 Qualification of coating application and coating system</b>	<b>16</b>
10.1 General	16
10.2 Application procedure specification (APS)	16
10.3 Inspection and testing plan (ITP)	17
10.4 Procedure qualification trial (PQT)	17
10.5 Coating system qualification (CSQ)	18
10.6 Pre-production trial (PPT)	19
10.7 Inspection and testing during production	19
10.8 Minimum requirements for qualification and production	20
<b>11 Inspection and testing</b>	<b>23</b>
11.1 General	23
11.2 Testing of incoming epoxy powder	23
11.3 In-process and finished product testing requirements	23
11.3.1 General	23
11.3.2 Holiday inspection	23
11.3.3 Production test rings	24
11.4 Test results	24

<b>12</b>	<b>Repair of coated pipe</b>	<b>25</b>
12.1	General	25
12.2	Repair of holidays	25
12.2.1	Pinholes and small holidays	25
12.2.2	Large defects	25
12.2.3	Inspection of repaired area	25
12.3	Stripping and recoating	25
<b>13</b>	<b>Markings</b>	<b>25</b>
13.1	General	25
13.2	Required markings	25
<b>14</b>	<b>Handling and storage in the coating area</b>	<b>26</b>
14.1	Handling	26
14.2	Storage	26
<b>15</b>	<b>Test reports and inspection documents</b>	<b>26</b>
15.1	General	26
15.2	Common requirements for reports	27
15.3	Specific requirements for test reports	28
15.4	Specific requirements for sampling reports	28
15.5	Reporting statements of conformity	28
15.6	Reporting opinions and interpretations	29
15.7	Amendments to reports	29
<b>Annex A</b> (normative)	<b>Inspection of thickness</b>	<b>30</b>
<b>Annex B</b> (normative)	<b>Holiday detection test</b>	<b>31</b>
<b>Annex C</b> (normative)	<b>Cure time of the epoxy powder</b>	<b>33</b>
<b>Annex D</b> (normative)	<b>Thermal analysis of epoxy powder and cured coating film</b>	<b>36</b>
<b>Annex E</b> (normative)	<b>Resistance to impact of the coating</b>	<b>43</b>
<b>Annex F</b> (normative)	<b>Dry adhesion test</b>	<b>45</b>
<b>Annex G</b> (normative)	<b>Particle size of epoxy powder</b>	<b>46</b>
<b>Annex H</b> (normative)	<b>Cathodic disbondment test</b>	<b>47</b>
<b>Annex I</b> (normative)	<b>Flexibility of the coating</b>	<b>56</b>
<b>Annex J</b> (normative)	<b>Gel time of the epoxy powder</b>	<b>58</b>
<b>Annex K</b> (normative)	<b>Total volatile or moisture content of the epoxy powder — Mass loss</b>	<b>60</b>
<b>Annex L</b> (normative)	<b>Hot-water adhesion of the coating</b>	<b>62</b>
<b>Annex M</b> (normative)	<b>Density of the epoxy powder</b>	<b>64</b>
<b>Annex N</b> (normative)	<b>Interface contamination of the coating</b>	<b>66</b>
<b>Annex O</b> (normative)	<b>Porosity of the coating</b>	<b>70</b>
<b>Bibliography</b>		<b>72</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 document 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)).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). ISO shall not be held responsible for identifying any or all such patent rights.

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 67, *Oil and gas industries including lower carbon energy*, Subcommittee SC 2, *Pipeline transportation systems*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 459/SC 10, *Steel tubes, and iron and steel fittings*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 21809-2:2014), which has been technically revised.

The main changes are as follows:

- inclusion of new classifications for materials with glass transitions greater than 115 °C;
- inclusion of a qualification scheme;
- harmonization with the other parts of the ISO 21809 series;
- renumbering and rearranging of the annexes;
- changes in various annexes.

A list of all the parts in the ISO 21809 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).



# Oil and gas industries including lower carbon energy — External coatings for buried or submerged pipelines used in pipeline transportation systems —

## Part 2: Single-layer fusion-bonded epoxy coatings

### 1 Scope

This document specifies the requirements for qualification, application, inspection, testing handling and storage of materials for plant application of single-layer fusion-bonded epoxy (FBE) coatings applied externally for the corrosion protection of bare steel pipe for use in pipeline transportation systems for oil and gas industries as defined in ISO 13623.

NOTE Pipes coated in accordance with this document are considered suitable for additional protection by means of cathodic protection.

### 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 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, *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 — Tests 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 — Tests for the assessment of surface cleanliness — Part 6: Extraction of water soluble contaminants for analysis (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*