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

**Part 3:
Field joint coatings**

*Industries du pétrole et du gaz naturel — Revêtements externes
des conduites enterrées ou immergées utilisées dans les systèmes de
transport par conduites —*

Partie 3: Revêtements des joints soudés sur site



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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.

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).

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).

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 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Subcommittee SC 2, *Pipeline transportation systems*.

This second edition cancels and replaces the first edition (ISO 21809-3:2008), which has been technically revised. It also incorporates the Amendment ISO 21809-3:2008/Amd 1:2011.

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: Single layer fusion-bonded epoxy coatings*
- *Part 3: Field joint coatings*
- *Part 4: Polyethylene coatings (2-layer PE)*
- *Part 5: External concrete coatings*

Multilayer fusion bonded epoxy coatings is to form the subject of future part 6.

Coating repairs on rehabilitation is to form the subject of future part 11.

Introduction

Users of this part of ISO 21809 are to be aware that further or differing requirements can be needed 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, the vendor is to identify any variations from this part of ISO 21809 and provide details.

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

Part 3: Field joint coatings

1 Scope

This part of ISO 21809 specifies requirements for field joint coating of seamless or welded steel pipes for buried and submerged sections of pipeline transportation systems used in the petroleum, petrochemical and natural gas industries as defined in ISO 13623. This part of ISO 21809 specifies the qualification, application and testing of the corrosion protection coatings applied to steel surfaces left bare after the joining of pipes and fittings (components) by welding.

This part of ISO 21809 defines and codifies in [Table 1](#) the different types of field joint coatings for pipelines.

This part of ISO 21809 does not address requirements for additional mechanical protection, for thermal insulation or for joint infills of concrete weight-coated pipes.

NOTE Field joints of pipes and fittings coated in accordance with this part of ISO 21809 are considered suitable for further protection by means of cathodic protection.

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.

ISO 34-1, *Rubber, vulcanized or thermoplastic — Determination of tear strength — Part 1: Trouser, angle and crescent test pieces*

ISO 37, *Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties*

ISO 62, *Plastics — Determination of water absorption*

ISO 188, *Rubber, vulcanized or thermoplastic — Accelerated ageing and heat resistance tests*

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 1431-1, *Rubber, vulcanized or thermoplastic — Resistance to ozone cracking — Part 1: Static and dynamic strain testing*

ISO 1523, *Determination of flash point — Closed cup equilibrium method*

ISO 1817, *Rubber, vulcanized or thermoplastic — Determination of the effect of liquids*

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

ISO 2781, *Rubber, vulcanized or thermoplastic — Determination of density*

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

ISO 2811-1, *Paints and varnishes — Determination of density — Part 1: Pyknometer method*

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

ISO 3303-1, *Rubber- or plastics-coated fabrics — Determination of bursting strength — Part 1: Steel-ball method*

ISO 3417, *Rubber — Measurement of vulcanization characteristics with the oscillating disc curemeter*

ISO 3801, *Textiles — Woven fabrics — Determination of mass per unit length and mass per unit area*

ISO 4591, *Plastics — Film and sheeting — Determination of average thickness of a sample, and average thickness and yield of a roll, by gravimetric techniques (gravimetric thickness)*

ISO 4593, *Plastics — Film and sheeting — Determination of thickness by mechanical scanning*

ISO 4624, *Paint and varnishes — Pull-off test for adhesion*

ISO 4625-1, *Binders for paints and varnishes — Determination of softening point — Part 1: Ring-and-ball method*

ISO 5893, *Rubber and plastics test equipment — Tensile, flexural and compression types (constant rate of traverse) — Specification*

ISO 7619-1, *Rubber, vulcanized or thermoplastic — Determination of indentation hardness — Part 1: Durometer method (Shore hardness)*

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 8501-3, *Preparation of steel substrates before application of paints and related products — Visual assessment of surface cleanliness — Part 3: Preparation grades of welds, edges and other areas with surface imperfections.*

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 soluble contaminants 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 conductometric determination of water-soluble salts*

ISO 8503-1, *Preparation of steel substrates before application of paints and related products — Surface roughness characteristics of blast-cleaned steel substrates — Part 1: Specifications and definitions for ISO surface profile comparators for the assessment of abrasive blast-cleaned surfaces*

ISO 8503-2, *Preparation of steel substrates before application of paints and related products — Surface roughness characteristics of blast-cleaned steel substrates — Part 2: Method for the grading of surface profile of abrasive blast-cleaned steel — Comparator procedure*

- 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 8504-2, *Preparation of steel substrates before application of paints and related products — Surface preparation methods — Part 2: Abrasive blast-cleaning*
- ISO 8504-3, *Preparation of steel substrates before application of paints and related products — Surface preparation methods — Part 3: Hand- and power-tool cleaning*
- 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 11357-1, *Plastics — Differential scanning calorimetry (DSC) — Part 1: General principles*
- ISO 11357-2, *Plastics — Differential scanning calorimetry (DSC) — Part 2: Determination of glass transition temperature and glass transition step height*
- ISO 11357-3, *Plastics — Differential scanning calorimetry (DSC) — Part 3: Determination of temperature and enthalpy of melting and crystallization*
- ISO 11357-6, *Plastics — Differential scanning calorimetry (DSC) — Part 6: Determination of oxidation induction time (isothermal OIT) and oxidation induction temperature (dynamic OIT)*
- ISO 13623, *Petroleum and natural gas industries — Pipeline transportation systems*
- ISO 21809-2, *Petroleum and natural gas industries — External coatings for buried or submerged pipelines used in pipeline transportation systems — Part 2: Single layer fusion-bonded epoxy coatings*
- ISO 80000-1:2009, *Quantities and units — Part 1: General*
- EN 10204, *Metallic products — Types of inspection documents*
- ASTM D70¹⁾, *Standard Test Method for Density of Semi-Solid Bituminous Materials (Pycnometer Method)*
- ASTM D92, *Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester*
- ASTM D127, *Standard Test Method for Drop Melting Point of Petroleum Wax, Including Petrolatum*
- ASTM D149, *Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies*
- ASTM D257, *Standard Test Methods for DC Resistance or Conductance of Insulating Materials*
- ASTM D695, *Standard Test Method for Compressive Properties of Rigid Plastics*
- ASTM D937, *Standard Test Method for Cone Penetration of Petrolatum*
- ASTM D938, *Standard Test Method for Congealing Point of Petroleum Waxes, Including Petrolatum*
- ASTM D1000, *Standard Test Methods for Pressure — Sensitive Adhesive — Coated Tapes Used for Electrical and Electronic Applications*

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

ASTM D1141, *Standard Practice for the Preparation of Substitute Ocean Water*

ASTM D1321, *Standard Test Method for Needle Penetration of Petroleum Waxes*

ASTM D2084, *Standard Test Method for Rubber Property — Vulcanization Using Oscillating Disk Cure Meter*

ASTM D4285, *Standard Test Method for Indicating Oil or Water in Compressed Air*

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

AWS C2.25/C2.25M²⁾, *Specification for Thermal Spray Feedstock Solid and Composite Wire and Ceramic Rods*

SSPC-SP1³⁾, *Surface preparation specification No.1 — Solvent cleaning*

SSPC CS 23.00, *Specification for the Application of Thermal Spray Coatings (Metallizing) of Aluminium, Zinc and Their Alloys and Composites for the Corrosion Protection of Steel*

3 Terms and definitions

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

3.1 application procedure specification APS

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

3.2 applicator

company that undertakes the coating application in accordance with the provisions of this part of ISO 21809

3.3 batch

quantity of material produced in a continuous manufacturing operation using raw materials of the same source and grade

3.4 batch certificate

certificate of analysis issued by the manufacturer for a given batch

3.5 bonding agent

material applied as a film to the primed steel surface in order to ensure adhesion of the subsequent protective coating

3.6 inspection document

document issued in accordance with ISO 10474 (or EN 10204) stating compliance with the requirements given in the purchase order

3.7 coating operative

individual undertaking coating activity on the work site, including surface preparation

3.8 cutback

length of pipe left uncoated at each end for joining purposes (e.g. welding)

2) America Welding Society, 550 N.W. Le Jeune Road, Miami, Florida 33126, USA.

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

3.9**end user**

company that owns and/or operates the pipeline system

3.10**field joint area**

uncoated area that results when two pipe sections or a pipe section and a fitting with coating cutbacks are assembled by welding in the field

3.11**holiday**

coating discontinuity that exhibits electrical conductivity when exposed to a specific voltage

3.12**inspection and testing plan****ITP**

document providing an overview of the sequence of inspections and tests, including resources and procedures

3.13**inspector**

end user and/or purchaser's representative responsible for one or more of the inspections specified in this part of ISO 21809

3.14**layer of tape**

single wrap of tape without overlap

Note 1 to entry: Wrapping of a tape with 50 % overlap constitutes a two-layer coating.

3.15**manufacturer**

company responsible for the manufacture of coating material

3.16**maximum service temperature of field joint coating**

$T_{\max}$

maximum continuous temperature that the field joint coating can resist during operation

3.17**maximum and minimum design temperature of pipeline**

maximum and minimum operating temperature for which the pipeline has been designed

3.18**minimum service temperature of field joint coating**

minimum temperature that the field joint coating can resist during operation and installation

3.19**overlap**

length of the field joint coating over the plant-applied coating including the coating bevel

3.20**pipeline**

those facilities through which fluids are conveyed, including pipe, pig traps, components and appurtenances, up to and including the isolating valves

[SOURCE: ISO 13623]