SLOVENSKI STANDARD
oSIST prEN ISO 21809-2:2025

01-februar-2025

Naftna in plinska industrija, vključno z nizkoogljično energijo - Zunanje prevleke za cevovode, zakopane v zemljo ali potopljene v vodo, v sistemih cevovodnega transporta - 2. del: Enoplastne epoksidne prevleke, nataljene na podlago (ISO/DIS 21809-2:2024)

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 (ISO/DIS 21809-2:2024)

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 (ISO/DIS 21809-2:2024)

Ta slovenski standard je istoveten z: **prEN ISO 21809-2**

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 21809-2:2025 **en,fr,de**

DRAFT International Standard

ISO/DIS 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

ICS: 75.200

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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 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

This document was prepared by ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Subcommittee SC 2, *Pipeline transportation systems*.

This third edition cancels and replaces the first edition (ISO 21809-2:2014), which has been technically revised. The main changes compared to the previous edition are as follows:

— Inclusion of new classifications for materials with glass transitions greater than 115 °C.

— Inclusion of a qualification scheme

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.

Introduction

Users of this document should be aware that further or differing requirements might be needed for individual applications. This document 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 if there is innovative or developing technology. If an alternative is offered, the vendor should identify any variations from this document and provide details.

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, testing and handling 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 the petroleum and natural 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*

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 step height*

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

ISO 17025, *Testing and calibration laboratories*

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, *Quantities and units — Part 1: General*

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

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

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

SSPC-AB 1, *Mineral and Slag Abrasives*

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

SSPC-AB 3, *Ferrous Metallic Abrasive*

SSPC-PA2, *Procedure for Determining Conformance to Dry Coating Thickness Requirements*

SSPC-SP 1, *Solvent cleaning*

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

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.3
adhesion
bond between coating and substrate

3.1
application procedure specification (APS)
document describing procedures, methods, equipment and tools used for coating application

3.2
applicator
company that undertakes the coating application in accordance with the provisions of this document

Note 1 to entry: The requirements shall be in accordance with this document.

3.4
batch
quantity of material produced in a continuous manufacturing operation using raw materials of the same source and grade

3.5
batch certificate
document provided by the manufacturer which indicates results of specific tests or analysis, including test methodology, performed on a defined lot of the manufacturer's product and corresponding conformity ranges

3.6
certificate of compliance
document issued in accordance with ISO 10474 or EN 10204 stating compliance with the purchase order for coated pipes, but without mention of any test results, issued in accordance with the purchasing requirements

3.7
coating material qualification (CQ)
qualification of the coating materials properties carried out by the manufacturer before the coating system qualification

3.8
coating system qualification (CSQ)
qualification of application method, applied coating system and subsequent inspection/testing of its properties, to confirm that the APS is adequate to produce a coating with the specified properties

3.9
cutback
length of pipe left uncoated at each end for joining purposes

3.10
design temperature
temperature, that can be endured by a pipeline (component) and/or pipeline transportation system during operation, including maximum and minimum temperatures, likely to be reached during transport, storage, handling, installation, upset conditions and operation

Note 1 to entry: The design temperature range of the coating can be narrower than that specified for the steel pipe material and/or the pipeline transportation system.

3.11
dummy pipe
pipe having the same outside diameter and wall thickness of the project pipes. Dummy pipes and coated dummy pipes shall be representative of the production and shall be coated in accordance with approved APS.

3.12
end user
company (or companies) that owns and/or operates pipeline(s)

3.13
glass transition
reversible change in an amorphous polymer or in amorphous regions of a partially crystalline polymer from (or to) a viscous or rubbery condition to (or from) a hard and relatively brittle one

3.14
glass transition temperature
***T*g**
characteristic value of the temperature range over which the glass transition takes place

Note 1 to entry: The assigned glass transition temperature, T_g, can vary, depending on the specific property and on the method and conditions selected to measure it.

[SOURCE: ISO 11357-2:2020, 3.1]

3.15
holiday
coating discontinuity that exhibits electrical conductivity when exposed to a specific voltage

3.16
inspection certificate
document declaring that the product supplied conform with the requirements of the order and in which test results are supplied from specific inspection

document giving the results of the testing of coated pipes, supplied and signed by a representative of the applicator authorized to issue such documents.

Note 1 to entry: As per ISO 10474 or EN 10204

3.17
inspection and testing plan (ITP)
document providing an overview of the sequence of inspections and tests, including appropriate resources and procedures

3.18
laboratory-coated test specimen
specimen taken from a laboratory-prepared panel

3.19
manufacturer
company responsible for the manufacture of coating material(s)

3.20
manufacturer's specification
document that specifies the characteristics, test requirements and application recommendations for the coating materials

3.21
Maximum, minimum service temperature of a coating system
Tmax , Tmin
Maximum, minimum continuous temperature that the coating can resist based on information from coating material manufacturer.

3.22
operating temperature
temperature that can be endured by a pipeline (component) and/or pipeline transportation system during operation, within the design temperature range

3.23
shipment
an individual container received at the site of the applicator with a total weight of epoxy powder not to exceed 25,000 kg

3.24
pipe diameter length
length along the pipe axis equal to the specified outside diameter of the pipe

3.25
pipeline
those facilities through which fluids are conveyed including pipe, pig traps, components, appurtenances, isolating valves, and sectionalizing valves

[SOURCE: ISO 13623]

3.26
pipeline transportation system
pipelines, stations, supervisory control and data acquisition system (SCADA), safety systems, corrosion protection systems, and any other equipment, facility or building used in the transportation of fluids

[SOURCE: ISO 13623:2017, 3.1.16]

3.27
pre-production trial (PPT)
application of a coating and subsequent inspection/testing of its properties, to confirm that the application procedure specification is adequate to produce a coating with the specified properties, carried out in the coating plant immediately prior to start of production and to verify that the plant's equipment is adequate to consistently adhere to the APS requirements

3.28
procedure qualification trial (PQT)
application of a coating and subsequent inspection/testing of its properties, to confirm that the coatings produced in accordance with the APS and ITP are acceptable within the specified properties, carried out in the coating plant at a specific coating line and to verify that the plant's equipment is adequate to consistently adhere to the APS requirements

3.29
purchaser
company responsible for providing the purchase order requirements

3.30
sample
sample from a batch of raw material or coating that represents the properties of the complete batch.

3.31
specimen
an object prepared for the purpose of testing specific properties. Specimens may be as follows: the coating material; a flat panel or similar prepared specifically for testing; a coupon, ring or similar that has been cut from a pipe; a pipe that has been coated in production or otherwise, in laboratory or plant conditions.

3.32
test report
document that provides the quantitative test results for tests conducted in accordance with document specific requirements

3.33
test ring
specimen taken from production-coated pipe

4 Symbols and abbreviated terms

4.1 Symbols

C	percentage conversion of FBE coating, expressed as a percentage
t	effective specimen thickness, expressed in millimetres
ΔH	exothermic heat of reaction, expressed in joule per grams
m	mass, expressed in grams
R	mandrel radius, expressed in millimetres

ΔT_g variation of the glass transition temperature, expressed in degrees Celsius

w_{ep} mass fraction of the epoxy power retained on a sieve, expressed as a percentage of total sample

w_m mass fraction of moisture, expressed as a percentage

4.2 Abbreviated terms

DC direct current

DSC differential scanning calorimetry

FBE fusion-bonded epoxy

HRC Rockwell C scale hardness

ID inner diameter

NPS nominal pipe size

OD outer diameter

ppd per pipe diameter

5 General requirements

5.1 Rounding

Unless otherwise stated in this document, 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 purposes of this provision, the rounding method of ASTM E29 is equivalent to ISO 80000-1.

5.2 Conformity to requirements

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

NOTE ISO 9001 gives guidance on quality management system 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 for the application of this document. The purchaser shall be allowed to make any investigation necessary to ensure conformity by the applicator and to reject any material and/or coating that does not comply.

6 Information supplied by the purchaser

6.1 General information

In advance of the purchase order there shall be agreement between purchaser and applicator on the following items and laid down in the purchase order:

a) a reference to this document i.e. ISO 21809-2;

b) pipe quantity, outside diameter, length (minimum, maximum and nominal), wall thickness (minimum and nominal) and grade of steel;