SLOVENSKI STANDARD
oSIST prEN ISO 21809-2:2021

01-februar-2021

Naftna industrija in industrija zemeljskega plina - 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 21809-2:2020)

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/DIS 21809-2:2020)

Erdöl- und Erdgasindustrie - Umhüllungen für erd- und wasserverlegte Rohrleitungen in Transportsystemen - Teil 2: Einschicht-Epoxipulverbeschichtungen (ISO/DIS 21809-2:2020)

Industries du pétrole et du gaz naturel - Revêtements externes des conduites enterrées et immergées utilisées dans les systèmes de transport par conduites - Partie 2: Revêtements monocouches à base de résine époxydique appliquée par fusion (ISO/DIS 21809-2:2020)

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 21809-2:2021 **en,fr,de**

DRAFT INTERNATIONAL STANDARD

ISO/DIS 21809-2

ISO/TC **67**/SC **2**

Secretariat: **UNI**

Voting begins on:
2020-12-08

Voting terminates on:
2021-03-02

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

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

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

ICS: 75.200

This document is circulated as received from the committee secretariat.

ISO/CEN PARALLEL PROCESSING

Reference number
ISO/DIS 21809-2:2020(E)

COPYRIGHT PROTECTED DOCUMENT

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

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 second edition cancels and replaces the first edition (ISO 21809-2:2007), which has been technically revised. It also includes the Technical corrigendum ISO 21809-2:2007/Cor.1:2008.

The main changes compared to the previous edition are as follows:

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

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.

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

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 2815, *Paints and varnishes — Buchholz indentation test*

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

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

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 — 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 10474:2013, *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 11357-1, *Plastics — Differential scanning calorimetry (DSC) — Part 1: General principles*

ISO 11357-2:2020, *Plastics — Differential scanning calorimetry (DSC) — Part 2: Determination of glass transition temperature and step height*

ISO 13623:2017, *Petroleum and natural gas industries — Pipeline transportation systems*

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

EN 10204:2004,[1)] *Metallic products — Types of inspection documents*

AS 3894.6,[2)] *Site testing of protective coatings — Determination of residual contaminants*

ASTM D4060,[3)] *Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser*

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

SSPC-AB 1,[4)] *Mineral and Slag Abrasives*

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

SSPC-AB 3, *Ferrous Metallic Abrasive*

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

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 http://www.electropedia.org/

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 coating application

1) European Committee for Standardization, Management Centre, Avenue Marnix 17, B-1000, Brussels, Belgium.

2) Standards Australia, GPO Box 476, Sydney, NSW 2001, Australia.

3) American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, USA.

4) SSPC: The Society for Protective Coatings, 40 24th Street, 6th Floor, Pittsburg. PA 15222-4656, USA.

3.2
applicator
company that undertakes the coating application in accordance with this part of ISO 21809

3.3
adhesion
bond between coating and substrate

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

3.5
batch certificate
certificate of analysis issued by the manufacturer

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
qualification of the coating materials properties carried out by the manufacturer before the coating system qualification

3.8
coating system qualification
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

Note 1 to entry: The coating system qualification is not project dependent.

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

3.10
design temperature range
temperature range, including maximum and minimum temperatures, likely to be reached during transport, storage, handling, installation 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 system.

3.11
dummy pipe
pipe having the same outside diameter and wall thickness of the project pipes coated in accordance with approved APS

3.12
end user
company (companies) that own(s) and/or operate(s) 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: Note 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 in accordance with ISO 10474 or EN 10204 declaring that the product supplied complies with the requirements of the order and in which test results are supplied from specific inspection

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

3.22
powder shipment
amount of powder transported in one container

3.23
pipe diameter length
length along the pipe axis equal to the specified outside diameter of the pipe

3.24
pipeline
components of a pipeline system connected together to convey fluids between stations and/or plants, including pipe, pig traps, components, appurtenances, isolating valves, and sectionalizing valves

[SOURCE: ISO 13623:2017, 3.1.15, modified]

3.25
pipeline 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]

3.26
pre-production trial
PPT
application of a coating and subsequent inspection/testing of its properties, to confirm that the APS 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

3.27
procedure qualification trial
PQT
application of a coating and subsequent inspection/testing of its properties, to confirm that the APS is adequate to produce a coating with the specified properties, carried out prior in correlation to a specific project

3.28
purchaser
company responsible for providing the purchase order requirements

3.29
start up
coating application activities re-start in case of modification of production parameters or unplanned stoppage or production interruption exceeding 12 h

3.30
test report
document that provides the quantitative test results for tests conducted in accordance with the requirements of this part of ISO 21809

3.31
test ring
sample 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 sample 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
T_g	glass transition temperature, expressed in degrees Celsius

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

APS application procedure specification

DC direct current

DSC differential scanning calorimetry

FBE fusion-bonded epoxy

HRC Rockwell C scale hardness

ID inner diameter

ITP inspection and testing plan

NPS nominal pipe size

OD outer diameter

ppd per pipe diameter

PPT pre-production trial

PQT procedure qualification trial

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 80000-1:2009, Annex B, Rule A.

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

5.2 Conformity to requirements

Systems for quality and environmental management, and the competence of testing and calibration laboratories, should be applied to assist conformity with the requirements of this document.

1. ISO 29001 gives sector-specific guidance on quality management systems.
2. ISO 14001 gives requirements with guidance for the use of an environmental management system.
3. ISO/IEC 17025 gives general requirements for the competence of testing and calibration laboratories.

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

The purchase order shall include the following information:

a) number of this document and year of publication, (ISO 21809-2:XXXX);

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

c) bare pipe standard or specification designation, e.g. ISO 3183;

d) minimum thickness and maximum permissible thickness of the FBE coating and FBE coating classes;

e) cutback and tolerances for both ends of pipe;

f) minimum and maximum pipeline design temperatures (°C);

g) operating temperature(°C);

h) type of certificate of compliance;

i) pipe line installation methods

6.2 Additional information

The purchase order shall specify which of the following provisions apply for the specific item ordered:

a) plant and process inspection by the purchaser;

b) increased test ring length;

c) test ring location;

d) test frequency for additional test rings;

e) additional markings;

f) handling procedures;

g) storage procedures;

h) waiver of test reports;

i) maximum allowable preheating temperature;

j) applicator qualification requirements;

k) other special requirements;

l) pipe tracking and traceability of pipes to coating materials;

m) permissible number coating repairs if different from 11;

n) documentation and schedule for supply of documents;

o) purchaser approval of APS;

p) inspection and testing plan and/or daily log;

q) inspection of incoming pipe;