SLOVENSKI STANDARD
oSIST prEN ISO 24817:2014

01-julij-2014

Petrokemična industrija ter industrija za predelavo nafte in zemeljskega plina - Popravila cevovodov s kompozitnimi materiali - Ocenitev in načrtovanje, montaža, preskušanje in nadzor (ISO/DIS 24817:2014)

Petroleum, petrochemical and natural gas industries - Composite repairs for pipework - Qualification and design, installation, testing and inspection (ISO/DIS 24817:2014)

Erdöl-, petrochemische und Erdgasindustrie - Reparatur von Rohrleitungen mit Verbundwerkstoffen - Bewertung und Ausführung, Montage, Test und Inspektion (ISO/DIS 24817:2014)

Industries du pétrole, de la pétrochimie et du gaz naturel - Réparations en matériau composite pour canalisations: Conformité aux exigences de performance et conception, installation, essai et inspection (ISO/DIS 24817:2014)

Ta slovenski standard je istoveten z: **prEN ISO 24817**

ICS:

75.180.20	Predelovalna oprema	Processing equipment

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ISO/DIS 24817

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Petroleum, petrochemical and natural gas industries — Composite repairs for pipework — Qualification and design, installation, testing and inspection

Industries du pétrole, de la pétrochimie et du gaz naturel — Réparations en matériau composite pour canalisations: Conformité aux exigences de performance et conception, installation, essai et inspection

[Revision of first edition (ISO/TS 24817:2006)]

ICS: 75.180.20

ISO/CEN PARALLEL PROCESSING

This draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

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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.

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 24817 was prepared by Technical Committee ISO/TC 67, *Petroleum, petrochemical and natural gas industries*, Subcommittee SC 6, .

This second/third/... edition cancels and replaces the first/second/... edition (), [clause(s) / subclause(s) / table(s) / figure(s) / annex(es)] of which [has / have] been technically revised.

Introduction

The objective of ISO 24817 is to ensure that pipework, pipelines, tanks and vessels repaired using composite systems that are qualified, designed, installed and inspected using ISO 24817 will meet the specified performance requirements. Repair systems are designed for use within the petroleum, petrochemical and natural gas industries and also within utility service applications. The main users of this standard will be plant and equipment owners of the pipework and vessels, design contractors, suppliers contracted to provide the repair system, certifying authorities, installation, maintenance and inspection contractors.

Petroleum, petrochemical and natural gas industries — Composite repairs for pipework and vessels — Qualification and design, installation, testing and inspection

1 Scope

ISO 24817 gives requirements and recommendations for the qualification and design, installation, testing and inspection for the external application of composite repair systems to corroded or damaged pipework, pipelines, tanks and vessels used in the petroleum, petrochemical and natural gas industries.

2 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 75-3, *Plastics — Determination of temperature of deflection under load — Part 3: High-strength thermosetting laminates and long-fibre-reinforced plastics*

ISO 527-1, *Plastics — Determination of tensile properties — Part 1: General principles*

ISO 527-4, *Plastics — Determination of tensile properties — Part 4: Test conditions for isotropic and orthotropic fibre-reinforced plastic composites*

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

ISO 10952, *Plastics piping systems -- Glass-reinforced thermosetting plastics (GRP) pipes and fittings — Determination of resistance to chemical attack on the inside of a section in deflected condition*

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

ISO 11359-2, *Plastics — Thermomechanical analysis (TMA) — Part 2: Determination of coefficient of linear thermal expansion and glass transition temperature*

ISO 14692, *Petroleum and natural gas industries — Glass-reinforced plastics (GRP) piping* (all parts)

ASME FFS-1 / API RP 579, *Fitness-For-Service (Recommended Practice)*

ASME B31G, *Manual, Determining Remaining Strength of Corroded Pipelines: Supplement to B31 Code-Pressure Piping*

ASME PCC-2-2011 Part 5 Article 5.1, *Pressure and tightness testing of piping and equipment*

ASTM C581, *Standard Practice for Determining Chemical Resistance of Thermosetting Resins Used in Glass-Reinforced Structures Intended for Liquid Service*

ASTM D543, *Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents*

ASTM D696, *Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between Minus 30°C and 30°C with a Vitreous Silica Dilatometer*

ASTM D1598, *Standard Test Method for Time-to-Failure of Plastic Pipe under Constant Internal Pressure*

ASTM D1599, *Standard Test Method for Resistance to Short-Time Hydraulic Pressure of Plastic Pipe, Tubing, and Fittings*

ASTM D2583, *Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor*

ASTM D2992, *Standard Practice for Obtaining Hydrostatic or Pressure Design Basis for Fiberglass (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe and Fittings*

ASTM D3039, *Standard Test Method for Tensile Properties of Polymer Matrix Composite Materials*

ASTM D3165, *Standard Test Method for Strength Properties of Adhesives in Shear by Tension Loading of Single-Lap-Joint Laminated Assemblies*

ASTM D3681, *Standard Test Method for Chemical Resistance of Fiberglass (Glass-Fiber-Reinforced Thermosetting Resin) Pipe in a Deflected Condition*

ASTM D5379, *Standard Test Method for Shear Properties of Composite Materials by the V-Notched Beam Method*

ASTM D6604, *Standard Practice for Glass Transition Temperatures of Hydrocarbon Resins by Differential Scanning Calorimetry*

ASTM E831, *Standard Test Method for Linear Thermal Expansion of Solid Materials by Thermomechanical Analysis*

ASTM E1640, *Standard Test Method for Assignment of the Glass Transition Temperature by Dynamic Mechanical Analysis*

ASTM E2092, *Standard Test Method for Distortion Temperature in Three-Point Bending by Thermomechanical Analysis*

ASTM G8, *Standard Test Methods for Cathodic Disbonding of Pipeline Coatings*

AWWA M45, *Fiberglass Pipe Design*

BS 7910, *Guide to methods for assessing the acceptability of flaws in metallic structures*

BS EN 13121, *GRP tanks and vessels for use above ground.*

EN 59, *Methods of testing plastics — Glass reinforced plastics — Measurement of hardness by means of a Barcol impressor (*BS 2782-10, *Method 1001, Measurement of hardness by means of a Barcol impresser)*

EN 1465, *Adhesives — Determination of tensile lap shear strength of rigid-to-rigid bonded assemblies*

3 Terms and definitions

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

3.1
anisotropic
exhibiting different physical properties in different directions

3.2
Barcol hardness
measure of surface hardness using a surface impresser

3.3
blister
an air void between layers within the laminate visible on the surface as a raised area

3.4
composite
thermoset resin system that is reinforced by fibres

3.5
crack
a split in the laminate extending through the wall (perpendicular to the surface) such that there is actual separation with opposite surfaces visible

3.6
cure
curing
setting of a thermosetting resin system, such as polyester or epoxy, by an irreversible chemical reaction

3.7
cure schedule
the time-temperature profile qualified to generate a specified T_g or HDT

3.8
defect type A
the defect is within the substrate, not through-wall and not expected to become through-wall within the repair design lifetime of the repair system

3.9
defect type B
a through-wall defect or a defect within the substrate where at the end of service life the remaining wall thickness is less than 1 mm

3.10
defined lifetime
the actual application or service lifetime of the repair

3.11
delamination
an area between the repair laminate and the substrate which should be bonded together but where no bond exists, or an area of separation between layers in the repair laminate

3.12
design lifetime
the maximum application lifetime of the repair

3.13
differential scanning calorimetry
DSC
method of determining the glass transition temperature of a thermosetting resin

3.14
dry spot or un-impregnated/dry fibre
an area of fibre not impregnated with resin, with bare, exposed fibre visible

3.15
engineered repair
a repair which has been designed and applied under a specified, controlled process so that under the design conditions, there is a high degree of confidence that the repair will maintain its integrity over the design lifetime

3.16
exposed fibre
an area of fibre not impregnated with resin that projects from the body of the repair

3.17
foreign matter
any substance other than the reinforcing fibre or other materials that form part of the repair system

3.18
finishing materials
repair systems typically use a final layer of material to help compact the repair laminate, typically a polymeric film or a fabric. They should be fully removed after the repair has hardened and before the repair is inspected or painted.

3.19
glass transition temperature
temperature at which a resin undergoes a marked change in physical properties

3.20
hardener
component added to a thermosetting resin to effect cure

3.21
heat distortion temperature
HDT
temperature at which a standard test bar deflects by a specified amount under a given load

3.22
installer
a person who is qualified to apply a composite repair system

3.23
filler material
material used to repair external surface imperfections prior to the application of the composite laminate

3.24
laminate
repair laminate
that part of a repair system that is the composite

NOTE Most composites considered in this standard are composed of discrete lamina or layers which are wrapped or stacked, one on top of the other. This stacked construction is the laminate.

3.25
layer
an individual layer or wrap within the composite laminate

3.26
leak
condition of a substrate wall that can allow the contents to make contact with and act directly upon the (composite) repair laminate

NOTE This does not refer to a fluid leaking through a hole or breach in the substrate.

3.27
occasional load
load that occurs rarely and during a short time

NOTE Occasional loads typically occur less than 10 times in the life of the component and each load duration is less than 30 min.

3.28
owner
organization that owns or operates the substrate to be repaired

3.29
pin hole
pin-prick hole in the resin rich surface, not extending into the laminate

3.30
pipeline
pipe with components subject to the same design conditions used to transport fluids between plants

NOTE Components include e.g. bends, flanges, valves.

3.31
pipework
interconnected piping subject to the same set or sets of design conditions

3.32
piping
piping system
assemblies of piping components used to convey fluids within a plant

NOTE Components include pipe, fittings, flanges, gaskets, bolting, valves. A piping system is often above ground but sometimes buried.

3.33
pit
a depression in the surface of the laminate

3.34
ply
single wrap or layer (lamina) of a repair laminate

3.35
post cure
additional elevated-temperature cure applied after resin has hardened to ensure the required glass transition temperature is achieved

3.36
qualification application procedure
application procedure used to apply the repair system for the qualification tests

3.37
qualification test temperature
test temperature at which qualification testing of the repair system is performed

3.38
reinforcement
fibre embedded in the resin system