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Oil and gas industries including lower carbon energy — Internal coating of carbon steel process vessels —

Part 2: Requirements and guidance for the selection of coating systems

Industries du pétrole et du gaz, y compris les énergies à faible teneur en carbone — Revêtement de protection interne des récipients de production en acier au carbone —

Partie 2: Exigences et recommandations pour le choix des systèmes de revêtement

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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 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).

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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 Technical Committee ISO/TC 67, *Oil and gas industries including lower carbon energy.*

A list of all parts in the ISO 18796 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.

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Introduction

By providing requirements and guidance for the selection of coating materials, this document:

— ensures the long-term performance of coating materials.

— ensures that coating materials selected meet the needs of a broad range of end users in the oil and gas industries.

— enables coating manufactures to develop and provide coatings that meet the requirements of this document.

Oil and gas production projects benefit from a structured evaluation of coatings performance for the different process liquids and gases being handled within process vessels**.**

The main objective of this document is to provide general requirements with guidance for the selection of coatings for the internal surfaces of process vessels, with due consideration to the liquids and gases contained within the vessel and the impact of the external environment. Particular attention is paid to key parameters such as operating temperature, pressure, and presence of abrasion, amongst others. It is the end user's responsibility to provide a project document with respect to the implementation of the requirements and guidance of this document, and to specify the design conditions for coating selection. In addition to the end user, the organization responsible for the facility or for the process equipment design, or for both, is regarded as responsible for coating selection.

This document is developed to provide responsible parties with a structured process to carry out evaluation of proposed coatings in a consistent manner as a part of the engineering work, with a design basis for a particular installation or equipment item. Further this document is intended for use by oil companies and engineering contractors. Further or differing requirements can be needed for individual applications.

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Oil and gas industries including lower carbon energy — Internal coating of carbon steel process vessels —

Part 2: Requirements and guidance for the selection of coating systems

1 Scope

This document specifies the criteria and minimum requirements for selecting internal coatings (often referred to as linings) for pressurized service within process vessels. The document provides the following:

— key factors influencing coating selection;

— generic composition of test liquids which can be used as references when evaluating supporting testing evidence for coatings;

— principal test methods to be used as evidence of performance when selecting suitable coatings;

— supporting evidence to be used in evaluating coatings that is relevant to the potential end use.

This document covers types of coatings that are generally available, with properties that are known and documented. It also covers other materials to be evaluated and qualified for use.

This document is applicable to process vessels coated at the new construction phase. It can be applied only where the coating is applied directly to the substrate.

This document does not cover requirements related to metallic coatings nor weld overlay materials.

2 Normative references

The following documents are referred to in the text in such a way that some or all 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 1514, *Paints and varnishes — Standard panels for testing*

ISO 1519, *Paints and varnishes — Bend test (cylindrical mandrel)*

ISO 2811-3, *Paints and varnishes — Determination of density — Part 3: Oscillation method*

ISO 3270, *Paints and varnishes and their raw materials — Temperatures and humidities for conditioning and testing*

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

ISO 4628-2, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 2: Assessment of degree of blistering*

ISO 4628-3, *Paints and varnishes — Evaluation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 3: Assessment of degree of rusting*

ISO 4628-4, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 4: Assessment of degree of cracking*

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ISO 4628-5, *Paints and varnishes — Evaluation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 5: Assessment of degree of flaking*

ISO 4628-6, *Paints and varnishes — Evaluation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 6: Assessment of degree of chalking by tape method*

ISO 7783, *Paints and varnishes — Determination of water-vapour transmission properties — Cup method*

ISO 7784-2, *Paints and varnishes — Determination of resistance to abrasion — Part 2: Method with abrasive rubber wheels and rotating test specimen*

ISO 6272-1, *Paints and varnishes — Rapid-deformation (impact resistance) tests — Part 1: Falling-weight test, large-area indenter*

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 11357, *Plastics — Differential scanning calorimetry (DSC)*

ISO 12944-9:2018, *Paints and varnishes — Corrosion protection of steel structures by protective paint systems — Part 9: Protective paint systems and laboratory performance test methods for offshore and related structures*

ISO 15184, *Paints and varnishes — Determination of film hardness by pencil test*

ISO/IEC 17025, *General requirements for the competence of 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 29601, *Paints and varnishes — Corrosion protection by protective paint systems — Assessment of porosity in a dry film*

NACE TM0174-22, *Laboratory methods for the evaluation of protective coatings and lining materials on metallic substrates in immersion service*

NACE TM0185-24, *Evaluation of Internal Plastic Coatings for Corrosion Control of Tubular Goods by Autoclave Testing*

ASTM D2485, *Standard test methods for evaluating coatings for high temperature service*

3 Terms and definitions

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

ISO and IEC maintain terminology 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/

3.1
abrasion resistance
coating (3.5) wear resistance property

3.2
ambient temperature
external temperature range in degrees Celsius in which a *process vessel* (3.27) operates and maintains characteristics within recommended limits

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