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Oil and gas industries including lower carbon energy — Cathodic protection of pipeline transportation systems —

Part 1: On-land pipelines

Industries du pétrole et du gaz y compris les énergies à faible teneur en carbone — Protection cathodique des systèmes de transport par conduites —

Partie 1: Conduites terrestres

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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

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Foreword

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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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This document was prepared by Technical Committee ISO/TC 67, *Oil and gas industries including lower carbon energy*, Subcommittee SC 2, *Pipeline transportation systems,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 219, *Cathodic protection,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 15589-1:2015), which has been technically revised.

The main changes are as follows:

— cathodic protection criteria have been extended with further clarification on the application of the criteria;

— requirements for design have been more detailed; periodicities for inspection of cathodic equipment have been enlarged; and the option for remote monitoring has been added;

— requirements for measurements and testing during commissioning have been further detailed.

A list of all parts in the ISO 15589 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

Pipeline cathodic protection is achieved by the supply of sufficient direct current to the external pipe surface, so that the steel-to-electrolyte potential is lowered to values at which external corrosion is reduced to an insignificant rate.

Cathodic protection is normally used in combination with a suitable protective coating system to protect the external surfaces of steel pipelines from corrosion.

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Oil and gas industries including lower carbon energy — Cathodic protection of pipeline transportation systems —

Part 1: On-land pipelines

1 Scope

This document specifies requirements and gives recommendations for the pre-installation surveys, design, materials, equipment, installation, commissioning, operation, inspection, and maintenance of cathodic protection systems for the external surface of on-land pipelines.

This document is applicable to on-land pipelines and piping systems used in other industries and transporting other media such as industrial gases, waters, or slurries.

Throughout this document, on-land pipelines mean:

— pipelines that are buried;

— landfalls of offshore pipeline sections protected by onshore based cathodic protection installations;

— immersed sections of on-land pipelines such as river or lake crossings.

This document is applicable to pipelines of carbon steel, stainless steel, cast iron, galvanized steel, and copper.

This document does not apply to pipelines made of reinforced concrete (see ISO 12696).

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 8044, *Corrosion of metals and alloys — Vocabulary*

ISO 10012, *Measurement management systems — Requirements for measurement processes and measuring equipment*

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

ISO 13847, *Petroleum and natural gas industries — Pipeline transportation systems — Welding of pipelines*

ISO 21809-3, *Oil and gas industries including lower carbon energy — External coatings for buried or submerged pipelines used in pipeline transportation systems — Part 3: Field joint coatings*

ISO 21809-5, *Oil and gas industries including lower carbon energy — External coatings for buried or submerged pipelines used in pipeline transportation systems — Part 5: External concrete coatings*

ISO 21857, *Petroleum, petrochemical and natural gas industries — Prevention of corrosion on pipeline systems influenced by stray currents*

IEC 60079-10-1, *Explosive atmospheres — Part 10-1: Classification of areas — Explosive gas atmospheres*

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IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 62561-3, *Lightning protection system components (LPSC) - Part 3: Requirements for isolating spark gaps (ISGs)*

EN 1594, *Gas infrastructure — Pipelines for maximum operating pressure over 16 bar — Functional requirements*

EN 12007-3, *Gas infrastructure — Pipelines for maximum operating pressure up to and including 16 bar – Part 3: Specific functional recommendations for steel*

EN 14161, *Petroleum and natural gas industries — Pipeline transportation systems from 2011+A1 from 2015 (ISO 13623:2017)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8044 and the following 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
anode backfill
added material immediately surrounding a buried anode

3.2
bond
conductor connecting two points on the same structure or between different structures

3.3
cathodic protection system
impressed current and galvanic anode system consisting of all the equipment necessary for the application of cathodic protection, such as impressed current installations, power supplies, *impressed current anodes* (3.12), galvanic anodes, monitoring facilities, *bonds* (3.2) and cables

3.4
coupon
metal sample of defined surface area and thickness made of a metal equivalent to the metal of the pipeline

3.5
coating defect
anomaly in the coating that results in the steel surface making direct contact with the surrounding electrolyte

3.6
DC decoupling device
direct current decoupling device
equipment that provides a low-impedance path for alternating current and high resistance for direct current

EXAMPLE *Polarization* cells, capacitors, or diode assemblies.

3.7
drain point
location of the cable connection to the protected pipeline through which the protective current returns to its source

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