SVENSK STANDARD
SS-EN ISO 16440:2016

Fastställd/Approved: 2016-11-29
Publicerad/Published: 2016-12-06
Utgåva/Edition: 1
Språk/Language: engelska/English
ICS: 75.200; 77.140.75

Petroleum- och naturgasindustrier – Rörledningssystem – Konstruktion, tillverkning och underhåll för skyddsrör av stål (ISO 16440:2016)

Petroleum and natural gas industries – Pipeline transportation systems – Design, construction and maintenance of steel cased pipelines (ISO 16440:2016)

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The European Standard EN ISO 16440:2016 has the status of a Swedish Standard. This document contains the official English version of EN ISO 16440:2016.

Denna standard är framtagen av kommittén för Gassystem, SIS/TK 289.

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 16440

November 2016

ICS 75.200; 77.140.75

English Version

Petroleum and natural gas industries - Pipeline transportation systems - Design, construction and maintenance of steel cased pipelines (ISO 16440:2016)

Industries du pétrole et du gaz naturel - Systèmes de transport par conduites - Conception, construction et maintenance de conduites en fourreau en acier (ISO 16440:2016)

Erdöl- und Erdgasindustrien - Rohrleitungs-Transportsysteme - Auslegung, Konstruktion und Instandhaltung von stahlverkleideten Rohrleitungen (ISO 16440:2016)

This European Standard was approved by CEN on 7 August 2016.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN ISO 16440:2016) has been prepared by Technical Committee ISO/TC 67 "Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries" in collaboration with Technical Committee CEN/TC 12 “Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries” the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2017, and conflicting national standards shall be withdrawn at the latest by May 2017.

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Endorsement notice

The text of ISO 16440:2016 has been approved by CEN as EN ISO 16440:2016 without any modification.

Introduction

Users of this document are advised 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 might be particularly applicable where there is innovative or developing technology. Where an alternative is offered, it is advisable that the vendor identify any variations from this document and provide details.

Petroleum and natural gas industries — Pipeline transportation systems — Design, construction and maintenance of steel cased pipelines

1 Scope

This document specifies requirements, including corrosion protection, for the design, fabrication, installation and maintenance of steel-cased pipelines for pipeline transportation systems in the petroleum and natural gas industries in accordance with ISO 13623.

NOTE 1 Steel casings can be used for mechanical protection of pipelines at crossings, such as at roads and railways and the installation of a casing at a highway, railway, or other crossing can be required by the permitting agency or pipeline operator.

NOTE 2 This document does not imply that utilization of casings is mandatory or necessary.

NOTE 3 This document does not imply that cased crossings, whether electrically isolated or electrically shorted, contribute to corrosion of a carrier pipe within a cased crossing. However, cased crossings can adversely affect the integrity of the carrier pipe by shielding cathodic protection (CP) current to the carrier pipe or reducing the CP effectiveness on the carrier pipe in the vicinity of the casing. Their use is not recommended unless required by load considerations, unstable soil conditions, or when their use is dictated by sound engineering practices.

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 15589-1, *Petroleum, petrochemical and natural gas industries — Cathodic protection of pipeline systems — Part 1: On-land pipelines*

EN 12954, *Cathodic protection of buried or immersed metallic structures — General principles and application for pipelines*

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:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
carrier pipe
pipe that conveys the fluid

Note 1 to entry: Note to entry: This applies to both transmission and distribution piping.

3.2
casing
steel pipe installed around a carrier pipe for mechanical protection

3.3
electrolyte
medium in which electric current is transported by ions

3.4
electrolytic contact
ionic contact between the carrier pipe and the casing pipe through an electrolyte

3.5
end seal
device installed over or within the end of a casing to keep water, deleterious materials and debris out of the casing or provide a water tight seal between the casing and the carrier pipe

3.6
holiday
unintentional discontinuity in a protective coating that exposes the bare steel surface to the environment

3.7
isolator
spacer
dielectric device designed to electrically isolate a carrier pipe from a casing and provide support for the carrier pipe

3.8
metallic short
unintentional contact between two metallic structures

3.9
P/S potential
pipe-to-electrolyte potential
structure-to-electrolyte potential
potential difference between the surface of a buried or submerged metallic structure (pipe or casing) and the electrolyte that is measured with respect to a reference electrode in contact with the electrolyte

3.10
split sleeve
casing installed in situ by welding two halves of the casing together around the carrier pipe

3.11
tunnel liner plate
steel plate used when micro tunnelling, used to shore horizontal excavations in soft ground

3.12
C/S potential
casing–to–electrolyte potential
potential difference between the surface of a buried or submerged metallic casing and the electrolyte that is measured with respect to a reference electrode in contact with the electrolyte

4 Design

4.1 General

The purpose of a casing is to provide additional mechanical protection to the carrier pipe. A casing can also be required by a permitting authority to allow replacement of a carrier pipe without excavations at the location of a crossing.

A carrier pipe within a casing is not designed to be cathodically protected. It is designed to be electrically isolated from the casing with non-conducting spacers, or isolated if the annulus of the casing is filled with a dielectric filler material. The carrier pipe is designed to be protected with a protective coating.

Steel casings shall not be cathodically protected by the pipeline's dedicated CP system.

4.2 Carrier pipe design

The carrier pipe shall be coated for corrosion protection. The application of an abrasion resistant coating over the corrosion coating should be considered.

NOTE 1 See NACE/SP 0169 for details of abrasion resistant coatings.

The carrier pipe shall be supported inside the casing with isolating spacers and outside the casing to prevent sagging. Sagging can lead to metallic contact between the casing and the carrier pipe and to carrier pipe stresses.

NOTE 2 See NACE/SP 0286 for details of isolation techniques.

4.3 Casing design

Casing design shall be in accordance with the local, national, or industry requirements/standards.

The casing should be kept as short in length as possible to minimize the risk of electrical shorting over time due to soil stress and pipe movement.

The casing internal diameter shall be selected based on the nominal diameter of the carrier pipe, the thickness of any abrasion resistant coating, such as concrete, duroplastic material, or epoxy polymer and the design of the isolators between carrier pipe and casing.

For individual carrier pipes with a nominal diameter of 200 mm (8.0 in) or greater, the outer diameter of the casing should be a minimum of 100 mm (4.0 in) larger than that of the carrier pipe or if installing parallel cable or conduits the casing should be a minimum of 300 mm larger than that of the carrier pipe.

For individual carrier pipes with a nominal diameter less than 200 mm (8.0 in), the diameter of the casing should be a minimum of 50 mm (2.0 in) larger than that of the carrier pipe.

Uncoated casing should be used. Coated or non-conductive casing may be used if the casing can be harmonized with the carrier pipe cathodic protection.

NOTE 1 The use of coated or nonconductive casing pipe is not recommended due to potential shielding problems when cathodic protection is applied. If coated casings (either internally coated or externally coated or both) are used, external cathodic protection will not provide protection to the carrier pipe in the event that the annulus is filled with a conductive electrolyte.

If vent pipes are required, then they should be installed on both ends of the casing. Vent pipes should be positioned so that they are not directly over any isolation spacer or end seal. If concrete coated pipe is used and no isolating spacers are used, then the vent pipes should only be installed on the top of the casing.

The casing vent hole should be at least one-half the diameter of the vent pipe, with a minimum of 25 mm (1,0 in). The vent pipe should be a minimum of 50 mm (2.0 in) in diameter.

Vent pipes shall be designed to prevent intrusion of water and debris.

Casing end seals shall be installed to prevent ingress of water, deleterious material and debris.

Vent pipes are used for venting, monitoring the casing for carrier pipe leaks, filling the casing and as line markers.

NOTE 2 NACE/SP 0200 gives guidance for design of end seals.