SLOVENSKI STANDARD
SIST EN 14161:2011

01-oktober-2011

Nadomešča:
SIST EN 14161:2004

Industrija nafte in zemeljskega plina - Transportni cevovodni sistemi (ISO 13623:2009, spremenjen)

Petroleum and natural gas industries - Pipeline transportation systems (ISO 13623:2009 modified)

Erdöl- und Erdgasindustrie - Rohrleitungstransportsysteme (ISO 13623:2009 modifiziert)

Industries du pétrole et du gaz naturel - Systèmes de transport par conduites (ISO 13623:2009 modifiée)

Ta slovenski standard je istoveten z: **EN 14161:2011**

ICS:

75.200	Oprema za skladiščenje nafte, naftnih proizvodov in zemeljskega plina	Petroleum products and natural gas handling equipment

SIST EN 14161:2011 **en,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 14161

July 2011

ICS 75.200

Supersedes EN 14161:2003

English Version

Petroleum and natural gas industries - Pipeline transportation systems (ISO 13623:2009 modified)

Industries du pétrole et du gaz naturel - Systèmes de transport par conduites (ISO 13623:2009 modifiée)

Erdöl- und Erdgasindustrie - Rohrleitungstransportsysteme (ISO 13623:2009 modifiziert)

This European Standard was approved by CEN on 3 June 2011.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

Foreword

This document (EN 14161:2011) has been prepared by Technical Committee CEN/TC 12 “Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries”, the secretariat of which is held by AFNOR.

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 January 2012, and conflicting national standards shall be withdrawn at the latest by January 2012.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 14161:2003.

The text of ISO 13623:2009 has been adopted by CEN/TC 12 with some modifications. These modifications are indicated by a vertical line in the left margin of the text.

Where the expression “International Standard” is used, it is understood as “European Standard”.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

Significant differences exist between member countries in the areas of public safety and protection of the environment, which cannot be reconciled into a single preferred approach to pipeline transportation systems for the petroleum and natural gas industries. Reconciliation was further complicated by the existence in some member countries of legislation that establishes requirements for public safety and protection of the environment. Recognizing these differences, ISO/TC 67/SC 2 concluded that this International Standard should allow individual countries to apply their national requirements for public safety and the protection of the environment.

This International Standard is not a design manual; rather, it is intended for use in conjunction with sound engineering practice and judgment. This International Standard allows the use of innovative techniques and procedures, such as reliability-based limit state design methods, providing the minimum requirements of this International Standard are satisfied.

This second edition cancels and replaces the first edition, (ISO 13623:2000), which has been technically revised. Major revisions include replacement of various references to national standards with references to International Standards; replacement of sections on coatings and cathodic protection with ISO references; revision of design to accommodate line pipe above L555 in the new edition of ISO 3183; and the addition of a section on life extension.

ISO 13623:2009, developed within ISO/TC 67 SC 2, has been adopted as EN 14161:2011 (ISO 13623:2009 modified).

The scope of ISO/TC 67/SC 2 is pipeline transportation systems for the petroleum and natural gas industries without exclusions. However, in CEN the scopes of CEN/TC 12 and CEN/TC 234 overlapped until 1995. This scope overlap caused problems for the parallel procedure for the above-mentioned items. The conflict in scope was resolved when both the CEN/Technical Committees and the CEN/BT took the following resolution:

> *Resolution BT 38/1995: Subject: Revised scope of CEN/TC 12*
> *"BT endorses the conclusions of the coordination meeting between CEN/TC 12 "Materials, equipment and offshore structures for petroleum and natural gas industries" and CEN/TC 234 "Gas supply" and modifies the CEN/TC 12 scope, to read:*
> *"Standardization of the materials, equipment and offshore structures used in drilling, production, refining and the transport by pipelines of petroleum and natural gas, excluding on-land supply systems used by the gas supply industry and those aspects of offshore structures covered by IMO requirement (ISO/TC 8).*
> *The standardization is to be achieved wherever possible by the adoption of ISO Standards."*

In 2009, CEN/TC 12 changed its scope to be in coherency with the last CEN/TC 234's scope changes, as follows (resolution CEN/BTC 19/2009):

> *Standardisation of the materials, equipment and offshore structures used in the drilling, production, transport by pipelines and processing of liquid and gaseous hydrocarbons within the petroleum, petrochemical and natural gas industries, excluding on-land supply systems used by the gas supply industry excluding gas infrastructure from the input of gas into the on-shore transmission network up to the inlet connection of gas appliances. (covered by CEN/TC234) and those aspects of offshore structures covered by IMO requirements (ISO/TC8).*
> *The standardisation is to be achieved wherever possible by the adoption of ISO standards.*

Resulting from these resolutions, "*on-land supply systems used by the gas supply industry excluding gas infrastructure from the input of gas into the on-shore transmission network up to the inlet connection of gas appliances* " has been excluded from the scope of ISO 13623:2009 for the European adoption by CEN/TC 12.

1 Scope

This International Standard specifies requirements and gives recommendations for the design, materials, construction, testing, operation, maintenance and abandonment of pipeline systems used for transportation in the petroleum and natural gas industries.

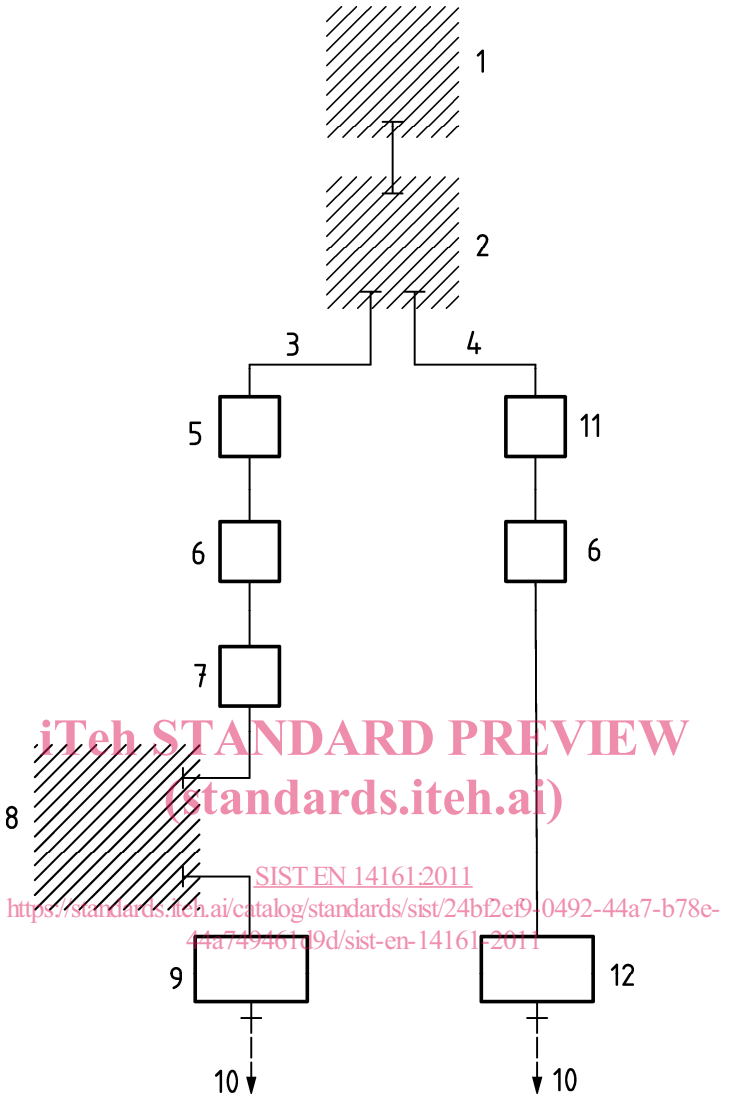
It applies to pipeline systems on land and offshore, connecting wells, production plants, process plants, refineries and storage facilities, including any section of a pipeline constructed within the boundaries of such facilities for the purpose of its connection. The extent of pipeline systems covered by this International Standard is illustrated in Figure 1.

This International Standard applies to rigid, metallic pipelines. It is not applicable for flexible pipelines or those constructed from other materials, such as glass-reinforced plastics.

This International Standard is applicable to all new pipeline systems and can be applied to modifications made to existing ones. It is not intended that it apply retroactively to existing pipeline systems.

It describes the functional requirements of pipeline systems and provides a basis for their safe design, construction, testing, operation, maintenance and abandonment.

On-land supply systems used by the gas supply industry excluding gas infrastructure from the input of gas into the on-shore transmission network up to the inlet connection of gas appliances are excluded from the scope of this standard.



Key

1	wellsite	5	pump station	9	depot
2	gathering station, treatment plant or process plant	6	valve station	10	distribution
3	liquid	7	tankage	11	compressor station
4	gas	8	refinery	12	pressure-reduction station

Pipeline elements covered by this International Standard

Connections with other facilities. The pipeline system should include an isolation valve at connections with other facilities and at branches.

Pipeline elements not covered by this International Standard.

Station/plant area, offshore installation not covered by this International Standard.

Station/plant area covered by this International Standard.

NOTE The pipeline system should include an isolation valve at connections with other facilities and at branches.

Figure 1 — Extent of pipeline systems covered by this International Standard

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 148-1, *Metallic materials — Charpy pendulum impact test — Part 1: Test method*

ISO 3183:2007, *Petroleum and natural gas industries — Steel pipe for pipeline transportation systems*

ISO 3977 (all parts), *Gas turbines — Procurement*

ISO 10439, *Petroleum, chemical and gas service industries — Centrifugal compressors*

ISO 10474:1991, *Steel and steel products — Inspection documents*

ISO 13623:2009, *Petroleum and natural gas industries -- Pipeline transportation systems*

ISO 13707, *Petroleum and natural gas industries — Reciprocating compressors*

ISO 13709, *Centrifugal pumps for petroleum, petrochemical and natural gas industries*

ISO 13710, *Petroleum, petrochemical and natural gas industries — Reciprocating positive displacement pumps*

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

ISO 14313, *Petroleum and natural gas industries — Pipeline transportation systems — Pipeline valves*

ISO 14723, *Petroleum and natural gas industries — Pipeline transportation systems — Subsea pipeline valves*

ISO 15156-1, *Petroleum and natural gas industries — Materials for use in H_2S-containing environments in oil and gas production — Part 1: General principles for selection of cracking-resistant materials*

ISO 15156-2, *Petroleum and natural gas industries — Materials for use in H_2S-containing environments in oil and gas production — Part 2: Cracking-resistant carbon and low alloy steels, and the use of cast irons*

ISO 15156-3, *Petroleum and natural gas industries — Materials for use in H_2S-containing environments in oil and gas production — Part 3: Cracking-resistant CRAs (corrosion-resistant alloys) and other alloys*

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

ISO 15589-2, *Petroleum and natural gas industries — Cathodic protection of pipeline transportation systems — Part 2: Offshore pipelines*

ISO 15590-1, *Petroleum and natural gas industries — Induction bends, fittings and flanges for pipeline transportation systems — Part 1: Induction bends*

ISO 15590-2, *Petroleum and natural gas industries — Induction bends, fittings and flanges for pipeline transportation systems — Part 2: Fittings*

ISO 15590-3, *Petroleum and natural gas industries — Induction bends, fittings and flanges for pipeline transportation systems — Part 3: Flanges*

ISO 15649, *Petroleum and natural gas industries — Piping*

ISO/DIS 21809-1, *Petroleum and natural gas industries — External coatings for buried or submerged pipelines used in pipeline transportation systems — Part 1: Polyolefin coatings (3-layer PE and 3-layer PP)*

ISO 21809-2, *Petroleum and natural gas industries — External coatings for buried or submerged pipelines used in pipeline transportation systems — Part 2: Fusion-bonded epoxy coatings*

ISO 21809-3, *Petroleum and natural gas industries — External coatings for buried or submerged pipelines used in pipeline transportation systems — Part 3: Field joint coatings*

ISO 21809-4, *Petroleum and natural gas industries — External coatings for buried or submerged pipelines used in pipeline transportation systems — Part 4: Polyethylene coatings (2-layer PE)*

ISO 21809-5, *Petroleum and natural gas industries — External coatings for buried or submerged pipelines used in pipeline transportation systems — Part 5: External concrete coatings*

IEC 60034-1, *Rotating electrical machines — Part 1: Rating and performance*

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

IEC 60079-14, *Explosive atmospheres — Part 14: Electrical installations design, selection and erection*

API[1] 620, *Design and Construction of Large, Welded, Low-Pressure Storage Tanks*

API 650, *Welded Steel Tanks for Oil Storage*

ASME B16.5, *Pipe Flanges and Flanged Fittings — NPS 1/2 Through NPS 24*

ASME Boiler and Pressure Vessel Code, Section VIII, Division I, *Rules for Construction of Pressure Vessels* (BPVC)

MSS[2] SP-25, *Standard Marking System for Valves, Fittings, Flanges and Unions*

MSS SP-44, *Steel Pipeline Flanges*

NFPA[3] 30, *Flammable and Combustible Liquids Code*

NFPA 220, *Standard on Types of Building Construction*

1) American Petroleum Institute, 1220 L Street, Northwest Washington, DC 20005-4070, USA.

2) Manufacturer's Standardization Society of the Valve and Fittings Industry, 127 Park Street, N.E., Vienna, VA 22180, USA.

3) National Fire Protection Association, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101, USA.

3 Terms, definitions and symbols

3.1 Terms and definitions

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

3.1.1
commissioning
activities associated with the initial filling of a pipeline system with the fluid being transported

3.1.2
design life
period for which the design basis is planned to remain valid

3.1.3
design pressure
maximum internal pressure of the pressure-containing components of the pipeline system designed in compliance with this International Standard

3.1.4
design strength
strength level to be used in design, based on material's specified minimum properties

3.1.5
fabricated assembly
grouping of pipe and components assembled as a unit and installed as a subunit of a pipeline system

3.1.6
fluid
medium being transported through the pipeline system

3.1.7
hot tapping
tapping, by mechanical cutting, of an in-service pipeline or piping

3.1.8
in-service pipeline
pipeline that has been commissioned for the transportation of fluid

3.1.9
lay corridor
corridor in which an offshore pipeline is being installed, usually determined prior to construction

3.1.10
location class
geographic area classified according to criteria based on population density and human activity

3.1.11
maintenance
all activities designed to retain the pipeline system in a state in which it can perform its required functions

NOTE These activities include inspections, surveys, testing, servicing, replacement, remedial works and repairs.

3.1.12
maximum allowable operating pressure
MAOP
maximum internal pressure at which a pipeline system, or parts thereof, is allowed to be operated in compliance with this International Standard

3.1.13
offshore pipeline
pipeline laid in maritime waters and estuaries seaward of the ordinary high water mark

3.1.14
pipeline
those components of a pipeline system connected together to convey fluids between stations and/or plants, including pipe, pig traps, components, appurtenances, isolating valves, and sectionalising valves

See Figure 1.

3.1.15
pipeline on land
pipeline laid on or in land, including lines laid under inland water courses

3.1.16
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

3.1.17
piping
pipe, fittings and components inside stations and terminals, but not part of the pipeline

3.1.18
primary piping
piping conveying or storing the fluid transported by the pipeline

3.1.19
right-of-way
corridor of land within which the pipeline operator has the right to conduct activities in accordance with the agreement with the land owner

3.1.20
riser
that part of an offshore pipeline, including subsea spool pieces, that extends from the sea bed to the pipeline termination point on an offshore installation

3.1.21
secondary piping
piping carrying fluids other than those of the primary piping and pipeline, such as fuel gas, water, or lube oil

3.1.22
specified minimum tensile strength
SMTS
minimum tensile strength required by the specification or standard under which the material is purchased

3.1.23
specified minimum yield strength
SMYS
minimum yield strength required by the specification or standard under which the material is purchased

3.1.24
station
facility for the purpose of increasing pressure, decreasing pressure, storage, metering, heating, cooling or isolating the transported fluid

3.2 Symbols

A_i internal cross-sectional area of the pipe

A_s cross-sectional area of pipewall

D specified diameter (outside or inside)

D_{max} maximum measured diameter (outside or inside)

D_{min} minimum measured diameter (outside or inside)

D_o nominal outside diameter

E modulus of elasticity

f_h hoop-stress design factor, obtained from Table 2 for pipelines on land and Table 3 for offshore pipelines;

F pipe wall axial force

p_{id} design pressure

p_{od} minimum external hydrostatic pressure

O ovality or out-of-roundness

t_{min} specified minimum wall thickness

T_1 installation temperature

T_2 maximum or minimum metal temperature during operation

ν Poisson ratio

α linear coefficient of thermal expansion

σ_{eq} equivalent stress

σ_h circumferential stress

σ_{hp} circumferential hoop stress due to fluid pressure

σ_l longitudinal stress

σ_y specified minimum yield strength (SMYS) at the maximum design temperature

σ_D design strength

τ shear stress