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Industrija za predelavo nafte in zemeljskega plina - Transportni cevovodni sistemi - Specifikacije za upravljanje celovitosti cevovoda - 2. del: Upravljanje celovitosti podvodnega cevovoda v celotnem življenjskem ciklu (ISO/DIS 19345-2:2017)

Petroleum and natural gas industry - Pipeline transportation systems - Pipeline integrity management specification - Part 2: Full-life cycle integritymanagement for offshore pipeline (ISO/DIS 19345-2:2017)

Erdöl- und Erdgasindustrie - Leitfaden für das Integritätsmanagement von Fernleitungen - Teil 2: Integritätsmanagement des vollständigen Lebenszyklus von Offshore Fernleitungen (ISO/DIS 19345-2:2017)

PNGI - Spécifications de gestion de l'intégrité des pipelines - Partie 2: Gestion de l'intégrité des pipelines marins durant leur cycle de vie complet (ISO/DIS 19345-2:2017)

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Petroleum and natural gas industry — Pipeline transportation systems — Pipeline integrity management specification —

Part 2:
Full-life cycle integritymanagement for offshore pipeline

PNGI — Spécifications de gestion de l'intégrité des pipelines —

Partie 2: Gestion de l'intégrité des pipelines marins durant leur cycle de vie complet

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Contents

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.

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This document was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for the petroleum, petrochemical and natural gas industries*, Subcommittee SC 2, *Pipeline transportation systems*.

A list of all parts in the ISO 19345 series can be found on the ISO website.

Introduction

This document addresses the integrity of petroleum and natural gas pipelines through their entire life-cycle, from design to eventual abandonment. For this reason, considerations relating to design, construction, and abandonment have been included. This approach supports the development and implementation of a holistic and integrated pipeline integrity management program that bridges between life-cycle elements and thereby avoids compartmentalizing of the pipeline life-cycle into essentially independent data and functional silos, which traditionally has been the case. The integrated approach was developed on the basis of extensive research and examination of best practices and results from pipeline integrity audits world-wide. This document is intended to be used by companies that have not yet developed an official program or are developing a program for new pipelines. This document can also be used to guide continual improvement of existing programs by both operating companies and regulators to evaluate integrity management program effectiveness.

Petroleum and natural gas industry — Pipeline transportation systems — Pipeline integrity management specification —

Part 2:
Full-life cycle integritymanagement for offshore pipeline

1. Scope

This document specifies requirements and gives recommendations on integrity management of pipeline during the design, construction, commission, operation, maintenance and abandonment.

This document applies to offshore pipeline for transporting petroleum and natural gas. It applies to rigid steel pipelines. It is not applicable to flexible pipelines, dynamic risers or those constructed from other materials, such as glass-reinforced plastics.

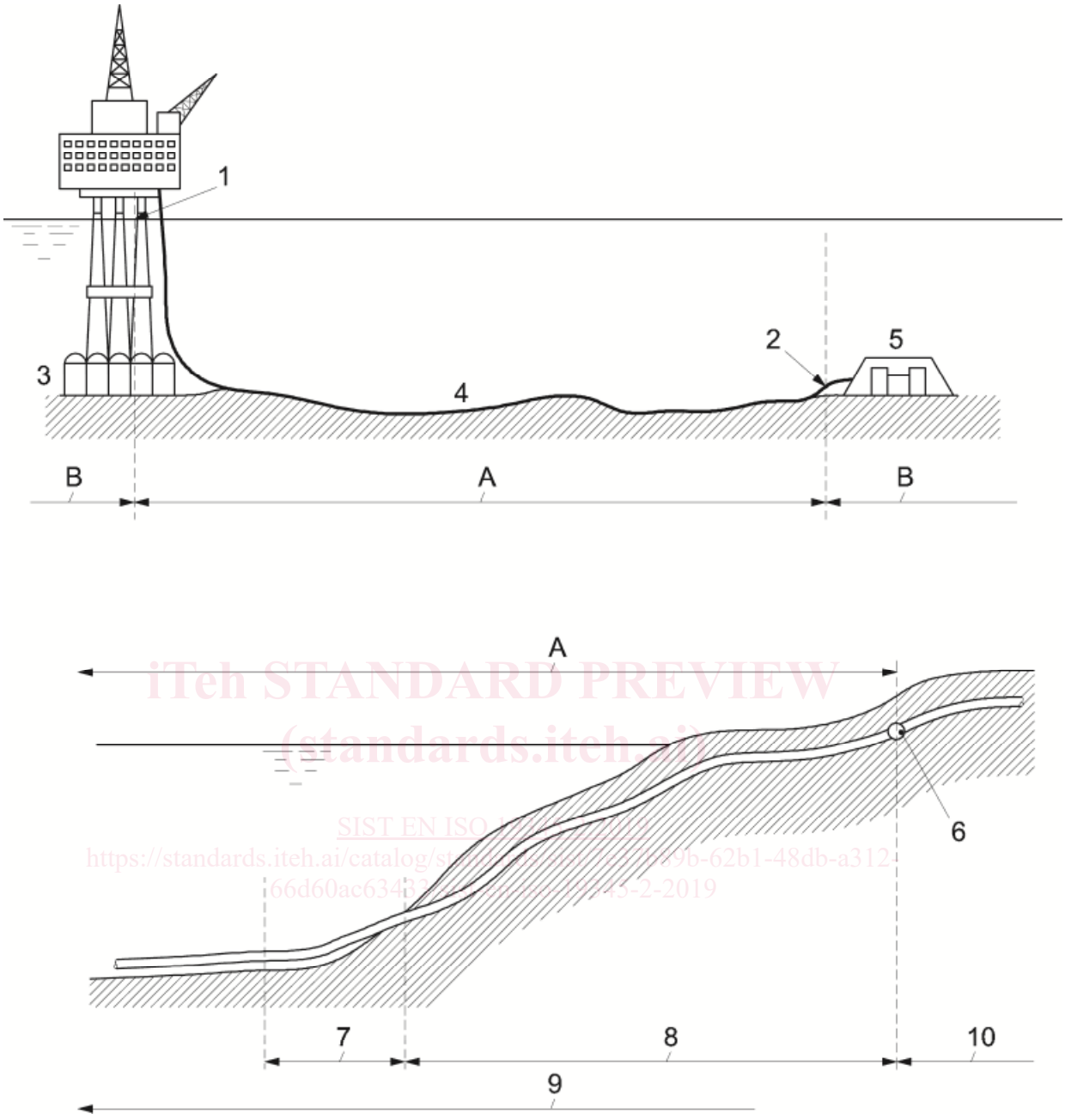
An offshore pipeline system extends to:

— the first valve, flange or connection above water on platform or subsea mechanical connector with subsea structure (i.e. manifold or dynamic riser);

— the connection point to the offshore installation (i.e. piping manifolds are not included);

— the first valve, flange, connection or isolation joint at a landfall, unless otherwise specified by the onshore legislation.

The components mentioned above (valve, flange, connection, isolation joint) include also any pup pieces, i.e. the offshore pipeline system extends to the weld beyond the pup piece, see in Figure 1.



Key

1	First valve, flange, connection or isolation joint	7	Nearshore section
2	Connector point to subsea piping	8	Shore approach
3	Topside	9	Offshore section
4	Pipeline system	10	Onshore section
5	Pipeline subsea structure	A	Not covered by this document
6	First valve, flange, connection or isolation joint	B	Not covered by this document

Figure 1 — Extent of pipeline systems covered by this document

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 13623:2009, *Petroleum and natural gas industries — Pipeline transporting system*

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

ISO 31000, *Risk management — Principles and guidelines*

IEC 31010, *Risk assessment techniques*

3. Terms, definitions and abbreviated terms

3.1 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:

— ISO Online browsing platform: available at http://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1.1
abandonment
activities associated with taking a pipeline permanently out of operation

Note 1 to entry: An abandoned pipeline cannot be returned to operation.

Note 2 to entry: Depending on the legislation this may require cover or removal.

3.1.2
anomaly
possible deviation from pipe material or weld soundness

Note 1 to entry: The identification of an indication of an anomaly may be generated by non-destructive inspection, such as in-line inspection.

3.1.3
baseline assessment
first integrity assessment prior to or after operation

3.1.4
cathodic protection
corrosion control technique to prevent or reduce the corrosion of underground metal pipelines by transferring an electrical current onto the pipe to achieve higher electrical potentials

3. 1.5
corrosion
deterioration of a material, usually a metal that results from an electrochemical reaction with its environment

3.1.6
crack
planar flaw, or linear discontinuity, with a sharp tip radius

3.1.7
critical consequence area
location where a pipeline release might have a significant adverse effect on public safety, property and the environment

Note 1 to entry: The location and scope of critical consequence areas will change over time as human activity data becomes available. The pipeline segments in CCAs are of particular interest in risk assessment and integrity assessment evaluations and prioritizations.

3.1.8
deactivation
remove from service, may return to service after proper assessment, also defined as decommissioning or suspension

3.1.9
deformation
change in shape of the pipe or component, such as a bend, buckle, dent, ovality, ripple, wrinkle, or any other change that affects the roundness of the pipe or component's original cross-section or straightness of the pipe or component

3.1.10
defect
imperfection of a type or magnitude exceeding acceptable criteria

3.1.11
dent
depression which produces a disturbance in the curvature of the pipe wall, caused by contact with a foreign body resulting in plastic deformation of the pipe wall

3. 1.12
design life
period for which the design basis is planned to remain valid

[SOURCE: ISO 13623:2009, 3.1.2]

3. 1.13
failure
event in which a component or system does not perform according to its operational requirements

3. 1.14
fitness for purpose
quantitative engineering evaluation that is performed to demonstrate the structural integrity of an in-service component that can contain an imperfection, defect or damage

3. 1.15
gouge
surface damage to a pipeline caused by contact with a foreign object that has scraped (gouged) material out of the pipe, resulting in a metal loss defect or imperfection

3. 1.16
incident
unintentional release of gas or liquid due to the failure of a pipeline

Note1 to entry: Some regulatory authorities have defined incidents differently. In these cases, an incident may be defined as: an event occurring on a pipeline for which operators shall make a report to the concerned regulatory authority.

3. 1.17
in-line inspection
inspection of a pipe wall from the interior of the pipe using specialized tools

3. 1.18
integrity assessment
process that includes inspection and test of pipeline to obtain the pipe body's information, combining analysis of material and structure's reliability, evaluating the safety state of the pipeline, so as to determine the applicability of it

3. 1.19
integrity management program
documented program that specifies the practices used by the operating company to proactively manage the safe, environmentally responsible, and reliable service of a pipeline system throughout its lifecycle that incorporates a continual improvement process

3. 1.20
life extension
additional period of time beyond the original design or service life (but within the assessed remnant life) for which permission to continue operating a pipeline system is granted by the regulatory bodies

Note 1 to entry: Life extension is considered as a modification to the design basis.

[SOURCE: ISO/TS 12747:2011, 3.7]

3. 1.21
magnetic flux leakage
type of in-line inspection technology in which a magnetic field is induced in the pipe wall between two poles of a magnet

Note 1 to entry: Anomalies affect the distribution of the magnetic flux in the wall. The magnetic flux leakage pattern is used to detect and characterize anomalies.

3. 1.22
management of change
process that systematically recognizes and communicates to the necessary parties changes of a technical, physical, procedural, or organizational nature that can impact system integrity

3. 1.23
manufacturing defect
defect in the pipe body or coating created during the pipe or component manufacturing or coating processes

3. 1.24
maximum allowable operating pressure
maximum pressure at which the pipeline system, or parts thereof, is allowed to be operated and usually determined by hydrostatic tests and a corresponding safety factor associated with the fluid transported within a given location class area

3. 1.25
metal loss
pipe anomaly in which metal has been removed

Note 1 to entry: Metal loss is usually the result of corrosion, but gouging, manufacturing defects, or mechanical damage can also result in metal loss.

3. 1.26
non-destructive testing
wide group of analysis techniques used to evaluate the properties of a material, component or system without causing damage

Note 1 to entry: The terms non-destructive inspection (NDI) and non-destructive evaluation (NDE) are also commonly used to describe this technology.

3. 1.27
offshore pipeline
part of a pipeline system that, except for pipeline risers, is located below the water surface at maximum tide that use universally recognized offshore pipeline construction techniques.

Note 1 to entry: The pipeline may be resting wholly or intermittently on, or buried below, the seabed.

3. 1.28
operator
person or organization who owns or operates a pipeline system or facilities and is ultimately responsible for the operation and integrity of the pipeline system

3. 1.29
pipeline integrity management
set of processes and procedures that proactively ensures incident-free transportation of fluids through a pipeline system

3. 1.30
pipeline integrity management program
continual improvement closed-loop system using information technology to realize functions such as data acquisition and integration, integrity and risk assessment, mitigation and repair activity and maintenance decisions, with comprehensive management of change and continual review and improvement processes

3. 1.31
pressure test
means of assessing the integrity of a new or existing pipeline that involves filling the pipeline with water and pressurizing to a level reasonably in excess of the MAOP of the pipeline to demonstrate that the pipeline is fit for service at the MAOP for a given time frame dependent on the identified integrity hazards

3. 1.32
risk
measure of loss, either qualitative or quantifiable, in terms of both the likelihood of incident occurrence and the magnitude of the consequences of the incident occurrence

3. 1.33
risk assessment
systematic, analytical process in which potential hazards from pipeline system are proactively identified, and the likelihood and consequences of potential adverse events are determined

3. 1.34
risk management
coordinated activities to direct and control an organization with regard to risk

[SOURCE: ISO Guide 73:2009, 2.1]

3. 1.35
safe operating pressure
pressure, calculated using remaining strength of corroded pipeline formulas, where all corroded regions will withstand a pressure equal to a stress level of certain times of the MAOP according to different safety factors or formula chosen

3. 1.36
service life
length of time over which the pipeline system is intended to operate

Note 1 to entry: Service life is considered the actual operational life to date, but may include any planned future use of the line. Service life may be less or longer than design life.

[SOURCE: ISO/TS 12747:2011, 3.21]

3. 1.37
sizing accuracy
accuracy with which an anomaly dimension or characteristic is reported.

Note 1 to entry: Typically, accuracy is expressed by tolerance and certainty. As an example, depth sizing accuracy for metal loss using NDT methods, such as an ILI tool, is commonly expressed as +/-10 % of the wall thickness (the tolerance) and 80 % of the time (the certainty).

3. 1.38
third party damage
damage done to the pipeline as a result of activities by personnel not associated with the pipeline

3.1.39
threat
activity or condition than can adversely affect the pipeline system if not adequately controlled

[SOURCE: ISO/TS 12747:2011, 3.23]

3.2 Abbreviated terms

AC	alternating current
CP	cathodic protection

CCA	critical consequence area
CoF	consequence of failure
DA	direct assessment
ECDA	external corrosion direct assessment
FFP	fitness for purpose
GIS	geographic information system
HIC	hydrogen-induce cracking
ICDA	internal corrosion direct assessment
ILI	in-line inspection
IMP	integrity management program
MAOP	maximum allowable operating pressure
MFL	magnetic flux leakage
NDT	non-destructive testing
PIM	pipeline integrity management
PoF	probablity of failure
SCC	stress corrosion cracking
SCCDA	stress corrosion cracking direct assessment
SMYS	specified minimum yield strength
SSC	sulfide-stress cracking

4. General

4.1 Key principles

The operator uses integrity management programs (IMPs) to enable them to manage its pipeline systems in a safe, environmentally responsible and reliable manner. An effective IMP anticipates and mitigates or eliminates integrity issues before they lead to incidents or failures.

Key principles for an effective IMP are listed below:

a) Pipeline system integrity shall be viewed as a lifecycle approach from initial planning, design, construction, operation and maintenance up to and including abandonment.

b) The operator shall provide adequate resources in terms of funds, equipment and competent personnel to implement the IMP.

c) Clearly defined roles and responsibilities with clear communication processes are necessary.