SLOVENSKI STANDARD
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Petrokemična industrija ter industrija za predelavo nafte in zemeljskega plina - Nekovinski materiali v stiku z mediji v povezavi s proizvodnjo nafte in plina - 2. del: Elastomeri (ISO 23936-2:2011)

Petroleum, petrochemical and natural gas industries - Non-metallic materials in contact with media related to oil and gas production - Part 2: Elastomers (ISO 23936-2:2011)

Erdöl-, petrochemische und Erdgasindustrie - Nichtmetallische Werkstoffe mit Medienkontakt bei der Öl- und Gasproduktion - Teil 2: Elastomere (ISO 23936-2:2011)

Industries du pétrole, de la pétrochimie et du gaz naturel - Matériaux non métalliques en contact avec les fluides relatifs à la production de pétrole et de gaz - Partie 2: Élastomères (ISO 23936-2:2011)

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Petroleum, petrochemical and natural gas industries - Non-metallic materials in contact with media related to oil and gas production - Part 2: Elastomers (ISO 23936-2:2011)

Industries du pétrole, de la pétrochimie et du gaz naturel - Matériaux non métalliques en contact avec les fluides relatifs à la production de pétrole et de gaz - Partie 2: Élastomères (ISO 23936-2:2011)

Erdöl-, petrochemische und Erdgasindustrie - Nichtmetallische Werkstoffe mit Medienkontakt bei der Öl- und Gasproduktion - Teil 2: Elastomere (ISO 23936-2:2011)

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Foreword

This document (EN ISO 23936-2:2011) 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 AFNOR.

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Petroleum, petrochemical and natural gas industries — Non-metallic materials in contact with media related to oil and gas production —

Part 2: Elastomers

Industries du pétrole, de la pétrochimie et du gaz naturel — Matériaux non métalliques en contact avec les fluides relatifs à la production de pétrole et de gaz —

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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ISO 23936-2 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*.

ISO 23936 consists of the following parts, under the general title *Petroleum, petrochemical and natural gas industries — Non-metallic materials in contact with media related to oil and gas production*:

— *Part 1: Thermoplastics*

— *Part 2: Elastomers*

The following parts are planned:

— *Part 3: Thermosets*

— *Part 4: Fibre-reinforced composite*

— *Part 5: Other non-metallic materials*

Introduction

ISO 23936 is intended to be of benefit to a broad industry group, ranging from operators and suppliers to engineering companies and authorities. ISO 23936 covers relevant generic types of non-metallic material (thermoplastics, elastomers, thermosetting plastics, fibre-reinforced plastics, etc.) and draws upon a wide range of existing technical experience, which has never before been summarized in a technical standard.

ISO 23936 does not cover polymeric coatings such as thermal insulation and paint that are applied to the outside of components but that are not in contact with oilfield fluids.

The evaluation and qualification process described in this part of ISO 23936 is intended to ensure that the user of non-metallic materials has sufficient understanding and knowledge of the applicable materials to obtain acceptable performance in the specified environment, and that the user can rely on stable quality to meet given specifications. A quality system is useful to ensure compliance with the requirements of this part of ISO 23936.

Successful qualification of a manufacturer and a specific material is intended to be valid for other projects and different operators. The consideration of qualification of a manufacturer is at the discretion and determination of the purchaser, normally on the basis of documentation provided by the manufacturer, as required in this part of ISO 23936 or any specific additional documentation.

The purchaser is responsible for ensuring (if necessary, with external competence) that the manufacturers selected are qualified.

This part of ISO 23936 is based on NORSOK standard M-710.

Petroleum, petrochemical and natural gas industries — Non-metallic materials in contact with media related to oil and gas production —

Part 2: Elastomers

1 Scope

ISO 23936 describes general principles and gives requirements and recommendations for the selection and qualification of non-metallic materials for service in equipment used in oil and gas production environments, where the failure of such equipment could pose a risk to the health and safety of the public and personnel, or to the environment. It can be applied to help avoid failures of the equipment itself. It supplements, but does not replace, the material requirements given in the appropriate design codes, standards or regulations.

This part of ISO 23936 describes the requirements and procedures for qualification of elastomeric material used in equipment for oil and gas production.

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 34-1:2010, *Rubber, vulcanized or thermoplastic — Determination of tear strength — Part 1: Trouser, angle and crescent test pieces*

ISO 37, *Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties*

ISO 48, *Rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD)*

ISO 815-1, *Rubber, vulcanized or thermoplastic — Determination of compression set — Part 1: At ambient or elevated temperatures*

ISO 2781, *Rubber, vulcanized or thermoplastic — Determination of density*

ISO 2921, *Rubber, vulcanized — Determination of low-temperature retraction (TR test)*

ISO 3601-3:2005, *Fluid power systems — O-rings — Part 3: Quality acceptance criteria*

ISO 7619-1, *Rubber, vulcanized or thermoplastic — Determination of indentation hardness — Part 1: Durometer method (Shore hardness)*

ISO 13628-10:2005, *Petroleum and natural gas industries — Design and operation of subsea production systems — Part 10: Specification for bonded flexible pipe*

ASTM D297, *Standard Test Methods for Rubber Products — Chemical Analysis*

ASTM D395, *Standard Test Methods for Rubber Property — Compression Set*

ASTM D412, *Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers — Tension*

ASTM D624, *Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers*

ASTM D1414, *Standard Test Methods for Rubber O-Rings*

ASTM D1415, *Standard Test Method for Rubber Property — International Hardness*

ASTM D2240, *Standard Test Method for Rubber Property — Durometer Hardness*

API 17K, *Specification for Bonded Flexible Pipe*

3 Terms, definitions and abbreviated terms

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

3.1 Terms and definitions

3.1.1
accelerated test
test undertaken under conditions designed to speed material deterioration

NOTE This is usually accomplished by increasing temperature, in order to raise chemical reaction rates, but fluid concentration and stress are variables which can also be manipulated.

3.1.2
asset operator
person who operates an asset, who has knowledge of well parameters and who transmits this information to the **user** (3.1.15)

NOTE 1 An asset can be a well, a production train, a plant, etc.

NOTE 2 Well parameters can be fluid exposure, temperatures, pressures, duration, etc.

3.1.3
compression set
difference between the original sample height and the post-test height, divided by the interference, expressed as a percentage

3.1.4
elastomer
rubber
amorphous material mechanically mixed with other constituents to form a rubber compound, which is then shaped by flow into articles by means of the manufacturing processes of moulding or extrusion, and then (invariably) chemically cured at elevated temperature to form an elastic insoluble material

3.1.5
fluid
medium such as a gas, liquid, supercritical gas, or a mixture of these

3.1.6
interference
difference between the original sample height and the height of spacer bar, each measured in the same direction as the direction of compression

3.1.7
compound manufacturer
manufacturer
producer of the elastomer material or of semi-finished products made from elastomer materials

3.1.8
modulus
tensile stress at a given elongation

NOTE In the rubber industry, the modulus at 50 % elongation is often chosen.

3.1.9
polymer
high molecular weight molecule, natural or synthetic, whose chemical structure can be represented by repeated small units which collectively form molecular chains

NOTE This material class has three main sub-groups: elastomers, thermoplastics and thermosets.

3.1.10
rapid gas decompression
RGD
depressurization
explosive decompression
rapid pressure-drop in a high pressure gas-containing system which disrupts the equilibrium between external gas pressure and the concentration of gas dissolved inside any polymer, with the result that excess gas tries to escape from the solution at points throughout the material, causing expansion

NOTE If large enough, and if the pressure-drop rate is faster than the natural gas diffusion rate, blistering or rupturing can occur.

3.1.11
room temperature
temperature of (23 ± 2) °C

3.1.12
seal cross-section
cross-section diameter
CSD
free height of a seal at room temperature, measured normal to seal diameter in the direction of compression in the test

NOTE The measurement is taken at three circumferentially equidistributed positions.

3.1.13
seal type
seal design of specified geometry, size and orientation

EXAMPLE An O-ring.

3.1.14
thermoplastic
material capable of being repeatedly softened by heating and hardened by cooling through a temperature range characteristic of the plastic and, in the softened state, of being repeatedly shaped by flow into articles by moulding, extrusion or forming