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Olieindustri, petrokemisk industri og naturgasindustri – Ikke-metalliske materialer i kontakt med medier relateret til olie- og gasproduktion – Del 1: Termoplast

Oil and gas industries including lower carbon energy – Non-metallic materials in contact with media related to oil and gas production – Part 1: Thermoplastics (ISO 23936-1:2022)

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EUROPÄISCHE NORM

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ICS 75.180.01

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English Version

**Oil and gas industries including lower carbon energy -
Non-metallic materials in contact with media related
to oil and gas production - Part 1: Thermoplastics
(ISO 23936-1:2022)**

Industries du pétrole et du gaz y compris les
énergies à faible teneur en carbone - Matériaux
non-métalliques en contact avec les fluides relatifs
à la production de pétrole et de gaz - Partie 1:
Matières thermoplastiques (ISO 23936-1:2022)

Erdöl-, petrochemische und Erdgasindustrie -
Nichtmetallische Werkstoffe mit Medienkontakt
bei der Öl- und Gasproduktion - Teil 1:
Thermoplaste (ISO 23936-1:2022)

This European Standard was approved by CEN on 23 May 2022.

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.

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COMITÉ EUROPÉEN DE NORMALISATION
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CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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Contents

Page

European foreword	3
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European foreword

This document ([EN ISO 23936-1:2022](#)) has been prepared by Technical Committee ISO/TC 67 "Oil and gas industries including lower carbon energy" 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 March 2023, and conflicting national standards shall be withdrawn at the latest by March 2023.

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

This document supersedes [EN ISO 23936-1:2009](#).

Any feedback and questions on this document should be directed to the users' national standards body/national committee. A complete listing of these bodies can be found on the CEN website.

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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

Endorsement notice

The text of [ISO 23936-1:2022](#) has been approved by CEN as [EN ISO 23936-1:2022](#) without any modification.

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Second edition
2022-08

Oil and gas industries including lower carbon energy — Non-metallic materials in contact with media related to oil and gas production —

Part 1: Thermoplastics

*Industries du pétrole et du gaz y compris les énergies à faible teneur
en carbone — Matériaux non-métalliques en contact avec les fluides
relatifs à la production pétrole et de gaz —*

Partie 1: Matières thermoplastiques



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Contents

Page

Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms, definitions and abbreviated terms	2
3.1 Terms and definitions.....	2
3.2 Abbreviated terms.....	4
4 Technical requirements	5
4.1 General requirements.....	5
4.2 Cautionary remarks.....	6
4.3 Traceability.....	6
4.4 Test specimen identification.....	7
4.4.1 Coding overview	7
4.4.2 Moulding.....	7
4.4.3 Orientation.....	8
4.4.4 Form.....	8
4.4.5 Post treatment.....	8
4.4.6 Shaping.....	8
4.4.7 Test specimen fabrication for Level 2, Level 3 and Level 4 ageing experiments.....	8
4.5 Validation of conformance.....	9
5 Level 1 – Material property characterization	9
5.1 General.....	9
5.2 Reporting.....	10
5.2.1 Material data report.....	10
5.2.2 Certificate of conformance.....	11
6 Level 2 – Material stability (short-term)	11
6.1 General.....	11
6.2 Test criteria	11
6.2.1 General.....	11
6.2.2 Exposure temperature	11
6.2.3 Exposure durations.....	11
6.2.4 Test fluids	11
6.2.5 Property test methods	12
6.2.6 Threshold criteria	13
6.3 Preconditioning considerations	13
6.4 Reporting.....	13
7 Level 3 – Material stability (accelerated)	14
7.1 General	14
7.2 Exposure temperatures.....	14
7.3 Exposure durations.....	14
7.4 Exposure fluids	15
7.5 Initial swelling.....	15
7.6 Property test methods.....	15
7.7 Threshold criteria.....	15
7.8 Preconditioning considerations	16
7.9 Reporting.....	16
8 Level 4 – Material stability (long-term)	16
8.1 General requirements for Level 4 evaluation	16
8.2 Exposure temperatures.....	16
8.3 Exposure durations.....	17

This is a preview of "DS/EN ISO 23936-1:20...". [Click here to purchase the full version from the ANSI store.](#)

8.4	Exposure fluids	17
8.5	Initial swelling.....	17
8.6	Property test methods.....	17
8.7	Guidance for selection of Level 4 test methods	17
8.8	Preconditioning considerations	17
8.9	Evaluation of data for Level 4.....	17
8.10	Threshold baseline.....	18
8.11	Threshold criteria.....	18
Annex A (normative) Test media, conditions, equipment and procedures for ageing of thermoplastic materials.....		19
Annex B (informative) Long-term life estimation methodology		35
Bibliography		46

This is a preview of "DS/EN ISO 23936-1:20...". Click here to purchase the full version from the ANSI store.

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.

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 documents 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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 67, *Oil and gas industries including lower carbon energy*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 12, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition ([ISO 23936-1:2009](http://www.iso.org/iso/23936-1:2009)), which has been technically revised.

The main changes are as follows:

- added a short-term, single temperature 28-day non-H₂S material stability evaluation as Level 2;
- added a 56-day total duration target for the traditional three temperature Arrhenius material degradation evaluation as Level 3 and this is very similar to the previous edition;
- moved the life estimation analysis requirement to Level 4 and this new section has a 180-day total duration target for the Arrhenius material degradation evaluation;
- added life estimation analysis examples for plastics.

A list of all parts in the [ISO 23936 series](http://www.iso.org/iso/23936-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

Non-metallic materials are used in the petroleum, petrochemical and natural gas industries for a wide range of components. The purpose of this document is to establish requirements and guidelines for systematic and effective planning, for non-metallic material selection to achieve cost effective technical solutions, taking into account possible constraints due to safety and/or environmental issues.

This document will be of benefit to a broad industry group ranging from operators and suppliers to engineers and authorities. It covers relevant generic types of non-metallic material (e.g. thermoplastics, elastomers, thermosetting plastics) and includes the widest range of existing technical experience. Coatings are excluded from the scope of this document.

This document complements the [ISO 15156 series](#) on metallic materials in sour service. It differs in the form of guidance provided to the user related to the potential degradation of desired properties when used in equipment for oil and gas production environments. The [ISO 15156 series](#) provides application limits and qualification requirements for metallic materials in H₂S-containing environments, which are related solely to relevant environmentally assisted cracking mechanisms.

This document recognizes that a wider range of compounds and parameters influence the degradation of non-metallic materials and thus provides guidance to permit selection of materials for hydrocarbon exploration and production applications based upon stability in appropriate test conditions.

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Oil and gas industries including lower carbon energy — Non-metallic materials in contact with media related to oil and gas production —

Part 1: Thermoplastics

CAUTION — The non-metallic materials selected using this document are resistant to the given environments in the petroleum and natural gas industries, but not necessarily immune under all service conditions. This document allocates responsibility for suitability for the intended service in all cases to the equipment user.

1 Scope

This document gives general principles, specifies requirements and gives recommendations for the assessment of the stability of non-metallic materials for service in equipment used in oil and gas exploration and production environments. This information aids in material selection. It can be applied to help avoid costly degradation failures of the equipment itself, which could pose a risk to the health and safety of the public and personnel or the environment. This document also provides guidance for quality assurance. It supplements but does not replace, the material requirements given in the appropriate design codes, standards or regulations.

This document addresses the resistance of thermoplastics to the deterioration in properties that can be caused by physical or chemical interaction with produced and injected oil and gas-field media, and with chemical treatment. Interaction with sunlight and ionizing radiation are excluded from the scope of this document.

This document is not necessarily suitable for application to equipment used in refining or downstream processes and equipment.

The equipment considered includes, but is not limited to, non-metallic pipelines, piping, liners, seals, gaskets and washers.

Blistering by rapid gas decompression is not included in the scope of this document.

This document applies to the assessment of the stability of non-metallic materials in simulated hydrocarbon production conditions to aid the selection of materials for equipment designed and constructed using conventional design criteria. Designs utilizing other criteria are excluded from its scope.

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 75-1](#), *Plastics — Determination of temperature of deflection under load — Part 1: General test method*

[ISO 75-2](#), *Plastics — Determination of temperature of deflection under load — Part 2: Plastics and ebonite*

[ISO 178](#), *Plastics — Determination of flexural properties*

[ISO 306](#), *Plastics — Thermoplastic materials — Determination of Vicat softening temperature (VST)*

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[ISO 527-1](#), *Plastics — Determination of tensile properties — Part 1: General principles*

[ISO 604](#), *Plastics — Determination of compressive properties*

[ISO 868](#), *Plastics and ebonite — Determination of indentation hardness by means of a durometer (Shore hardness)*

[ISO 1183-1](#), *Plastics — Methods for determining the density of non-cellular plastics — Part 1: Immersion method, liquid pycnometer method and titration method*

[ISO 2039-2](#), *Plastics — Determination of hardness — Part 2: Rockwell hardness*

[ISO 3451-1](#), *Plastics — Determination of ash — Part 1: General methods*

[ISO 6721-11](#), *Plastics — Determination of dynamic mechanical properties — Part 11: Glass transition temperature*

[ISO 11357-2](#), *Plastics — Differential scanning calorimetry (DSC) — Part 2: Determination of glass transition temperature and step height*

[ASTM D638](#), *Standard Test Method for Tensile Properties of Plastics*

[ASTM D648](#), *Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position*

[ASTM D695](#), *Standard Test Method for Compressive Properties of Rigid Plastics*

[ASTM D785](#), *Standard Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials*

[ASTM D790](#), *Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials*

[ASTM D792](#), *Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement*

[ASTM E1640](#), *Standard Test Method for Assignment of the Glass Transition Temperature By Dynamic Mechanical Analysis*

[ASTM D1708](#), *Standard Test Method for Tensile Properties of Plastics by Use of Microtensile Specimens*

[ASTM D2240](#), *Standard Test Method for Rubber Property-Durometer Hardness*

[ASTM D5630](#), *Standard Test Method for Ash Content in Plastics*