

STN	Ropný a plynárenský priemysel vrátane nízkouhlíkovej energie Metóda skúšky ovalizácie celého kruhu na hodnotenie odolnosti ocelových potrubí proti praskaniu v kyslej prevádzke (ISO 3845: 2024)	STN EN ISO 3845 45 2229
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Oil and gas industries including lower carbon energy - Full ring ovalization test method for the evaluation of the cracking resistance of steel line pipe in sour service (ISO 3845:2024)

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 04/26

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Oil and gas industries including lower carbon energy - Full
ring ovalization test method for the evaluation of the
cracking resistance of steel line pipe in sour service (ISO
3845:2024)

Industries du pétrole et du gaz, y compris les énergies
à faible teneur en carbone - Méthode d'essai de
déformation du diamètre d'une conduite en acier pour
évaluer sa tenue mécanique en environnement corrosif
(ISO 3845:2024)

Öl- und Gasindustrie einschließlich kohlenstoffarmer
Energieträger - Vollring-Ovalisierungsprüfverfahren
für die Bewertung der Rissbeständigkeit von
Stahlleitungsrohren im sauren Betrieb (ISO
3845:2024)

This European Standard was approved by CEN on 9 February 2026.

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EN ISO 3845:2026 (E)

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European foreword

The text of ISO 3845:2024 has been prepared by Technical Committee ISO/TC 67 "Oil and gas industries including lower carbon energy" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 3845:2026 by Technical Committee CEN/TC 12 "Oil and gas industries including lower carbon energy" the secretariat of which is held by NEN.

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Endorsement notice

The text of ISO 3845:2024 has been approved by CEN as EN ISO 3845:2026 without any modification.



International Standard

ISO 3845

Oil and gas industries including lower carbon energy — Full ring ovalization test method for the evaluation of the cracking resistance of steel line pipe in sour service

Industries du pétrole et du gaz, y compris les énergies à faible teneur en carbone — Méthode d'essai de déformation du diamètre d'une conduite en acier pour évaluer sa tenue mécanique en environnement corrosif

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ISO 3845:2024(en)



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ISO 3845:2024(en)**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 document 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).

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This document was prepared by Technical Committee ISO/TC 67, *Oil and gas industries including lower carbon energy*.

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ISO 3845:2024(en)**Introduction**

Sour service cracking problems in susceptible steel line pipe are caused by the various forms of hydrogen damage due to the presence of wet hydrogen sulfide (H_2S). The main mechanisms are hydrogen-induced cracking (HIC) or stepwise cracking (SWC), sulfide stress cracking (SSC) and stress-oriented hydrogen-induced cracking (SOHIC). An industry-proven technique for assessing the cracking resistance of steel line pipe is to stress a full ring pipe specimen in a sour environment.

The advantages of the full ring test specified in this document are that it is not necessary to pressurize the line pipe full ring specimen to achieve the required stress, and residual stresses are retained. Equivalent internal stresses can be produced by ovalization of the pipe using mechanical means.

Additional advantages are more representative samples, when compared to machined four-point bend specimens and single-sided exposure can allow in-situ inspection during test exposure.

A known stress is exerted at two regions on a full ring section of steel pipe. The pipe specimen is then exposed internally to the sour test solution.

Ultrasonic testing can be conducted regularly on internally loaded test specimens during the exposure period to monitor crack initiation and propagation. Hydrogen permeation measurements may also be conducted. Both crack initiation and propagation can therefore be monitored. Finally, a metallurgical examination is undertaken to classify any indications found by non-destructive testing (NDT), such as visual inspection, magnetic particle testing (MT), penetrant testing (PT) or ultrasonic testing (UT).

The method has been in use since 1984, but in 1991 a Joint Industry Sponsored Project was set up with the aim of systematically developing, defining and validating the full ring test. The resultant test method designed to determine the susceptibility of steel line pipe, bends, flanges and fittings, including all associated welds to hydrogen damage caused by exposure to sour environments, was published by the UK HSE as OTI 95 635^[1] and subsequently in 2016 as BS 8701, prior to adoption as ISO 3845.

Oil and gas industries including lower carbon energy — Full ring ovalization test method for the evaluation of the cracking resistance of steel line pipe in sour service

WARNING — The use of this document can involve hazardous materials, operations and equipment. It does not purport to address all the safety or environmental problems associated with its use. Attention is drawn to national and health safety practices and regulations regarding the use of hazardous materials prior to use, in particular for hydrogen sulfide.

1 Scope

This document gives a method for determining the resistance to cracking of steel pipes in sour service.

This test method employs a full-scale test specimen consisting of a short length of pipe (a 'full ring'), sealed at each end to contain the sour test environment within. The test method applies to any pipe; seamless, longitudinally welded (with or without filler), helical welded, and to girth welds between pipes.

NOTE 1 The specimen is usually a pipe but can also consist of flange neck or section of a bend, or other tubular component or a combination of the above.

NOTE 2 This test method can also be used for corrosion resistant alloys (CRAs).

The method utilizes ovalization by mechanical loading to produce a circumferential stress, equal to the target hoop stress, at two diametrically opposite locations on the inside surface of the test specimen. The test specimen is then subjected to single sided exposure to the sour test environment.

NOTE 3 The test also allows measurement of hydrogen permeation rates.

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 2400, *Non-destructive testing — Ultrasonic testing — Specification for calibration block No. 1*

ISO 3059, *Non-destructive testing — Penetrant testing and magnetic particle testing — Viewing conditions*

ISO 3452 (all parts), *Non-destructive testing – Penetrant testing*

ISO 4787, *Laboratory glass and plastic ware — Volumetric instruments — Methods for testing of capacity and for use*

ISO 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature*

ISO 7963, *Non-destructive testing — Ultrasonic testing — Specification for calibration block No. 2*

ISO 8044, *Corrosion of metals and alloys — Vocabulary*

ISO 8501-1, *Preparation of steel substrates before application of paints and related products — Visual assessment of surface cleanliness — Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings*

ISO 9934 (all parts), *Non-destructive testing — Magnetic particle testing*

ISO 11666, *Non-destructive testing of welds — Ultrasonic testing — Acceptance levels*

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ISO 16810, *Non-destructive testing – Ultrasonic testing – General principles*

ISO 17635, *Non-destructive testing of welds — General rules for metallic materials*

ISO 17638, *Non-destructive testing of welds — Magnetic particle testing*

ISO 17640:2018, *Non-destructive testing of welds — Ultrasonic testing — Techniques, testing levels, and assessment*

ISO 22232 (all parts), *Non-destructive testing — Characterization and verification of ultrasonic test equipment*

ISO 23277, *Non-destructive testing of welds — Penetrant testing — Acceptance levels*

ASTM D1193, *Standard Specification for Reagent Water*

ASTM E1237, *Standard Guide for Installing Bonded Resistance Strain Gages*

ASTM F21, *Standard test method for hydrophobic surface films by the atomizer test*

NACE TM0284:2016, *Evaluation of Pipeline and Pressure Vessel Steels for Resistance to Hydrogen-Induced Cracking*

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