
Petroleum and natural gas industries - Cements and materials for well cementing - Part 3: Testing of deepwater well cement formulations (ISO 10426-3:2003)

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Erdöl- und Erdgasindustrie - Zemente und Materialien für die Zementation von Tiefbohrungen - Teil 3: Prüfung von Unterwasser-Bohrlochzement (ISO 10426-3:2003)

Industries du pétrole et du gaz naturel - Ciments et matériaux pour la cimentation des puits - Partie 3: Essais de formulations de ciment pour puits en eau profonde (ISO 10426-3:2003)

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Ta slovenski standard je istoveten z: EN ISO 10426-3:2004

ICS:

75.180.10	Oprema za raziskovanje in odkopavanje	Exploratory and extraction equipment
91.100.10	Cement. Mavec. Apno. Malta	Cement. Gypsum. Lime. Mortar

SIST EN ISO 10426-3:2005**en,fr**

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN ISO 10426-3

October 2004

ICS 91.100.10; 75.020

English version

**Petroleum and natural gas industries - Cements and materials
for well cementing - Part 3: Testing of deepwater well cement
formulations (ISO 10426-3:2003)**

Industries du pétrole et du gaz naturel - Ciments et
matériaux pour la cimentation des puits - Partie 3: Essais
de formulations de ciment pour puits en eau profonde (ISO
10426-3:2003)

Erdöl- und Erdgasindustrie - Zemente und Materialien für
die Zementation von Tiefbohrungen - Teil 3: Prüfung von
Unterwasser-Bohrlochzement (ISO 10426-3:2003)

This European Standard was approved by CEN on 30 September 2004.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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



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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

EN ISO 10426-3:2004 (E)

Foreword

The text of ISO 10426-3:2003 has been prepared by Technical Committee ISO/TC 67 "Materials, equipment and offshore structures for petroleum and natural gas industries" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 10426-3:2004 by Technical Committee CEN/TC 12 "Materials, equipment and offshore structures for petroleum 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 April 2005, and conflicting national standards shall be withdrawn at the latest by April 2005.

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

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The text of ISO 10426-3:2003 has been approved by CEN as EN ISO 10426-3:2004 without any modifications.

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NOTE Normative references to International Standards are listed in annex ZA (normative).

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Annex ZA
(normative)

**Normative references to international publications
with their relevant European publications**

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE Where an International Publication has been modified by common modifications, indicated by (mod.), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN</u>	<u>Year</u>
ISO 10426-2	2003	Petroleum and natural gas industries - Cements and materials for well cementing - Part 2: Testing of well cements	EN ISO 10426-2	2003

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INTERNATIONAL
STANDARD

ISO
10426-3

First edition
2003-08-15

**Petroleum and natural gas industries —
Cements and materials for well
cementing —**

**Part 3:
Testing of deepwater well cement
formulations**

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*Industries du pétrole et du gaz naturel — Ciments et matériaux pour la
cimentation des puits —*

Partie 3: Essais de formulations de ciment pour puits en eau profonde

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Reference number
ISO 10426-3:2003(E)

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Published in Switzerland

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ISO 10426-3:2003(E)

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.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 10426-3 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Subcommittee SC 3, *Drilling and completion fluids, and well cements*.

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ISO 10426 consists of the following parts, under the general title *Petroleum and natural gas industries — Cements and materials for well cementing*:

- *Part 1: Specification* [SIST EN ISO 10426-3:2005
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- *Part 2: Testing of well cements*
- *Part 3: Testing of deepwater well cement formulations*
- *Part 4: Preparation and testing of foamed cement slurries at atmospheric pressure*

The following part is under preparation:

- *Part 5: Determination of shrinkage and expansion of well cement formulations at atmospheric pressure*

Introduction

The test methods contained in this part of ISO 10426, though generally based on ISO 10426-2, take into account the specialized sampling/testing requirements and unique downhole temperature profiles found in deepwater wells. ISO 10426-2 contains no applicable well simulation schedules for deepwater cementing operations.

In a deepwater cementing environment, a number of factors impact the thermal history of the cement slurry. These factors include: water depth, mud-line temperature, geothermal gradient, the presence or absence of a drilling riser, drilling fluid temperature, ocean current velocity, presence of thermoclines (layers of ocean water separated by temperature), ambient sea-surface temperature, cement mix-water temperature, bulk cement temperature, cement mixing rate, cement heat of hydration, displacement rate, prior circulating and static event history, drill pipe size and mass, casing size and mass, and hole size.

Given the number of variables impacting the thermal history of a cement formulation during placement and curing, and the interdependence of many of those variables, the user is directed to employ numerical heat-transfer simulation or actual field measurement to determine the test temperature and the temperature/pressure schedule for the test methods contained in this part of ISO 10426. In this way, the testing of the cement formulation can reflect as closely as possible the actual temperature profile found during field cementing operations.

Numerical modelling may be used to determine the relative magnitude of the input variables so that “most likely” and “less likely” scenarios of temperature history can be assessed. The values of some input variables may not be known precisely and a range of possible values should be employed. Physical laboratory testing can then be conducted at “most likely” conditions, with some additional testing at “less likely” conditions to determine the sensitivity to well conditions. Sound engineering judgement can then be applied to assess the risks.

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These procedures serve not only for the testing of well cements under deepwater well conditions, but may also be used in those circumstances where low seafloor temperatures are found at shallow water depths.

Well cements that can be used in deepwater well cementing can include those of ISO Classes A, C, G or H (as given in ISO 10426-1^[1]), high-alumina cement, appropriate foamed cements, various types of ductile cement compositions, etc. In each deepwater well cementing operation, the cement chosen needs to be fit for purpose.

In this part of ISO 10426, where practical, United States customary (USC) units are included in parentheses for information.