

DIN EN ISO 10426-5

ICS 75.020; 91.100.10

**Erdöl- und Erdgasindustrie –
Zemente und Materialien für die Zementation von Tiefbohrungen –
Teil 5: Bestimmung der Schrumpfung und Quellung von
Bohrloch-Zementmischungen bei atmosphärischem Druck
(ISO 10426-5:2004);
Englische Fassung EN ISO 10426-5:2005**

Petroleum and natural gas industries –
Cements and materials for well cementing –
Part 5: Determination of shrinkage and expansion of well cement formulations at
atmospheric pressure (ISO 10426-5:2004);
English version EN ISO 10426-5:2005

Industries du pétrole et du gaz naturel –
Ciments et matériaux pour la cimentation des puits –
Partie 5: Détermination du retrait et de l'expansion à la pression atmosphérique des
formulations de ciments pour puits (ISO 10426-5:2004);
Version anglaise EN ISO 10426-5:2005

Gesamtumfang 19 Seiten

Normenausschuss Erdöl- und Erdgasgewinnung (NÖG) im DIN

Nationales Vorwort

Diese Europäische Norm wurde vom Technischen Komitee CEN/TC 12 „Materialien, Ausrüstungen und Offshore-Bauwerke für die Erdöl-, petrochemische und Erdgasindustrie“ (Sekretariat: Frankreich) erstellt. Es handelt sich dabei um die unveränderte Übernahme von ISO 10426-5:2004, erarbeitet von ISO/TC 67 „Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries“, Subkomitee SC 3 „Drilling and completion fluids, and well cements“.

Für Deutschland hat hieran der Arbeitskreis NÖG 12/67 AK 3 „Bohrspülung und Zemente“ im Normenausschuss Erdöl- und Erdgasgewinnung (NÖG) mitgearbeitet.

Diese Europäische Norm enthält unter Berücksichtigung des DIN-Präsidialbeschlusses 13/1983 nur die englische Originalfassung der ISO-Norm.

Es wird ausdrücklich darauf hingewiesen, dass die Anwendung der in dieser Norm aufgeführten Einheit „in“ in Deutschland im nationalen amtlichen und geschäftlichen Verkehr aufgrund des Gesetzes über Einheiten im Messwesen (vom 1985-02-22 sowie der Ausführungsverordnung vom 1985-12-13 – geändert durch Verordnung vom 2001-10-29 und Verordnung vom 2003-11-25) nicht zulässig ist.

ISO 10426 besteht unter dem gemeinsamen Haupttitel *Erdöl- und Erdgasindustrie – Zemente und Materialien für die Zementation von Tiefbohrungen* aus folgenden Teilen:

- *Teil 1: Anforderungen*
- *Teil 2: Prüfung von Bohrloch-Zemente*
- *Teil 3: Prüfung von Unterwasser-Bohrlochzement*
- *Teil 4: Vorbereitung und Prüfung von Schaumzementbrühen unter atmosphärischen Bedingungen*
- *Teil 5: Bestimmung der Schrumpfung und Quellung von Bohrloch-Zementmischungen bei atmosphärischem Druck*

English Version

Petroleum and natural gas industries - Cements and materials
for well cementing - Part 5: Determination of shrinkage and
expansion of well cement formulations at atmospheric pressure
(ISO 10426-5:2004)

Industries du pétrole et du gaz naturel - Ciments et
matériaux pour la cimentation des puits - Partie 5:
Détermination du retrait et de l'expansion à la pression
atmosphérique des formulations de ciments pour puits (ISO
10426-5:2004)

Erdöl- und Erdgasindustrie - Zemente und Materialien für
die Zementation von Tiefbohrungen - Teil 5: Bestimmung
der Schrumpfung und Quellung von Bohrloch-
Zementmischungen bei atmosphärischem Druck (ISO
10426-5:2004)

This European Standard was approved by CEN on 30 September 2005.

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.

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Foreword

The text of ISO 10426-5:2004 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 10426-5:2005 by 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.

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 2006, and conflicting national standards shall be withdrawn at the latest by April 2006.

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.

Endorsement notice

The text of ISO 10426-5:2004 has been approved by CEN as EN ISO 10426-5:2005 without any modifications.

Introduction

Dimensional changes in oil- and gas-well cements after placement, phenomena often referred to as shrinkage, (when the dimensional change corresponds to a decrease in cement volume) have often been used to explain various wellbore phenomena including

- a microannulus, leading to a bad bond as demonstrated by the bond log;
- interzonal communication, resulting in costly remedial operations;
- lack of a hydraulic seal when utilizing cement inflatable packers.

Attempts have been made to find additives that decrease cement shrinkage (shrinkage being a fundamental characteristic of Portland cement) The best solution for shrinkage thus far has been the identification of additives that favour the expansion of the cement. However, even if cement expands dimensionally, it will still shrink internally. In this case, the bulk expansion of the cement sample is simply superimposed on an inner shrinkage that will affect the porosity of the sample.

Shrinkage and expansion in cement result from the formation of hydration products having a density different from the compounded density of the reaction components. This can result in the following:

- change in pore volume;
- change in pore pressure;
- change in sample dimensions;
- change in internal stress.

In a closed cell with a non-deformable boundary, the volume of hydrates produced during the chemical reaction is less than the volume of dry compounds plus water. The change in volume of hydrates will be referred to as inner hydration shrinkage. The change in the sample dimensions will be referred to as bulk shrinkage or expansion. Bulk shrinkage and expansion of cement refer to the result of the measurement of linear dimensional change or volume change. The volume to which all volume changes are related is the volume of the slurry immediately after mixing and emplacement in the experimental equipment.

In this part of ISO 10426, units are given as SI, and where practical, U.S. Customary units are included in brackets for information.

Users of this part of ISO 10426 should be aware that further or differing requirements might be needed for individual applications. This part of ISO 10426 is not intended to inhibit a vendor from offering, or the purchaser from accepting, alternative equipment or engineering solutions for the individual application. This can be particularly applicable where there is innovative or developing technology. Where an alternative is offered, the vendor should identify any variations from this International Standard and provide details.

This part of ISO 10426 is based on API Technical Report 10TR 2^[1].