



# SLOVENSKI STANDARD SIST EN ISO 13500:2009

01-januar-2009

BUXca Yý U  
SIST EN ISO 13500:2006

---

!bXi ghf]U'nUdfYXYUj c`bUZn]b'nYa Y'g\_Y[ Ud`]bU!'A Uhf]U]'nUj fHUbY'HY\_c ]bY!  
GdYWZ\_UM]Y]b'dfYg\_i g]fIGC`% ) \$\$.&\$\$, Ł

Petroleum and natural gas industries - Drilling fluid materials - Specifications and tests  
(ISO 13500:2008)

Erdöl- und Erdgasindustrie - Bohrspülungen - Spezifikationen und Prüfungen (ISO  
13500:2008)

Industries du pétrole et du gaz naturel - Produits pour fluides de forage - Spécifications  
et essais (ISO 13500:2008)

Ta slovenski standard je istoveten z: **EN ISO 13500:2008**

---

**ICS:**

|           |  |   |
|-----------|--|---|
| 75.180.10 | Oprema za raziskovanje in<br>odkopavanje | Exploratory and extraction<br>equipment |
|-----------|--|---|

**SIST EN ISO 13500:2009**

**en,fr**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN ISO 13500:2009

<https://standards.iteh.ai/catalog/standards/sist/1c85bbd6-a806-46fe-ab1f-6233e0336f17/sist-en-iso-13500-2009>

EUROPEAN STANDARD

EN ISO 13500

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2008

ICS 75.180.10

Supersedes EN ISO 13500:2006

English Version

## Petroleum and natural gas industries - Drilling fluid materials - Specifications and tests (ISO 13500:2008)

Industries du pétrole et du gaz naturel - Produits pour  
fluides de forage - Spécifications et essais (ISO  
13500:2008)

Erdöl- und Erdgasindustrie - Bohrspülungen -  
Spezifikationen und Prüfungen (ISO 13500:2008)

This European Standard was approved by CEN on 12 October 2008.

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 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 Management Centre has the same status as the official versions.

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

[SIST EN ISO 13500:2009](https://standards.iteh.ai/catalog/standards/sist/1c85bbd6-a806-46fe-ab1f-6233e0336f17/sist-en-iso-13500-2009)

<https://standards.iteh.ai/catalog/standards/sist/1c85bbd6-a806-46fe-ab1f-6233e0336f17/sist-en-iso-13500-2009>



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

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

**Contents**

Page

Foreword.....3

**iTeh STANDARD PREVIEW  
(standards.iteh.ai)**

SIST EN ISO 13500:2009

<https://standards.iteh.ai/catalog/standards/sist/1c85bbd6-a806-46fe-ab1f-6233e0336f17/sist-en-iso-13500-2009>

## Foreword

This document (EN ISO 13500:2008) has been prepared by Technical Committee ISO/TC 67 "Materials, equipment and offshore structures for petroleum 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.

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 May 2009, and conflicting national standards shall be withdrawn at the latest by May 2009.

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

This document supersedes EN ISO 13500:2006.

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

**ITEH STANDARD PREVIEW**  
**(standards.iteh.ai)**  
**Endorsement notice**

The text of ISO 13500:2008 has been approved by CEN as a EN ISO 13500:2008 without any modification.

<https://standards.iteh.ai/catalog/standards/sist/1c85bbd6-a806-46fe-ab1f-6233e0336f17/sist-en-iso-13500-2009>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN ISO 13500:2009

<https://standards.iteh.ai/catalog/standards/sist/1c85bbd6-a806-46fe-ab1f-6233e0336f17/sist-en-iso-13500-2009>

# INTERNATIONAL STANDARD

**ISO**  
**13500**

Third edition  
2008-11-01

---

---

## **Petroleum and natural gas industries — Drilling fluid materials — Specifications and tests**

*Industries du pétrole et du gaz naturel — Produits pour fluides de  
forage — Spécifications et essais*

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN ISO 13500:2009](https://standards.iteh.ai/catalog/standards/sist/1c85bbd6-a806-46fe-ab1f-6233e0336f17/sist-en-iso-13500-2009)

<https://standards.iteh.ai/catalog/standards/sist/1c85bbd6-a806-46fe-ab1f-6233e0336f17/sist-en-iso-13500-2009>



Reference number  
ISO 13500:2008(E)

© ISO 2008

**ISO 13500:2008(E)****PDF disclaimer**

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN ISO 13500:2009](https://standards.iteh.ai/catalog/standards/sist/1c85bbd6-a806-46fe-ab1f-6233e0336f17/sist-en-iso-13500-2009)

<https://standards.iteh.ai/catalog/standards/sist/1c85bbd6-a806-46fe-ab1f-6233e0336f17/sist-en-iso-13500-2009>

**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2008

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland



## Contents

Page

|  |    |
|--|----|
| Foreword.....  | iv |
| Introduction .....                                       | v  |
| 1 Scope .....  | 1  |
| 2 Normative references .....                             | 1  |
| 3 Terms, definitions, symbols and abbreviations .....    | 1  |
| 4 Requirements .....                                     | 4  |
| 5 Calibration .....                                      | 4  |
| 6 Packaged material .....                                | 11 |
| 7 Barite .....   | 13 |
| 8 Haematite (hematite).....                              | 22 |
| 9 Bentonite .....  | 30 |
| 10 Non-treated bentonite.....                            | 34 |
| 11 OCMA grade bentonite .....                            | 36 |
| 12 Attapulgite .....                                     | 40 |
| 13 Sepiolite .....                                       | 43 |
| 14 Technical-grade low-viscosity CMC (CMC-LVT).....      | 46 |
| 15 Technical-grade high-viscosity CMC (CMC-HVT).....     | 50 |
| 16 Starch .....  | 55 |
| 17 Low-viscosity polyanionic cellulose (PAC-LV).....     | 59 |
| 18 High-viscosity polyanionic cellulose (PAC-HV) .....   | 66 |
| 19 Drilling-grade xanthan gum .....                      | 71 |
| Annex A (informative) Mineral impurities in barite ..... | 83 |
| Annex B (informative) Test precision.....                | 84 |
| Annex C (informative) Examples of calculations .....     | 89 |
| Bibliography .....                                       | 93 |

## ISO 13500:2008(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 13500 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*.

**iTeh STANDARD PREVIEW**

This third edition cancels and replaces the second edition (ISO 13500:2006), subclauses 7.1.2/Table 2, 7.3.1, 8.5.2, 8.6.5, 8.13.4, 10.2.5, 11.4, 14.4.3, and 15.4.3 of which have been technically revised. Clause 17 on low-viscosity polyanionic cellulose, Clause 18 on high-viscosity polyanionic cellulose, and Clause 19 on drilling-grade xanthan gum have been added.

<https://standards.iteh.ai/catalog/standards/sist/1c85bbd6-a806-46fe-ab1f-6233e0336f17/sist-en-iso-13500-2009>

## Introduction

This International Standard covers materials that are in common usage in petroleum and natural-gas drilling fluids. These materials are used in bulk quantities, can be purchased from multiple sources and are available as commodity products. No single-source or limited-source products are included, nor are speciality products.

International Standards are published to facilitate communication between purchasers and manufacturers, to provide interchangeability between similar equipment and materials purchased from different manufacturers and/or at different times and to provide an adequate level of safety when the equipment or materials are utilized in the manner and for the purposes intended. This International Standard provides minimum requirements and is not intended to inhibit anyone from purchasing or producing materials to other standards.

This International Standard is substantially based on API Spec 13A, 16th Edition, February 1, 2004. The purpose of this International Standard is to provide product specifications for barite, haematite, bentonite, nontreated bentonite, Oil Companies' Materials Association (OCMA) grade bentonite, attapulgite, sepiolite, technical-grade low-viscosity carboxymethylcellulose (CMC-LVT), technical-grade high-viscosity carboxymethylcellulose (CMC-HVT), starch, low-viscosity polyanionic cellulose, high-viscosity polyanionic cellulose and drilling-grade *Xanthomonas campestris*.

The intent of the document is to incorporate all International Standards for drilling fluid materials into an ISO-formatted document. A survey of the industry found that only the American Petroleum Institute (API) issued testing procedures and specification standards for these materials.

Reference to OCMA materials has been included in API work, as the OCMA and subsequent holding committees were declared defunct, and all specifications were submitted to API in 1983.

Annex A (informative) lists the mineral impurities in barite, Annex B (informative) provides the test precision and Annex C (informative) details examples of calculations.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN ISO 13500:2009

<https://standards.iteh.ai/catalog/standards/sist/1c85bbd6-a806-46fe-ab1f-6233e0336f17/sist-en-iso-13500-2009>

# Petroleum and natural gas industries — Drilling fluid materials — Specifications and tests

## 1 Scope

This International Standard covers physical properties and test procedures for materials manufactured for use in oil- and gas-well drilling fluids. The materials covered are barite, haematite, bentonite, nontreated bentonite, OCMA-grade bentonite, attapulgite, sepiolite, technical-grade low-viscosity carboxymethylcellulose (CMC-LVT), technical-grade high-viscosity carboxymethylcellulose (CMC-HVT), starch, low-viscosity polyanionic cellulose (PAC-LV), high-viscosity polyanionic cellulose (PAC-HV) and drilling-grade *Xanthomonas campestris* (Xanthan gum). This International Standard is intended for the use of manufacturers of named products.

## 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 6780, *Flat pallets for intercontinental materials handling — Principal dimensions and tolerances*

ISO 10414-1:2008, *Petroleum and natural gas industries — Field testing of drilling fluids — Part 1: Water-based fluids*

ASTM D422, *Standard Test Method for Particle-Size Analysis of Soils*

ASTM E11, *Standard Specification for Wire Cloth and Sieves for Testing Purposes*

ASTM E161, *Standard Specification for Precision Electroformed Sieves*

ASTM E77, *Standard Test Method for Inspection and Verification of Thermometers*

ASTM E177, *Standard Practice for Use of the Terms Precision and Bias in ASTM Test Methods*

NIST (NBS) Monograph 150, *Liquid-In-Glass Thermometry*

## 3 Terms, definitions, symbols and abbreviations

### 3.1 Terms and definitions

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

#### 3.1.1

##### **ACS reagent grade**

chemicals that meet purity standards as specified by the American Chemical Society (ACS)

## ISO 13500:2008(E)

## 3.1.2

**flash side**

side containing residue (“flash”) from stamping, or the side with concave indentation

## 3.2 Symbols and abbreviations

|                                 |  |
|---------------------------------|--|
| ACS                             | American Chemical Society  |
| API                             | American Petroleum Institute   |
| APME                            | Association of Plastic Manufacturers in Europe   |
| ASTM                            | American Society for Testing and Materials   |
| EDTA                            | Ethylenediaminetetraacetic acid  |
| CAS                             | Chemical Abstracts Service   |
| CMC-HVT                         | Carboxymethylcellulose — High-viscosity, technical-grade   |
| CMC-LVT                         | Carboxymethylcellulose — Low-viscosity, technical-grade  |
| OCMA                            | Oil Companies' Materials Association   |
| NBS                             | National Bureau of Standards   |
| NIST                            | National Institute of Standards and Technology   |
| TC                              | to contain   |
| TD                              | to deliver   |
| $B_c$                           | hydrometer correction curve intercept  |
| $b$                             | yield point/plastic viscosity ratio  |
| $D_1$                           | equivalent particle diameter immediately greater than 6 $\mu\text{m}$ , determined in Equation (9) |
| $D_2$                           | equivalent particle diameter immediately less than 6 $\mu\text{m}$ , determined in Equation (9)    |
| $D_e$                           | equivalent spherical diameter, expressed in micrometres  |
| $C_c$                           | calibration correction   |
| $C_m$                           | 40 times the EDTA volume, expressed in millilitres   |
| $K_S$                           | sample constant  |
| $L$                             | effective depth, expressed in centimetres  |
| $\log(\eta_{20}/\eta_{\theta})$ | correction for temperature variance  |
| $M_c$                           | hydrometer correction curve slope  |
| $m$                             | sample mass, expressed in grams  |
| $m_2$                           | residue mass, expressed in grams   |
| $m_3$                           | mass of the 425 $\mu\text{m}$ sieve, expressed in grams  |
| $m_4$                           | mass of 425 $\mu\text{m}$ sieve and sample retained, expressed in grams                            |
| $m_5$                           | mass passing through a 425 $\mu\text{m}$ sieve, expressed in grams                                 |
| $m_6$                           | mass of the bottom receiver, expressed in grams  |
| $m_7$                           | mass of the bottom receiver and sample content, expressed in grams                                 |
| $m_8$                           | mass of sample passing through a 75 $\mu\text{m}$ sieve, expressed in grams                        |

iTeh STANDARD PREVIEW  
(standards.iteh.ai)

SIST EN ISO 13500:2009  
<https://standards.iteh.ai/catalog/standards/sist/1c85bbd6-a806-46fe-ab1f-4a5555555555>

|                  |   |
|------------------|---|
| $R$              | hydrometer reading  |
| $R_1$            | average hydrometer reading at lower temperature   |
| $R_2$            | average hydrometer reading at higher temperature  |
| $R_{600}$        | viscometer dial reading at 600 r/min  |
| $R_{300}$        | viscometer dial reading at 300 r/min  |
| $S_s$            | sample test value   |
| $t$              | time, expressed in minutes  |
| $V$              | total filtrate volume, expressed in millilitres   |
| $V_c$            | filtrate volume, expressed in millilitres, collected between 7,5 min and 30 min                     |
| $V_1$            | initial volume, expressed in millilitres  |
| $V_2$            | final volume, expressed in millilitres  |
| $V_3$            | volume EDTA used, expressed in millilitres  |
| $V_4$            | volume of filtrate used, expressed in millilitres   |
| $w_1$            | mass fraction residue of particles greater than 75 $\mu\text{m}$ , expressed in percent             |
| $w_2$            | cumulative percent for point immediately greater than 6 $\mu\text{m}$                               |
| $w_3$            | cumulative percent for point immediately less than 6 $\mu\text{m}$                                  |
| $w_4$            | cumulative percent less than 6 $\mu\text{m}$  |
| $w_5$            | mass fraction residue of particles greater than 45 $\mu\text{m}$ , expressed in percent (see 8.9.6) |
| $w_6$            | mass fraction moisture, expressed in percent  |
| $w_a$            | cumulative percent finer  |
| $w_{\text{AEM}}$ | soluble alkaline earth metals as calcium, expressed in milligrams per kilogram                      |
| $w_{75}$         | mass fraction of sample passing through a 75 $\mu\text{m}$ sieve, expressed in percent              |
| $w_{425}$        | mass fraction passing through a 425 $\mu\text{m}$ sieve, expressed in percent                       |
| $\rho$           | sample density, expressed in grams per millilitre   |
| $\theta$         | temperature, expressed in degrees Celsius or degrees Fahrenheit                                     |
| $\theta_1$       | average temperature reading at lower temperature  |
| $\theta_2$       | average temperature reading at higher temperature   |
| $\eta_A$         | apparent viscosity, expressed in centipoise   |
| $\eta$           | viscosity of water, expressed in millipascal seconds  |
| $\eta_{20}$      | 1,002, is the viscosity of water at 20 °C (68 °F)   |
| $\eta_\theta$    | viscosity at desired temperature (see Table 3)  |
| $\eta_P$         | plastic viscosity, expressed in millipascal·seconds   |
| $\eta_Y$         | yield point, expressed in pounds per 100 ft <sup>2</sup>  |