# Recommended Practice for Field Testing Water-based Drilling Fluids

ANSI/API RECOMMENDED PRACTICE 13B-1
FOURTH EDITION, MARCH 2009

ERRATA 1, AUGUST 2014

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

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# ERRATA 1

Page 13, the NOTE associated with Section **6.3.2.6** *shall be replaced with:*

NOTE The gel strength value reported directly from the dial reading is an approximation of lbf/100•ft$^2$. Dial reading units are degrees of deflection (*1*⁄360 of 1 full rotation). Each 1 degree of deflection is equal to 0.511 Pa in SI units and to 1.067 lbf/100•ft$^2$ in USC units. These exact units corrections are often neglected for simplicity in reporting. Common field practice when reporting pascals is to divide dial units by 2 for simplicity.

1 r/min of the rotor equals a shear rate of 1.7023 s$^{-1}$.

Page 13, the NOTE associated with Section **6.3.2.7** *shall be replaced with:*

NOTE The gel strength value reported directly from the dial reading is an approximation of lbf/100•ft$^2$. Dial reading units are degrees of deflection (*1*⁄360 of 1 full rotation). Each 1 degree of deflection is equal to 0.511 Pa in SI units and to 1.067 lbf/100•ft$^2$ in USC units. These exact units corrections are often neglected for simplicity in reporting. Common field practice when reporting pascals is to divide dial units by 2 for simplicity.

1 r/min of the rotor equals a shear rate of 1.7023 s$^{-1}$.

*Page 21, Equation 16 shall be replaced with:*

$$\varphi_{lg} = \frac{1}{\left(\rho_b - \rho_{lg}\right)}\left[100\,\rho_f + \left(\rho_b - \rho_f\right)\times\varphi_{SS} - 100\rho_{df,A} - \left(\rho_f - \rho_o\right)\times\varphi_o\right]$$

*Page 21, Equation 17 shall be replaced with:*

$$\varphi_{lg} = \frac{1}{\left(\rho_b - \rho_{lg}\right)}\left[100\,\rho_f + \left(\rho_b - \rho_f\right)\times\varphi_{SS} - 12\rho_{df,B} - \left(\rho_f - \rho_o\right)\times\varphi_o\right]$$

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Suggested revisions are invited and should be submitted to the Standards Department, API, 1220 L Street, NW, Washington, D.C. 20005, standards@api.org.

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## 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.

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ISO 10414-1 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*.

This second edition cancels and replaces the first edition (ISO 10414-1:2001), to which Annexes I, J and K have been added and other minor changes made to the sentence structure, grammar and other non-technical editing.

ISO 10414 consists of the following parts, under the general title *Petroleum and natural gas industries — Field testing of drilling fluids*:

— *Part 1: Water-based fluids*

— *Part 2: Oil-based fluids*

## Introduction

This part of ISO 10414 is based on API RP 13B-1, third edition, December 2003[2] and ISO 10414 (all parts)[6].

Annexes A to H and K of this part of ISO 10414 are for information only. Annexes I and J are normative.

In this part of ISO 10414, where practical, U.S. Customary (USC) units are included in brackets for information.

# Petroleum and natural gas industries — Field testing of drilling fluids

## Part 1:
## Water-based fluids

**DANGER — As with any laboratory procedure requiring the use of potentially hazardous chemicals, the user is expected to have proper knowledge and to have received training in the use and disposal of these chemicals. The user is responsible for compliance with all applicable local, regional and national requirements for worker and local health, safety and environmental liability.**

## 1 Scope

This part of ISO 10414 provides standard procedures for determining the following characteristics of water-based drilling fluids:

a) drilling fluid density (mud weight);

b) viscosity and gel strength;

c) filtration;

d) water, oil and solids contents;

e) sand content;

f) methylene blue capacity;

g) pH;

h) alkalinity and lime content;

i) chloride content;

j) total hardness as calcium.

Annexes A through K provide additional test methods which may be used for

— chemical analysis for calcium, magnesium, calcium sulfate, sulfide, carbonate and potassium;

— determination of shear strength;

— determination of resistivity;

— removal of air;

— drill-pipe corrosion monitoring;

— sampling, inspection and rejection;

— rig-site sampling;

— calibration and verification of glassware, thermometers, viscometers, retort-kit cup and drilling-fluid balances;

— permeability-plugging testing at high temperature and high pressure for two types of equipment;

— example of a report form for water-based drilling fluid.

## 2 Terms and definitions

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

**2.1**
**ACS reagent grade**
chemical meeting the purity standards specified by the American Chemical Society (ACS)

**2.2**
**darcy**
permeability of a porous medium, where one darcy is the flow of a single-phase fluid of 1 cP viscosity that completely fills the voids of the porous medium, flowing through the medium under conditions of viscous flow at a rate of 1 $ml \cdot s^{-1} \cdot cm^{-2}$ cross-sectional area and under a pressure or equivalent hydraulic gradient of 1 $atm \cdot cm^{-1}$

NOTE 1 cP = 1 mPa·s.

**2.3**
**quarter**
⟨verb⟩ mix and divide into four specimens to ensure homogeneity of specimens

**2.4**
**spurt loss**
volume of fluid that passes through the filtration medium before a filter cake is formed

**2.5**
**tube sampling**
sampling method consisting of the withdrawal of powdered sample from bag or bulk via a cylindrical device pushed into the sample, locked shut and withdrawn

## 3 Symbols and abbreviated terms

### 3.1 Symbols

NOTE Subscript “A” to symbol denotes metric units. Subscript “B” to symbol denotes U.S. customary units.

$A_A$ area, in square centimetres

$A_B$ area, in square inches

$c_{b,A}$ concentration of weighting material, in kilograms per cubic metre

$c_{b,B}$ concentration of weighting material, in pounds per barrel

$c_{Ca}$ concentration of calcium ion, in milligrams per litre

$c_{Ca+Mg}$ concentration of calcium and magnesium ion (total hardness), in milligrams per litre