

Recommended Practice for Field Testing Water-based Drilling Fluids

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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•ft². 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•ft² 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•ft². 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•ft² 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:

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

Page 21, Equation 17 shall be replaced with:

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

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Contents

Page

API Foreword	ii
Foreword	v
Introduction	vi
1 Scope	1
2 Terms and definitions	2
3 Symbols and abbreviated terms	2
3.1 Symbols	2
3.2 Abbreviations	6
4 Drilling fluid density (mud weight).....	7
4.1 Principle.....	7
4.2 Apparatus	7
4.3 Procedure	7
4.4 Calculation	8
5 Alternative drilling fluid density method.....	9
5.1 Principle.....	9
5.2 Apparatus	10
5.3 Procedure	10
5.4 Calculation	10
6 Viscosity and gel strength.....	11
6.1 Principle.....	11
6.2 Determination of viscosity using the Marsh funnel	11
6.3 Determination of viscosity and/or gel strength using a direct-indicating viscometer	11
7 Filtration	14
7.1 Principle.....	14
7.2 Low-temperature/low-pressure test	14
7.3 High-temperature/high-pressure (HTHP) test.....	15
8 Water, oil and solids contents.....	18
8.1 Principle.....	18
8.2 Apparatus	18
8.3 Procedure	19
8.4 Calculation	20
9 Sand content	22
9.1 Principle.....	22
9.2 Apparatus	22
9.3 Procedure	22
10 Methylene blue capacity	23
10.1 Principle.....	23
10.2 Reagents and apparatus	23
10.3 Procedure	24
10.4 Calculation	26
11 pH	26
11.1 Principle.....	26
11.2 Reagents and apparatus	27
11.3 Procedure for pH measurement.....	28

11.4	Care of electrode.....	29
12	Alkalinity and lime content	29
12.1	Principle	29
12.2	Reagents and apparatus	30
12.3	Procedure — Phenolphthalein and methyl orange filtrate alkalinities.....	30
12.4	Procedure — Phenolphthalein drilling fluid alkalinity	31
12.5	Calculation of ion concentrations from P_f and M_f	31
12.6	Estimation of lime content.....	31
13	Chloride ion content.....	32
13.1	Principle	32
13.2	Reagents and apparatus	32
13.3	Procedure	32
13.4	Calculation.....	32
14	Total hardness as calcium.....	33
14.1	Principle.....	33
14.2	Reagents and apparatus	33
14.3	Procedure	34
14.4	Calculation.....	35
Annex A	(informative) Chemical analysis of water-based drilling fluids.....	36
Annex B	(informative) Shear strength measurement using shearometer tube	52
Annex C	(informative) Resistivity	54
Annex D	(informative) Removal of air or gas prior to testing.....	56
Annex E	(informative) Drill pipe corrosion ring coupon	57
Annex F	(informative) Sampling, inspection and rejection.....	61
Annex G	(informative) Rig-site sampling.....	63
Annex H	(informative) Calibration and verification of glassware, thermometers, viscometers, retort-kit cup and drilling fluid balances	66
Annex I	(normative) High-temperature/high-pressure filtration testing of water-based drilling fluids using the permeability-plugging apparatus and cells equipped with set-screw-secured end caps.....	71
Annex J	(normative) High-temperature/high-pressure filtration testing of water-based drilling fluids using the permeability-plugging apparatus and cells equipped with threaded end caps	81
Annex K	(informative) Water-based drilling fluids report form	90
	Bibliography	91

Foreword

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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 $1 \text{ ml}\cdot\text{s}^{-1}\cdot\text{cm}^{-2}$ cross-sectional area and under a pressure or equivalent hydraulic gradient of $1 \text{ atm}\cdot\text{cm}^{-1}$

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