SLOVENSKI STANDARD
SIST EN ISO 13501:2007

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Industrija za predelavo nafte in zemeljskega plina - Vrtalne tekoļ ine - Vrednotenje predelovalnih sistemov (ISO 13501:2005)

Petroleum and natural gas industries - Drilling fluids - Processing systems evaluation (ISO 13501:2005)

Erdöl- und Erdgasindustrie - Bohrflüssigkeiten - Beurteilung von Verarbeitungssystemen

Industries du pétrole et du gaz naturel - Fluides de forage - Évaluation des systemes de traitement (ISO 13501:2005)

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ICS:

75.180.10	Oprema za raziskovanje in odkopavanje	Exploratory and extraction equipment

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English Version

Petroleum and natural gas industries - Drilling fluids - Processing systems evaluation (ISO 13501:2005)

Industries du pétrole et du gaz naturel - Fluides de forage - Évaluation des systèmes de traitement (ISO 13501:2005)

Erdöl- und Erdgasindustrie - Bohrflüssigkeiten - Beurteilung von Verarbeitungssystemen

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Foreword

The text of ISO 13501:2005 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 13501:2006 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of an identical text or by endorsement, at the latest by June 2007, and conflicting national standards shall be withdrawn at the latest by June 2007.

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Endorsement notice

The text of ISO 13501:2005 has been approved by CEN as EN ISO 13501:2006 without any modifications.

INTERNATIONAL STANDARD

ISO 13501

First edition
2005-12-01

Petroleum and natural gas industries — Drilling fluids — Processing systems evaluation

Industries du pétrole et du gaz naturel — Fluides de forage — Évaluation des systèmes de traitement

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Foreword

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ISO 13501 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*.

Introduction

This International Standard covers equipment which is commonly used in petroleum and natural gas drilling fluids processing. This equipment can be purchased or rented from multiple sources, and is available worldwide. No single-source or limited-source equipment is included, either by inference or reference.

International Standards are published to facilitate communications between purchasers and manufacturers, or 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 using equipment made to other standards. This International Standard is subject to periodic review and can be revised or withdrawn at such time as deemed appropriate.

The purpose of this International Standard is to provide a method of assessing the performance of solids control equipment systems in the field. It includes procedures for evaluation of shale shakers, centrifugal pumps, degassers, hydrocyclones, mud cleaners and centrifuges, as well as an entire system evaluation. Shale-shaker screenLabelling and separation potential of shale-shaker screens have been addressed as part of this International Standard.

This International Standard is based on API RP 13C, third edition, December 2004 (for drilling fluid processing equipment) and shale-shaker screen API RP 13E, third edition, May 1, 1993 (for shale-shaker screens).

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Petroleum and natural gas industries — Drilling fluids — Processing systems evaluation

1 Scope

This International Standard provides a standard procedure for assessing and modifying performance of solids control equipment systems commonly used in the field in petroleum and natural gas drilling fluids processing.

This procedure is not intended for the comparison of similar types of individual pieces of equipment.

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 3310-1, *Test sieves — Technical requirements and testing — Part 1: Test sieves of metal wire cloth*

ANSI/AWWA Standard C700, *Cold-water meters — Displacement type, bronze main case*

API, *Manual of Petroleum Measurement Standards*

3 Terms, definitions, symbols and abbreviated terms

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

3.1 Terms and definitions

3.1.1
addition section
compartment(s) in the surface drilling fluid system between the removal section and the suction section which provides a well-agitated compartment(s) for the addition of commercial products such as chemicals, necessary solids and liquids

3.1.2
agitator
mechanical stirrer
mechanically driven mixer that stirs the drilling fluid by turning an impeller near the bottom of a mud compartment to blend additives, suspend solids and maintain a uniform consistency of the drilling fluid

3.1.3
aperture
⟨screen cloth⟩ opening between the wires in a screen cloth

3.1.4
aperture
⟨screen surface⟩ opening in a screen surface

3.1.5
apex
opening at lower end of a hydrocyclone

3.1.6
API sand
⟨physical description⟩ particles in a drilling fluid that are too large to pass through a 74 µm sieve (API 200 screen)

NOTE 1 Its amount is expressed as a volume fraction (percent) of drilling fluid.

NOTE 2 Particle size is a descriptive term; the particles can be shale, limestone, wood, gold or any other material.

3.1.7
API screen number
mesh, obsolete
mesh count, obsolete
number in an API system used to designate the D100 separation range of a mesh screen cloth

cf. **D100 separation** (3.1.23)

NOTE 1 The term mesh was formerly used to refer to the number of openings (and fraction thereof) per linear inch in a screen, counted in both directions from the centre of a wire. This term is being replaced by the API screen number.

NOTE 2 Mesh count was formerly used to describe the fineness of a square or rectangular mesh screen cloth. For example, a mesh count such as 30 × 30 or often 30 mesh indicates a square mesh, while a designation such as 70 x 30 mesh indicates rectangular mesh. This term is being replaced by the API screen number.

NOTE See 9.6 for further information.

3.1.8
backing plate
support plate attached to the back of screen cloth(s)

3.1.9
baffle
plate or obstruction built into a compartment to change the direction of fluid flow

3.1.10
barite
baryte
natural barium sulfate ($BaSO_4$) used for increasing the density of drilling fluids

NOTE International Standards require a minimum specific gravity of 4,20 for barite, but do not specify that the material must be barium sulfate. Commercial ISO 13500 barite can be produced from a single ore or a blend of ores, and can be a straight-mined product or processed by flotation methods. It can contain accessory minerals other than barium sulfate ($BaSO_4$). Because of mineral impurities, commercial barite can vary in colour from off-white to grey to red or brown. Common accessory minerals are silicates such as quartz and chert, carbonate compounds such as siderite and dolomite, and metallic oxide and sulfide compounds.

3.1.11
blinding
reduction of open area in a screening surface caused by coating or plugging

3.1.12
bonding material
material used to secure screen cloth to a backing plate or support screen

3.1.13
centrifugal pump
machine for moving fluid by spinning it using a rotating impeller in a casing with a central inlet and a tangential outlet

NOTE The path of the fluid is an increasing spiral from the inlet at the centre to the outlet, tangent to the impeller annulus. In the annular space between the impeller vane tips and the casing wall, the fluid velocity is roughly the same as that of the impeller vane tips. Useful work is produced by the pump when some of the spinning fluid flows out of the casing tangential outlet into the pipe system. Power from the motor is used to accelerate the fluid entering the inlet up to the speed of the fluid in the annulus. Some of the motor power is expended as friction of the fluid in the casing and impeller.

3.1.14
centrifuge
device, rotated by an external force, for the purpose of separating materials of various masses (depending upon specific gravity and particle sizes) from a slurry to which the rotation is imparted primarily by the rotating containing walls

NOTE In a weighted drilling fluid, a centrifuge is usually used to eliminate colloidal solids.

3.1.15
check section
suction section
last active section in the surface system which provides a location for rig pump and mud hopper suction, and ideally is large enough to check and adjust drilling fluid properties before the drilling fluid is pumped downhole

3.1.16
clay mineral
soft variously coloured earth, commonly hydrous silicate of alumina

NOTE Clay minerals are essentially insoluble in water but disperse under hydration, grinding, heating or velocity effects. Particle sizes of clay mineral can vary from sub-micrometre to larger than 100 µm.

3.1.17
clay particle
colloidal particles of clay mineral having less than 2 µm equivalent spherical diameter

cf. **colloidal solid** (3.1.20)

3.1.18
coating
⟨substance⟩ material adhering to a surface to change the properties of the surface

cf. **blinding** (3.1.11)

3.1.19
coating
⟨physical process⟩ procedure by which material forms a film that covers the apertures of the screening surface

cf. **blinding** (3.1.11)

3.1.20
colloidal solid
particle of diameter less than 2 µm

NOTE This term is commonly used as a synonym for clay particle size.

3.1.21
conductance
permeability per unit thickness of a static (not in motion) shale-shaker screen

NOTE It is expressed in units of kilodarcies/millimetre.[1)]

3.1.22
cuttings
formation pieces dislodged by the drill bit and brought to the surface in the drilling fluid

NOTE Field practice is to call all solids removed by the shaker screen “cuttings,” although some can be sloughed material.

3.1.23
D100 separation
particle size, expressed in micrometres, determined by plotting the percentage of aluminium oxide sample separated by the test screen on the plot of cumulative mass fraction (as percent) retained versus U.S. Sieve Opening (expressed in micrometres) for the sieve analysis of the aluminium oxide test sample

NOTE 100 % of the particles larger than the D100 separation are retained by the test screen.

3.1.24
decanting centrifuge
centrifuge which removes solids from a feed slurry by rotating the liquid in cylindrical bowl at high speed and discharges the larger particles as a damp underflow

NOTE Colloidal solids are discharged with the liquid overflow, or light slurry. The decanting centrifuge has an internal auger that moves solids that have settled to the bowl walls out of a pool of liquid and to the underflow.

3.1.25
density
mass divided by volume

NOTE 1 In the SI system, density is expressed in kilograms per cubic metre (kg/m^3); In United States Customary units it is expressed as pounds per gallon (lb/gal) or pounds per cubic foot (lb/ft^3).

NOTE 2 Drilling fluid density is commonly referred to as “drilling fluid weight” or “mud weight.”

3.1.26
desander
hydrocyclone, having an inside diameter of 152 mm (6 in) or larger, that removes a high proportion of the particles of diameter 74 µm and larger from a drilling fluid

3.1.27
desilter
hydrocyclone having an inside diameter less than 152 mm (6 in)

3.1.28
dilution
method of decreasing the drilled-solids content of a slurry by addition of a material(s) other than drilled solids, usually a clean drilling fluid

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1) The darcy is not an SI unit. The SI unit of permeability to fluid flow is defined as the amount of permeability that permits 1 m^3 of fluid of a viscosity of 1 pascal per second to flow through a section 1 m thick with a cross section of 1 m^2 in 1 second at a pressure difference of 1 pascal. That unit has no special name. The SI unit of permeability = 1,013 25 × 10^{12} darcy.

3.1.29
dilution factor
ratio of the actual volume of clean drilling fluid required to maintain a targeted drilled-solids concentration to the volume of drilling fluid required to maintain the same drilled-solids fraction over the same specified interval of footage with no drilled-solids removal system

3.1.30
drilled solids
formation solids which enter the drilling-fluid system, whether produced by the drill bit or from the side of the borehole

3.1.31
drilled-solids fraction
average volume fraction of drilled solids maintained in the drilling fluid over a specified interval of footage

3.1.32
drilled-solids removal system
all equipment and processes used while drilling a well that remove the solids generated from the hole and carried by the drilling fluid

NOTE These processes include settling, screening, desanding, desilting, centrifuging and dumping.

3.1.33
drilled-solids removal system performance
measure of the removal of drilled solids by surface solids-control equipment

NOTE The calculation is based on a comparison of the dilution required to maintain the desired drilled-solids content, with that which would have been required if none of the drilled solids were removed.

3.1.34
drilling fluid
any liquid or slurry pumped down the drill string and up the annulus of a hole during the drilling operation

3.1.35
eductor
⟨fluid stream⟩ device utilizing a fluid stream discharging under high pressure from a jet through an annular space to create a low pressure region

NOTE When properly arranged, it can evacuate degassed drilling fluid from a vacuum-type degasser or pull solids through a hopper.

3.1.36
eductor
⟨pressure jet⟩ device using a high velocity jet to create a low pressure region (Bernoulli Principle) which draws liquid or dry material to be blended with the drilling fluid

3.1.37
effluent
discharge of liquid, generally a stream, after some attempt at separation or purification has been made

3.1.38
equalizer
opening for flow between compartments in a surface fluid-holding system which allows all compartments to maintain the same fluid level

3.1.39
flow capacity
rate at which equipment, such as a shaker, can process drilling fluid and solids

NOTE It is a function of many variables, including shaker configuration, design and motion, drilling fluid rheology, solids loading, and blinding by near-size particles.