API Specification 13A 18th Edition, August 2010

Specification for Drilling Fluids – Specifications and Testing

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1.0 GENERAL

Specification 13A includes the following requirements for product ordered and may be applicable in addition to any product-specific requirements listed in other sections identified herein:

1.1 EVALUATION BASE CLAY

Testing Product: Evaluation Base Clay

Grade: API Standard

Product Information: API Specification 13A – 4.2.5

API standard evaluation base clay (formerly OCMA base clay; not OCMA grade bentonite): stocks of API standard evaluation base clay have been set aside and can be ordered through the API.

API Specification 13A – 17.4.1.2 Footnote 13

API standard evaluation base clay is an example of a suitable product available commercially. Requests for clay should be directed to the API which will forward the request to a supplier for further handling. This information is given for the convenience of users of this Internal Standard and does not constitute an endorsement by ISO of this product.

1.2 CALIBRATION BARITE

Testing Product: Calibration barite

Grade: Calibration

Product Information: API Specification 13A – Annex B.1.2

Calibration barite and test calibration bentonite are available through the API offices (see 4.2.1) for use by laboratories to determine their test precision.

1.3 TEST CALIBRATION BENTONITE

Testing Product: Test calibration bentonite

Grade: Test calibration

Product Information: API Specification 13A – Annex B.1.2

Calibration barite and test calibration bentonite are available through the API offices (see 4.2.1) for use by laboratories to determine their test precision.

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1.4 DOCUMENTATION REQUIREMENTS

Documentation:	Certificates of Calibration
Product:	All
Description of Requirements:	Use of test calibration materials in checking testing procedures API Specification 13A – 4.2.3 The custodian Shall furnish a certificate of analysis for each sample

1.5 SHIPPING REQUIREMENTS

Shipping:	Packaging Material
Product:	All
Description of Requirements:	API Specification 13A – 6.1.1 Packaging of palletized goods should safeguard the means of safe handling, transport, storage and identification, and minimize damage and spillage. Packed material should be inside the dimensions of the pallet although some overhang is allowed. API Specification 13A – 4.2.3 The custodian Shall furnish a certificate of analysis for each sample
Shipping:	Pallets
Product:	All
Description of Requirements:	API Specification 13A – 6.2.2 Preferred sizes for wooden pallets include the following: a) 1 200 mm × 1 000 mm (47 in × 39 in) CP6; b) 1 140 mm × 1 140 mm (45 in × 45 in) CP8/CP9/CP3; c) 1 219 mm × 1 219 mm (48 in × 48 in); d) 1 118 mm × 1 321 mm (44 in × 52 in); e) 1 067 mm × 1 321 mm (42 in × 52 in), equivalent to CP4/CP7; f) 1 016 mm × 1 219 mm (40 in × 48 in). NOTE CP is the size as defined in ISO 6780. API Specification 13A – 6.2.3 Other pallet sizes and details concerning design and construction should be agreed upon by the manufacturer and the customer.

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Shipping:	Pallet Covers
Product:	All
Description of Requirements:	API Specification 13A – 6.6.2 All plastics should be UV-stabilized, unless otherwise requested.

1.6 MARKING REQUIREMENTS

Marking:	Bags
Product:	All
Description of Requirements:	API Specification 13A – 6.5 Markings shall include the following, where applicable and as specified by individual contracts: a) name of the material in print script at least 13 mm (0,5 in) high; b) mass, which shall be denominated in kilograms, of the material in letters, or numbers and letters, at least 6 mm (0,25 in) high; c) lot/batch number in print script and/or numbers at least 3 mm (0,125 in) high, traceable to manufacturer's country of origin; d) identification as recyclable; e) safety information.

Marking:	Pallets
Product:	All
Description of Requirements:	API Specification 13A – 6.4 Markings should include the following, where applicable and as specified by individual contracts: a) product name; b) gross/net mass, in kilograms (pounds); c) other information as required, such as manufacturer's name, gross allowable mass, disposal options.

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1.7 STORAGE REQUIREMENTS

Storage:	All
Product:	All
Description of Requirements:	API Specification 13A – 6.8 The manufacturer shall advise on storage upon request.

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2.0 PRODUCT

2.1 ATTAPULGITE

Product: Attapulgite

Grade: Drilling Grade

Product Description: API Specification 13A – 12.1.1

Drilling-grade attapulgite clay is a naturally occurring clay mineral. Accessory minerals include quartz, feldspar and calcite.

Product Physical Requirements: API Specification 13A – 12.1.2

Drilling-grade attapulgite shall be deemed to meet the requirements of this International Standard if a composite sample representing no more than one day's production conforms to the physical specifications of Table 11, represents the product produced and is controlled by the manufacturer.

Table 11 – Attapulgite physical specifications

Requirement	Standard
Suspension properties:	
Viscometer dial reading at 600 r/min	Minimum 30
Residue of diameter greater than 75 µm	Maximum mass fraction 8,0 %
Moisture, percent	Maximum mass fraction 16,0 %

Note: General Shipping & Marking Requirements are listed in the General Requirements Section of this PurchasingGuideline

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2.2 BARITE

Product: Barite

Grade: Drilling Grade

Product Description: API Specification 13A – 7.1.1

Drilling-grade barite is produced from commercial barium sulfate-containing ores. The manufacturer shall retain certificates of analysis or similar documentation on these commercial barium sulfate ores. It may be produced from a single ore or a blend of ores and may be a straight-mined product or processed by beneficiation methods, i.e. washing, tabling, jigging or flotation. It may contain accessory minerals in addition to the barium sulfate ($BaSO_4$) mineral. Because of mineral impurities, commercial barite can vary in colour from off-white to grey to red or brown.

Product Physical Requirements: API Specification 13A – 7.1.2

Drilling-grade barite shall be deemed to meet the requirements of this International Standard if a composite sample representing no more than one day's production conforms to the chemical and physical specifications of Table 2, represents the product produced and is controlled by the manufacturer.

Manufacturer Certificate Documentation: API Specification 13A – 7.1.1

The manufacturer shall retain certificates of analysis or similar documentation on these commercial barium sulfate ores.

Table 2 – Barite physical and chemical requirements

Requirement	Standard
Density	4,20 g/ml, minimum
Water-soluble alkaline earth metals, as calcium	250 mg/kg, maximum
Residue greater than 75 µm	Maximum mass fraction 3,0 %
Particles less than 6 µm in equivalent spherical diameter	Maximum mass fraction 30 %

Note: General Shipping & Marking Requirements are listed in the General Requirements Section of this Purchasing Guideline

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Product: Barite 4.1

Grade: Drilling Grade

Product Description: API Specification 13A – 20.1.1

Drilling grade barite is produced from commercial barium sulfate-containing ores. It may be produced from a single ore or a blend of ores and may be a straight-mined product or processed by beneficiation methods, i.e. washing, tabling, jigging, or flotation. It may contain accessory minerals other than the barium sulfate (BaSO4) mineral. Because of mineral impurities, commercial barite may 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. Although these minerals are normally insoluble, they can, under certain conditions, react with other components in some types of drilling fluids and cause adverse changes in the drilling fluid properties. (See Annex A for more details.)

Product Physical Requirements: API Specification 13A – 20.1.5

Barite 4,1 shall be deemed to meet the requirements of this International Standard if a composite sample representing no more than one day's production conforms to the chemical and physical specifications of Table 19, represents the product produced, and is controlled by the manufacturer.

Manufacturer Certificate Documentation: API Specification 13A – 20.1.1

The manufacturer shall retail certificates of analysis or similar documentation on these commercial barium sulfate ores.

Table 19 – Barite 4,10 physical and chemical requirements

Requirement	Standard
Density	4,10 g/ml, minimum
Water-soluble alkaline earth metals, as calcium	250 mg/kg, maximum
Residue greater than 75 µm	Maximum mass fraction, 3,0%
Particles less than 6 µm in equivalent spherical diameter	Maximum mass fraction, 30%

Note 1: End users should be aware that the material described in this clause has a lower density than ISO13500/API 13A, Clause 7 Barite (API Specification 13A – 20.1.3)

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Note 2: General Shipping & Marking Requirements are listed in the General Requirements Section of this Purchasing Guideline

Testing Product: Calibration barite

Grade: Calibration

Product Information: API Specification 13A – Annex B.1.2

Calibration barite and test calibration bentonite are available through the API offices (see 4.2.1) for use by laboratories to determine their test precision.

Note: Calibration barite can also be found in the General Requirements Section of this Purchasing Guideline

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2.3 BENTONITE

Product: Bentonite

Grade: Drilling Grade

Product Description: API Specification 13A – 9.1.1

Drilling-grade bentonite is a naturally occurring clay containing the clay minerals of smectite. It can also contain accessory minerals, such as quartz, mica, feldspar and calcite.

Product Physical Requirements: API Specification 13A – 9.1.2

Drilling-grade bentonite shall be deemed to meet the requirements of this International Standard if a composite sample representing no more than one day's production conforms to the physical specifications of Table 8, represents the product produced and is controlled by the manufacturer.

Table 8 – Bentonite physical specifications

Requirement	Standard
Suspension properties:	
Viscometer dial reading at 600 r/min	Minimum 30
Yield point/plastic viscosity ratio	Maximum 3
Filtrate volume	Maximum 15,0 ml
Residue of diameter greater than 75 µm	Maximum mass fraction 4,0 %

Note: General Shipping & Marking Requirements are listed in the General Requirements Section of this Purchasing Guideline

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Product: Bentonite

Grade: OCMA

Product Description: API Specification 13A – 11.1.1

OCMA-grade bentonite is a montmorillonite-based clay which, by nature of its source, cannot meet all aspects of Clause 9. This bentonite may have been treated with soda ash, polymer or other chemicals to improve suspension property performance.

Product Physical Requirements: API Specification 13A – 11.1.2

OCMA-grade bentonite shall be deemed to meet the requirements of this International Standard if a composite sample representing no more than one day's production conforms to the physical specifications of Table 10, represents the product produced and is controlled by the manufacturer.

Product Specific Marking Requirements: API Specification 13A – 11.1.3

Manufacturers and licensees shall provide appropriate markings on the container in block letters at least 6 mm (0,25 in) high below the name of the material, the type of treatment of the bentonite with polymer, soda ash or other material.

Table 10 – OCMA grade bentonite physical specifications

Requirement	Standard
Suspension properties:	
Viscometer dial reading at 600 r/min	Minimum 30
Yield point/plastic viscosity ratio	Maximum 6
Filtrate volume, millilitres	Maximum 16,0
Residue of diameter greater than 75 µm	Maximum 2,5 % mass fraction

Note: General Shipping & Marking Requirements are listed in the General Requirements Section of this Purchasing Guideline

Testing Product: Test calibration bentonite

Grade: Test calibration

Product Information: API Specification 13A – Annex B.1.2

Calibration barite and test calibration bentonite are available through the API offices (see 4.2.1) for use by laboratories to determine their test precision.

Note: Test calibration barite can also be found in the Additional Requirements Section of this Purchasing Guideline

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2.4 NON-TREATED BENTONITE

Product: Non-treated Bentonite

Grade: Drilling Grade

Product Description: API Specification 13A – 10.1.1

Drilling-grade non-treated bentonite clay, composed principally of the mineral smectite, is dried and ground, but not chemically treated. It can also contain accessory minerals, such as quartz, mica, feldspar and calcite.

Product Physical Requirements: API Specification 13A – 10.1.2

Drilling-grade non-treated bentonite shall be deemed to meet the requirements of this International Standard if a composite sample representing no more than one day's production conforms to the physical specifications of Table 9, represents the product produced and is controlled by the manufacturer.

Table 9 – Non-treated bentonite physical specifications

Requirement	Standard
Suspension properties:	
Yield point/plastic viscosity ratio	Maximum 1,5
Dispersed plastic viscosity, millipascal-seconds	Minimum 10
Dispersed filtrate volume, millilitres	Maximum 12,5

Note: General Shipping & Marking Requirements are listed in the General Requirements Section of this Purchasing Guideline

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2.5 HAEMATITE

Product: Haematite

Grade: Drilling Grade

Product Description: API Specification 13A – 8.1.1

Drilling-grade haematite is produced from commercial ores, and may be a single ore or blends of haematite ores. The haematite ores may be a straight, mined product or processed material. Minor amounts of common accessory materials, other than the iron oxide (Fe_2O_3) mineral, include silicon oxide, aluminium oxide, calcium oxide, and magnesium oxide.

Product Physical Requirements: API Specification 13A – 8.1.2

Drilling-grade haematite shall be deemed to meet the requirements of this International Standard if a composite sample representing no more than one day's production conforms to the chemical and physical specifications of Table 6, represents the product produced, and is controlled by the manufacturer.

Table 6 – Haematite chemical and physical specifications

Requirement	Standard
Density	5,05 g/ml, minimum
Water-soluble alkaline earth metals, as calcium	100 mg/kg, maximum
Residue greater than 75 µm	Maximum mass fraction 1,5 %
Residue greater than 45 µm	Maximum mass fraction 15 %
Particles less than 6 µm in equivalent spherical diameter	Maximum mass fraction 15 %

Note: General Shipping & Marking Requirements are listed in the General Requirements Section of this Purchasing Guideline

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2.6 HIGH-VISCOSITY CMC (CMC-HVT)

Product: High-viscosity CMC (CMC-HVT)

Grade: Technical-Grade

Product Description:

API Specification 13A – 15.1.1
Technical-grade high-viscosity carboxymethylcellulose (CMC-HVT) is an alkali metal salt of carboxymethylcellulose. The manufacturer shall maintain documentation of the analysis of the cellulosic raw material used.

API Specification 13A – 15.1.2
The product is a free-flowing or granulated powder and is not normally purified of by-products formed in the reaction.

Product Physical Requirements:

API Specification 13A – 15.1.3
CMC-HVT shall be deemed to meet the requirements of this International Standard if a composite sample representing no more than one day's production conforms to the physical specifications of Table 14, represents the product produced and is controlled by the manufacturer.

Technical Requirements: Product Rejection

API Specification 13A – 15.1.4
CMC-HVT shall be free from any starch or starch derivatives. Therefore, a qualitative starch determination shall be performed before proceeding with the CMC-HVT performance testing. If starch is found, no further testing should be performed and the sample shall be rejected.

Table 14 – CMC-HVT physical specifications

Requirement	Standard
Starch or starch derivates presence	No
Solution properties:	
Viscometer dial reading at 600 r/min	
–in deionized water	Minimum 30
– in 40 g/l salt solution	Minimum 30
– in saturated salt water	Minimum 30
Filtrate volume, millilitres	Maximum 10,0

Note: General Shipping & Marking Requirements are listed in the General Requirements Section of this Purchasing Guideline

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2.7 LOW-VISCOSITY CMC (CMC-LVT)

Product: Low-viscosity CMC (CMC-LVT)

Grade: Technical-Grade

Product Description:

API Specification 13A – 14.1.1
Technical-grade low-viscosity carboxymethylcellulose (CMC-LVT) is an alkali metal salt of carboxymethylcellulose.

API Specification 13A – 14.1.2
The product is a free-flowing or granulated powder.

Product Physical Requirements:

API Specification 13A – 14.1.3
CMC-LVT shall be deemed to meet the requirements of this International Standard if a composite sample representing no more than one day's production conforms to the physical specifications of Table 13, represents the product produced and is controlled by the manufacturer.

Technical Requirements: Product Rejection

API Specification 13A – 14.1.4
CMC-LVT shall be free of any starch or starch derivatives. Therefore, a qualitative starch determination shall be performed before proceeding with the CMC-LVT performance testing. If starch is found, no further testing should be performed and the sample shall be rejected.

Table 13 – CMC-LVT physical specifications

Requirement	Standard
Starch or starch derivates presence	No
Solution properties	
Viscometer dial reading at 600 r/min	Maximum 90
Filtrate volume, millilitres	Maximum 10

Note: General Shipping & Marking Requirements are listed in the General Requirements Section of this Purchasing Guideline

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2.8 HIGH-VISCOSITY POLYANIONIC CELLULOSE (PAC-HV)

Product: High-viscosity polyanionic cellulose (PAC-HV)

Grade: Regular

Product Description:

API Specification 13A – 18.1.1

PAC-HV, also referred to as API PAC regular grade, is a water-soluble polymer produced only from cellulose chemically reacted with carboxy-methyl (anionic) groups. The product obtained is further purified to significantly increase the active polymer content.
The product is a free-flowing and/or granular powder. See Table 17 for physical requirements.

API Specification 13A – 18.1.2

PAC-HV is widely used in water-based drilling fluid for a variety of applications, such as filtration control, viscosity and shale inhibition. Although field use can vary, this procedure focuses on filtration-control and viscosity-control characteristics.

Product Physical Requirements:

API Specification 13A – 18.1.7

To obtain the best handling in the field, it is recommended that the particle size for the PAC-HV powder be u 0,8 mm (u 20 mesh).

Technical Requirements: Product Rejection

API Specification 13A – 18.1.1

It shall not contain any other polysaccharides, such as starch, guar or other naturally occurring polymers or their derivatives.

API Specification 13A – 18.1.4

PAC-HV shall be free of any foreign polymer. Therefore, a qualitative starch determination shall be performed before the performance tests. If starch is found, no further testing should be performed and the sample shall be rejected.

Table 17 – PAC-HV physical requirements

Requirement	Standard
Presence of starch or starch derivatives	Absent
Moisture content	Maximum 10 %
Apparent viscosity	Minimum 50 cP
API filtrate volume	Maximum 23 ml

Note: General Shipping & Marking Requirements are listed in the General Requirements Section of this Purchasing Guideline

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2.9 LOW-VISCOSITY POLYANIONIC CELLULOSE (PAC-LV)

Product: Low-viscosity polyanionic cellulose (PAC-LV)

Grade: Low-viscosity

Product Description:

API Specification 13A – 17.1.1

PAC-LV, also referred to as PAC low-viscosity grade, is a water-soluble polymer produced only from cellulose chemically reacted with carboxy-methyl (anionic) groups. The product obtained is further purified to significantly increase the active polymer content.
The product is a free-flowing and/or granular powder.

API Specification 13A – 17.1.2

PAC-LV is widely used in water-based drilling fluids for a variety of applications, such as filtration control, viscosity and shale inhibition. Although field use can vary, this procedure focuses on filtration control and viscosity characteristics.

Product Physical Requirements:

API Specification 13A – 17.1.7

To obtain the best handling in the field, it is recommended that the particle size for PAC LV powder be u 0,8 mm (u 20 mesh).

Technical Requirements: Product Rejection

API Specification 13A – 17.1.1

It shall not contain any other polysaccharides such as starch, guar or other naturally occurring polymers or their derivatives.

API Specification 13A – 17.1.4

PAC-LV shall be free of any foreign polymer. Therefore, a qualitative starch determination shall be performed. If starch is found, no further testing should be performed and the sample shall be rejected.

Filtrate Volume:

API Specification 13A – 17.4.1.2 Footnote 13

API standard evaluation base clay is an example of a suitable product available commercially. Requests for clay should be directed to the API which will forward the request to a supplier for further handling. This information is given for the convenience of users of this Internal Standard and does not constitute an endorsement by ISO of this product.

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Table 16 – PAC-LV physical requirements

Requirement	Standard
Presence of starch or starch derivatives	Absent
Moisture content	Maximum 10 %
Apparent viscosity	Maximum 40 cP
Filtrate volume	Maximum 16 ml

Note 1: Filtrate Volume, API Specification 13A – 17.2.1.2 Footnote 13 can also be found in the General Requirements Section of this Purchasing Guideline

Note 2: General Shipping & Marking Requirements are listed in the General Requirements Section of this Purchasing Guideline

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2.10 SEPIOLITE

Product: Sepiolite

Grade: Drilling Grade

Product Description: API Specification 13A – 13.1.1

Drilling-grade sepiolite is a naturally occurring clay mineral. Accessory minerals include quartz, feldspar and calcite.

Product Physical Requirements: API Specification 13A – 13.1.2

Drilling-grade sepiolite shall be deemed to meet the requirements of this International Standard if a composite sample representing no more than one day's production conforms to the physical specifications of Table 12, represents the product produced and is controlled by the manufacturer.

Table 12 – Sepiolite physical specifications

Requirement	Standard
Suspension properties:	
Viscometer dial reading at 600 r/min	Minimum 30
Residue of diameter greater than 75 µm	Maximum mass fraction 8,0 %
Moisture, percent	Maximum mass fraction 16,0 %

Note: General Shipping & Marking Requirements are listed in the General Requirements Section of this Purchasing Guideline

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2.11 STARCH

Product: Starch

Grade: Drilling Grade

Product Description: API Specification 13A – 16.1.1

Drilling-grade starch can be manufactured from several kinds of native starches

Product Physical Requirements: API Specification 13A – 16.1.2

Drilling-grade starch shall be free-flowing and free from lumps. Drilling-grade starch shall be deemed to meet the equirements of this International Standard if a composite sample representing no more than one day's production conforms to the physical specifications of Table 15, represents the product produced and is controlled by the manufacturer.

Table 15 – Starch physical specifications

Requirement	Standard
Suspension properties:	
Viscometer dial reading at 600 r/min	
– in 40 g/l salt water	Maximum 18
– in saturated salt water	Maximum 20
Filtrate volume	
– in 40 g/l salt water, millilitres	Maximum 10
– in saturated salt water, millilitres	Maximum 10
Residue greater than 2 000 µm	No residue

Note: General Shipping & Marking Requirements are listed in the General Requirements Section of this Purchasing Guideline

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2.12 XANTHAN GUM

Product: Xanthan Gum

Grade: Drilling Grade

Product Description:

API Specification 13A – 19.1.1
Xanthan gum is a water-soluble polysaccharide, commercially produced by a distinct fermentation process of Xanthomonas campestris... The product may contain up to 3 % of a material added specifically to enhance dispersibility or solubility of the product. Xanthan gum is an off-white, free-flowing granular powder.

API Specification 13A – 19.1.2
Xanthan gum is used in a wide variety of water-based drilling, workover or completion fluids as a rheology modifier to develop low-shear-rate viscosity and enhance suspension properties.

Product Physical Requirements:

API Specification 13A – 19.2.2
Reagents

Technical Requirements: Product Rejection

API Specification 13A – 19.1.1
[the product] shall not contain any other polysaccharide, such as starch, guar gum or other naturally occurring polymers or their derivatives.

API Specification 13A – 19.1.4
Xanthan gum shall be free of any foreign polymer including cellulosics, starch or guar gum.

Table 18 – Xanthan gum physical requirements

Requirement	Standard
Starch, guar, or their derivatives	Absent
Moisture content	Maximum 13 %
Screen analysis	
Less than 425 µm (11/64 in)	Minimum 95 %
Less than 75 µm	Maximum 50 %
Viscosity [a]	
Rotational viscometer, 300 r/min	Minimum 11 cP[6)] (minimum 55 dial reading)
Rotational viscometer, 6 r/min	Minimum 180 cP (minimum 18 dial reading)

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Rotational viscometer, 3 r/min	Minimum 320 cP (minimum 16 dial reading)
Brookfield LV, 1,5 r/min	Minimum 1 950 cP
[a] For rotational viscometer, equipped with f0.2 torsion spring, R1/B1 configuration: d) 300 r/min, cP equals the dial reading times 0,2; e) 6 r/min, cP equals the dial reading times 10,0; f) 3 r/min, cP equals the dial reading times 20,0.	

Note: General Shipping & Marking Requirements are listed in the General Requirements Section of this Purchasing Guideline

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