
**Petroleum and natural gas industries —
Completion fluids and materials —**

Part 2:

**Measurement of properties of proppants
used in hydraulic fracturing and gravel-
packing operations**

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AMENDMENT 1: Addition of Annex B:
Proppand specification

[ISO 13503-2:2006/Amd 1:2009](https://standards.iteh.ai/catalog/standards/sist/3687ff88-14b2-4575-b5ad-989181c1d4/ISO-13503-2-2006-amd-1-2009)

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Industries du pétrole et du gaz naturel — Fluides de complétion et matériaux —

Partie 2: Mesurage des propriétés des matériaux de soutènement utilisés dans les opérations de fracturation hydraulique et de remplissage de gravier

AMENDEMENT 1: Ajout de l'Annexe B: Spécifications relatives aux matériaux de soutènement



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Foreword

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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.

Amendment 1 to ISO 13503-2:2006 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for the petroleum, petrochemical and natural gas industries*, Subcommittee SC 3, *Drilling and completion fluids, and well cements*.

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AMENDMENT 1: Addition of Annex B: Proppand specification

Page 1, Clause 1

Replace the last line with the following:

The objective of this part of ISO 13503 is to provide a consistent methodology and specifications for testing performed on hydraulic fracturing and/or gravel-packing proppants.

Page 1, Clause 2

<https://standards.iteh.ai/catalog/standards/sist/3687ff88-14b2-4575-b5ad-989181cfd70/iso-13503-2-2006-amd-1-2009>

Add the date to ASTM E11 as follows:

ASTM E11-04, *Standard Specification for Wire Cloth and Sieves for Testing Purposes*

Page 28, after Annex A

Add the following Annex B.

Annex (informative)

Proppant specifications

B.1 Fracturing proppant sizes

A minimum of 90 % of the tested proppant sample shall pass the coarse designated (or first primary) sieve and be retained on the fine designated (or second primary) sieve (i.e. 12/20, 20/40, 40/60, etc.). For 20/40 sieve sizes, a minimum of 90,0 % of the tested proppant sample shall pass the 20 mesh sieve and be retained on the 40 mesh sieve. Not over 0,1 % of the total tested proppant sample shall be larger than the first sieve size in the sieve stack specified in Table B.1 and not over 1,0 % of the total tested proppant sample shall be smaller than the last designated sieve size.

EXAMPLE For 20/40 sieve sizes, no more than 0,1 % of the total tested proppant sample shall be retained on the 16 mesh sieve (the first sieve size in the stack) and no more than 1,0 % of the total tested proppant sample shall be smaller than the 50 mesh sieve.

The median diameter and sieve distribution of each grade shall be made available.

Table B.1 — Sieve sizes

Sieve opening sizes µm	3 350/ 11 700	2 360/ 1 180	1 700/ 1 000	1 700/ 850	1 180/ 850	1 180/ 600	850/ 425	600/ 300	425/ 250	425/ 212	212/ 106
Typical proppant/ gravel pack size designation ^a	6/12	8/16	12/18	12/20	16/20	16/30	20/40	30/50	40/60	40/70	70/140
Coarse sieve ^b	4	6	8	8	12	12	16	20	30	30	50
	6	8	12	12	16	16	20	30	40	40	70
	8	10	14	14	18	18	25	35	45	45	80
Fine sieve ^c	10	12	16	16	20	20	30	40	50	50	100
	12	14	18	18	25	25	35	45	60	60	120
	14	16	20	20	30	30	40	50	70	70	140
	16	20	30	30	40	40	50	70	100	100	200
	pan	pan	pan	pan	pan	pan	pan	pan	pan	pan	pan

^a Stack of sieves in vertical order top to bottom as defined in ASTM E 11-04.

^b Coarse designated (or first primary) sieve is shaded.

^c Fine designated (or second primary) sieve is shaded.

B.2 Gravel packing sizes

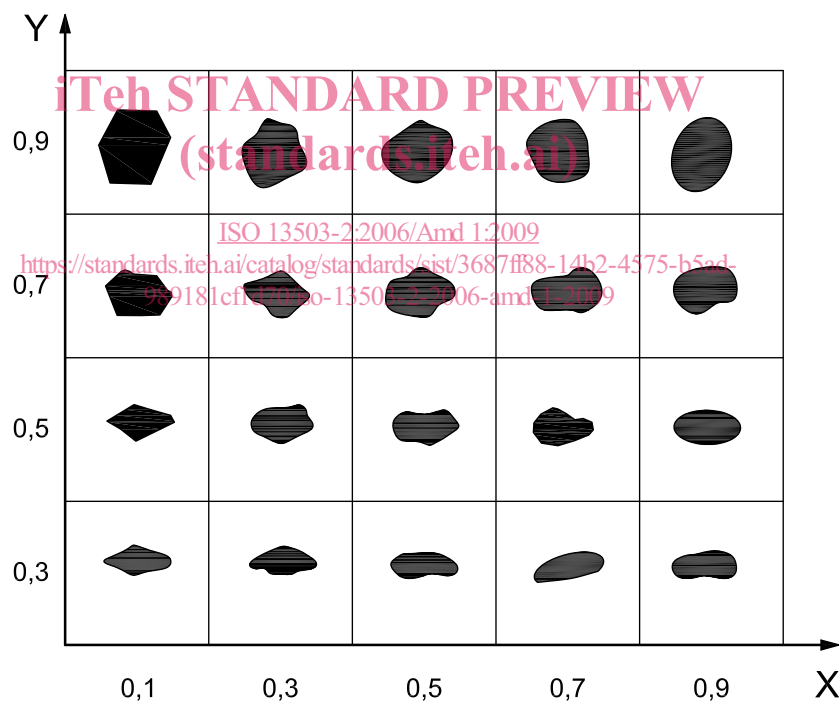
A minimum of 96,0 % of the tested proppant sample shall pass the coarse designated (or first primary) sieve and be retained on the fine designated (or second primary) sieve (i.e. 12/20, 20/40, 40/60, etc.). For 20/40 sieve sizes, a minimum of 96,0 % of the tested proppant sample shall pass the 20 mesh sieve and be retained on the 40 mesh sieve. Not over 0,1 % of the total tested proppant sample shall be larger than the first sieve size in the stack specified in Table B.1 and not over 1,0 % of the total tested proppant sample shall be smaller than the last designated sieve size.

EXAMPLE A 20/40 proppant sample shall have no more than 0,1 % of the total tested proppant sample retained on the 16 mesh sieve and no more than 1,0 % of the total tested proppant sample shall be smaller than the 50 mesh sieve.

The median diameter and sieve distribution shall be made available.

B.3 Sphericity and roundness

Ceramic proppants and resin-coated ceramic proppants shall have an average sphericity of 0,7 or greater and an average roundness of 0,7 or greater. All other proppants shall have an average sphericity of 0,6 or greater and an average roundness of 0,6 or greater.



Key

- X roundness
- Y sphericity

Figure B.1 — Chart for visual estimation of sphericity and roundness

B.4 Acid solubility

The acid soluble material in proppants shall not exceed the values shown in Table B.2.

Table B.2 — Maximum acid solubility

Proppant size mesh	Maximum solubility % mass fraction
Hydraulic fracturing sand, resin coated sand, gravel packing sand proppants	
— Larger than or equal to 30/50	2,0
— Smaller than 30/50	3,0
Ceramic proppants and resin coated ceramic proppants	7,0

B.5 Maximum proppant turbidity

The turbidity of all fracturing and gravel packing proppants shall not exceed 250 FTU (NTU).

B.6 Maximum crush material

B.6.1 General

The provisions of B.6 do not apply to curable resin coated proppants. Consolidated wafers fall outside this test.

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B.6.2 Gravel packing proppants

Samples of gravel packing proppant subjected to this test shall not produce average fines in excess of the fines specified in Table B.3, at a stress of 13,8 MPa (2 000 psi).

Table B.3 — Maximum fines

Proppant size mesh	Crushed material max. % mass fraction
8/16	8,0
12/20	4,0
16/30	2,0
20/40	2,0
30/50	2,0
40/60	2,0

B.6.3 Fracturing proppants

A determination of the highest stress level at which proppant generates no more than 10 % crushed material, rounded down to the nearest 6,9 MPa (1 000 psi), represents the maximum stress that the material can withstand without exceeding 10 % crush. Table B.4 can be used to establish the 10 % crush classification of the proppant by finding the classification that corresponds to this maximum stress.

EXAMPLE If a proppant generates 10 % crush at 33,27 MPa (4 826 psi), then, after rounding down, the maximum stress that the proppant can withstand without exceeding 10 % crush is 27,6 MPa (4 000 psi). Using Table B.4, the 10 % crush classification of this proppant is reported as 4K.

Table B.4 — 10 % Crush classification table

10 % crush classification	Stress	
	MPa	psi
1K	6,9	1 000
2K	13,8	2 000
3K	20,7	3 000
4K	27,6	4 000
5K	34,5	5 000
6K	41,4	6 000
7K	48,3	7 000
8K	55,2	8 000
9K	62,1	9 000
10K	68,9	10 000
11K	75,8	11 000
12K	82,7	12 000
13K	89,6	13 000
14K	96,5	14 000
15K	103,4	15 000