

# ISO 13503-2:2006-11 (E)

## Petroleum and natural gas industries - Completion fluids and materials - Part 2: Measurement of properties of proppants used in hydraulic fracturing and gravel-packing operations

<b>Contents</b>		<b>Page</b>
Foreword .....		v
Introduction .....		vi
1	Scope .....	1
2	Normative references .....	1
3	Abbreviations .....	1
4	Standard proppant sampling procedure .....	2
4.1	General .....	2
4.2	Particle segregation .....	2
4.3	Equipment .....	2
4.4	Number of required samples -- Bulk .....	4
4.5	Sampling --Bulk material .....	5
4.6	Sampling -- Bagged material .....	5
5	Sample handling and storage .....	5
5.1	Sample reduction .....	5
5.2	Sample splitting .....	5
5.3	Sample and record retention and storage .....	5
6	Sieve analysis .....	6
6.1	Purpose .....	6
6.2	Description .....	6
6.3	Equipment and materials .....	6
6.4	Procedure .....	6
6.5	Calculation of the mean diameter, median diameter and standard deviation .....	7
6.6	Sieve calibration .....	9
7	Proppant sphericity and roundness .....	11
7.1	Purpose .....	11
7.2	Description .....	12
7.3	Apparatus capability .....	12
7.4	Procedure .....	12
7.5	Alternate method for determining average sphericity and roundness .....	13
8	Acid solubility .....	13
8.1	Purpose .....	13
8.2	Description .....	13
8.3	Equipment and materials .....	14
8.4	Procedure .....	14
9	Turbidity test .....	15
9.1	Purpose .....	15
9.2	Description .....	16
9.3	Equipment and materials .....	16
9.4	Equipment calibration .....	16

9.5	Procedure .....	16
10	<b>Procedures for determining proppant bulk density, apparent density and absolute density .....</b>	<b>17</b>
10.1	Purpose .....	17
10.2	Description .....	17
10.3	Bulk density .....	17
10.4	Apparent density .....	19
10.5	Absolute density .....	21
11	<b>Proppant crush-resistance test .....</b>	<b>21</b>
11.1	Purpose .....	21
11.2	Description .....	21
11.3	Equipment and materials .....	22
11.4	Sample preparation .....	22
11.5	Crush-resistance procedure .....	23
12	<b>Loss on ignition of resin-coated proppant .....</b>	<b>25</b>
12.1	Objective .....	25
12.2	Apparatus and materials .....	25
12.3	Loss-on-ignition procedure for whole-grain proppant .....	25
	<b>Annex A (informative) Formazin solution preparation .....</b>	<b>27</b>
	<b>Bibliography .....</b>	<b>28</b>