

**“Measurement of Properties for Proppants Used In
Hydraulic Fracturing and Gravel-Packing Operations”
Evaluations on Sand Samples Labeled 30/50, 40/70
And 100 Mesh For Mississippi Sand, LLC
Submitted March 15, 2013**

Prepared For:

Rob Meyer
Mississippi Sand, LLC
12209 Big Bend Road
St. Louis, MO 63122
(314) 378-6459
rmeyer@mississippi-sand.com

Prepared By:

Stim-Lab, Inc.
7406 North Hwy 81
Duncan, OK 73533-1644
(580) 252-4309



Lisa O'Connell, Laboratory Supervisor

P.O. Number: Per Letter

File Number: SL10601

April 2013

ALL INTERPRETATIONS ARE OPINIONS BASED ON INFERENCES FROM SAMPLES AND LOGS, WHICH WERE SUPPLIED. WE CANNOT, AND DO NOT, GUARANTEE THE ACCURACY OR CORRECTNESS OF ANY INTERPRETATIONS, AND WE SHALL NOT, EXCEPT IN THE CASE OF GROSS OR WILLFUL NEGLIGENCE ON OUR PART, BE LIABLE OR RESPONSIBLE FOR ANY LOSS, COSTS, DAMAGES OR EXPENSES INCURRED OR SUSTAINED BY ANYONE RESULTING FROM ANY INTERPRETATION MADE BY ANY OF OUR OFFICERS, AGENTS OR EMPLOYEES. THESE INTERPRETATIONS ARE ALSO SUBJECT TO OUR GENERAL TERMS AND CONDITIONS AS SET OUT IN OUR CURRENT PRICE SCHEDULE. **Notice: Samples submitted to Stim-Lab, Inc.** for use in testing services are subject to disposal or storage fees following the completion of the testing services. Directive as to the disposition of samples must be submitted in writing with the samples or otherwise provided during the course of the project. Stim-Lab, Inc. reserves the right to request that you pickup samples, whether formation material, chemicals supplied, fixtures or other materials relating to a project. You may be charged a reasonable shipping and packaging fee for return of samples for which pickup arrangements have not been made. Stim-Lab, Inc. expressly disclaims liability for intentional disposal or unintentional loss of submitted samples for which no written directive has been provided.





STIM-LAB, Inc.
7406 North HWY 81
Duncan, Oklahoma 73533
Phone: 580-252-4309
Fax: 580-252-6979
www.stimlab.com

April 10, 2013

Mr. Rob Meyer
Mississippi Sand, LLC
12209 Big Bend Road
St. Louis, MO 63122

Dear Mr. Meyer:

STIM-LAB, Inc. has completed the ISO 13503-2:2006/API RP19C:2008 evaluations requested on the submitted sand samples labeled 30/50, 40/70 and 100 Mesh. The samples were received at Stim-Lab Inc. on March 15, 2013.

The sieve analysis results for the samples labeled 30/50 and 40/70 are provided in Table 1. The sieve analysis results for the sample labeled 100 Mesh are provided in Table 2. The sample labeled 100 Mesh was tested as size 45/140 per instructions. The sphericity and roundness (Krumbein Shape Factor), acid solubility and crush with K-Value results for the samples are provided in Tables 3 - 5. Pictures of the samples are provided at end of the report for your review. The procedures followed are as stated in ISO 13503-2:2006/API RP19C:2008.

Thank you for having STIM-LAB, Inc. perform these analyses. We hope you will consider us for your future testing needs. If you have any questions regarding the testing or results, please do not hesitate to give me a call.

Sincerely,

Lisa O'Connell
Laboratory Supervisor
Conductivity Laboratory



Table 1

**Sieve Analysis of Submitted Proppant Samples
Mississippi Sand, LLC**

ISO 13503-2:2006/API RP19C:2008, Section 6, "Sieve Analysis"

Sample I.D.	30/50		40/70	
US Standard Sieve No.	Weight %		Weight %	
	Retained	Cumulative	Retained	Cumulative
6	-	0.0	-	0.0
8	-	0.0	-	0.0
10	-	0.0	-	0.0
12	-	0.0	-	0.0
14	-	0.0	-	0.0
16	-	0.0	-	0.0
18	-	0.0	-	0.0
20	0.0	0.0	-	0.0
25	0.5	0.5	-	0.0
30	3.0	3.4	0.0	0.0
35	22.3	25.7	0.0	0.0
40	51.3	77.0	3.3	3.3
45	18.7	95.7	19.2	22.4
50	2.9	98.5	33.7	56.2
60	0.7	99.2	29.0	85.1
70	0.4	99.6	12.2	97.4
80	0.2	99.9	2.1	99.5
100	0.1	99.9	0.3	99.8
120	-	99.9	0.1	99.9
140	-	99.9	-	99.9
170	-	99.9	-	99.9
200	-	99.9	-	99.9
230	-	99.9	-	99.9
pan	0.0	100.0	0.0	99.9
total	100.0		99.9	
in-size	95.1 = as 30/50		94.1 = as 40/70	
ISO Mean Dia. (mm)	0.469		0.313	
Median Dia. (mm)	0.460		0.306	

April 2013

Table 2

**Sieve Analysis of Submitted Proppant Samples
Mississippi Sand, LLC**

ISO 13503-2:2006/API RP19C:2008, Section 6, "Sieve Analysis"

Sample I.D.	100 Mesh	
US Standard Sieve No.	Weight %	
	Retained	Cumulative
6	-	0.0
8	-	0.0
10	-	0.0
12	-	0.0
14	-	0.0
16	-	0.0
18	-	0.0
20	-	0.0
25	-	0.0
30	0.0	0.0
35	0.0	0.0
40	0.0	0.0
45	0.1	0.2
50	1.6	1.7
60	11.5	13.2
70	22.0	35.3
80	27.0	62.2
100	18.2	80.4
120	13.5	93.9
140	4.1	98.0
170	1.4	99.3
200	0.4	99.7
230	0.1	99.9
pan	0.1	100.0
total	100.0	
in-size	97.8	= as 45/140
in-size	96.2	= as 50/140
in-size	62.7	= as 70/140
ISO Mean Dia. (mm)	0.196	
Median Dia. (mm)	0.189	

April 2013

Table 3	
Sample ID: 30/50 Mississippi Sand, LLC March 15, 2013	
Measurement of Properties of Proppants Used In Hydraulic Fracturing and Gravel-Packing Operations	
ISO 13503-2:2006/API RP19C:2008, Section 7, "Proppant Sphericity and Roundness"	
* mean of a 20 count	
<u>Sphericity =</u>	<u>0.7</u>
<u>Roundness =</u>	<u>0.7</u>
<u>Clusters =</u>	<u>None Observed in Field of Count</u>
Recommended Sphericity and Roundness for proppants = 0.6 or greater (ISO/DIS 13503-2/Amd.1:2009) Recommended Sphericity and Roundness for high strength proppants = 0.7 or greater (ISO/DIS 13503-2/Amd.1:2009)	
ISO 13503-2:2006/API RP19C:2008, Section 8, "Acid Solubility"	
* mean of 3 analyses	
<u>Acid Sol. Percent =</u>	<u>2.0</u> %
Recommended Maximum Acid Solubility for proppants 6/12 thru 30/50 = 2.0% Tested as per ISO 13503-2:2006/API RP19C:2008, 100ml of 12:3 HCl:HF* with 5 grams of sand or proppant at 150°F for 30 minutes, *Other acids may be specified, depending on desired application	
ISO 13503-2:2006/API RP19C:2008, Section 11, "Proppant Crush-Resistance Test"	
<u>Stresses Tested (psi)</u>	<u>% Fines -30+50 crush prep</u>
4000	1.6%
7000	7.2%
8000	10.9%
K-Value =	<u>7K</u>
The highest stress level which proppant generates no more than 10% crushed material, rounded down to the nearest 1000psi = K-Value	

April 2013

Table 4	
<p>Sample ID: 40/70 Mississippi Sand, LLC March 15, 2013</p>	
Measurement of Properties of Proppants Used In Hydraulic Fracturing and Gravel-Packing Operations	
ISO 13503-2:2006/API RP19C:2008, Section 7, "Proppant Sphericity and Roundness"	
* mean of a 20 count	
<u>Sphericity =</u>	<u>0.7</u>
<u>Roundness =</u>	<u>0.7</u>
<u>Clusters =</u>	<u>None Observed in Field of Count</u>
<p>Recommended Sphericity and Roundness for proppants = 0.6 or greater (ISO/DIS 13503-2/Amd.1:2009) Recommended Sphericity and Roundness for high strength proppants = 0.7 or greater (ISO/DIS 13503-2/Amd.1:2009)</p>	
ISO 13503-2:2006/API RP19C:2008, Section 8, "Acid Solubility"	
* mean of 3 analyses	
<u>Acid Sol. Percent =</u>	<u>1.3</u> %
<p>Recommended Maximum Acid Solubility for proppants 40/70 to 70/140 = 3.0% Tested as per ISO 13503-2:2006/API RP19C:2008, 100ml of 12:3 HCl:HF* with 5 grams of sand or proppant at 150°F for 30 minutes, *Other acids may be specified, depending on desired application</p>	
ISO 13503-2:2006/API RP19C:2008, Section 11, "Proppant Crush-Resistance Test"	
<u>Stresses Tested (psi)</u>	<u>% Fines</u> <u>-40+70 crush prep</u>
5000	1.8%
9000	8.4%
10000	10.3%
K-Value =	<u>9K</u>
<p>The highest stress level which proppant generates no more than 10% crushed material, rounded down to the nearest 1000psi = K-Value</p>	

April 2013

Table 5

Sample ID: 100 Mesh
Mississippi Sand, LLC
March 15, 2013

Measurement of Properties of Proppants
Used In Hydraulic Fracturing and Gravel-Packing Operations

ISO 13503-2:2006/API RP19C:2008, Section 7, "Proppant Sphericity and Roundness"

* mean of a 20 count

<u>Sphericity</u> =	<u>0.7</u>
<u>Roundness</u> =	<u>0.6</u>
<u>Clusters</u> =	<u>None Observed in Field of Count</u>

Recommended Sphericity and Roundness for proppants = 0.6 or greater (ISO/DIS 13503-2/Amd.1:2009)

Recommended Sphericity and Roundness for high strength proppants = 0.7 or greater (ISO/DIS 13503-2/Amd.1:2009)

ISO 13503-2:2006/API RP19C:2008, Section 8, "Acid Solubility"

* mean of 3 analyses

<u>Acid Sol. Percent</u> =	<u>1.5</u>	%
-----------------------------------	-------------------	----------

Recommended Maximum Acid Solubility for proppants 40/70 to 70/140 = 3.0%

Tested as per ISO 13503-2:2006/API RP19C:2008, 100ml of 12:3 HCl:HF* with 5 grams of sand or proppant at 150°F for 30 minutes,

*Other acids may be specified, depending on desired application

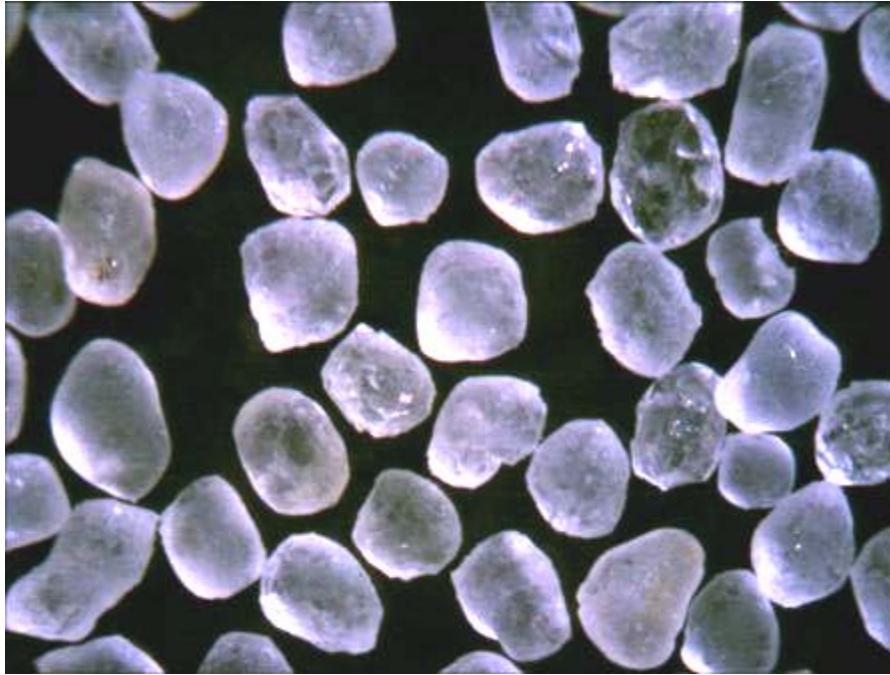
ISO 13503-2:2006/API RP19C:2008, Section 11, "Proppant Crush-Resistance Test"

<u>Stresses Tested (psi)</u>	<u>% Fines 45+140 crush prep</u>
5000	1.0%
12000	8.4%
13000	10.8%
K-Value =	<u>12K</u>

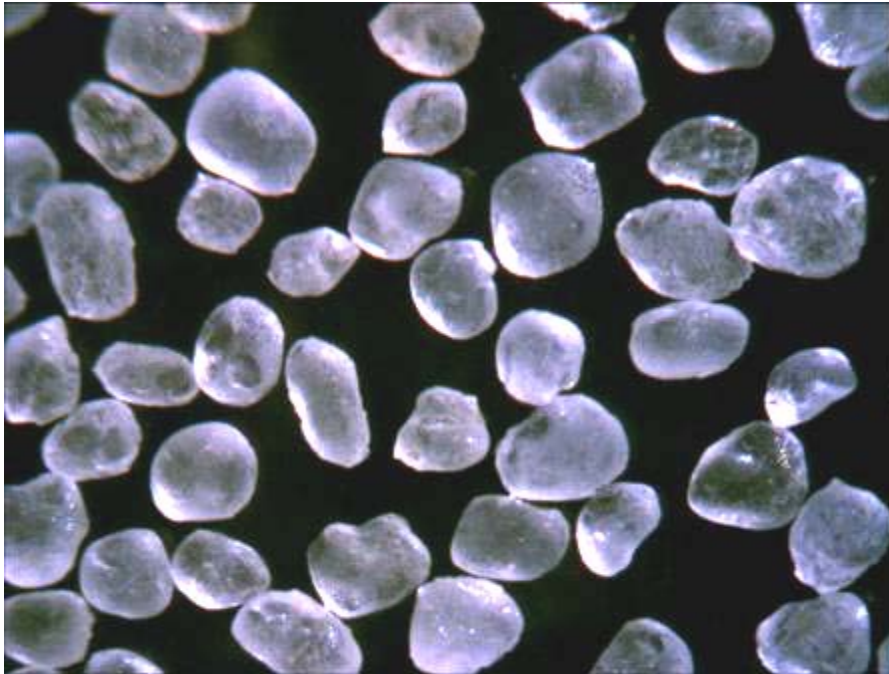
The highest stress level which proppant generates no more than 10% crushed material, rounded down to the nearest 1000psi = K-Value

April 2013

30/50 Sample



40/70 Sample



100 Mesh Sample

