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Sag Shoe Assembly

#130-22

Instruction Manual

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Ver. 2.0

OFI Testing Equipment, Inc.

11302 Steeplecrest Dr. · Houston, Texas · 77065 · U.S.A.

Tele: 832.320.7300 · Fax: 713.880.9886 · www.ofite.com

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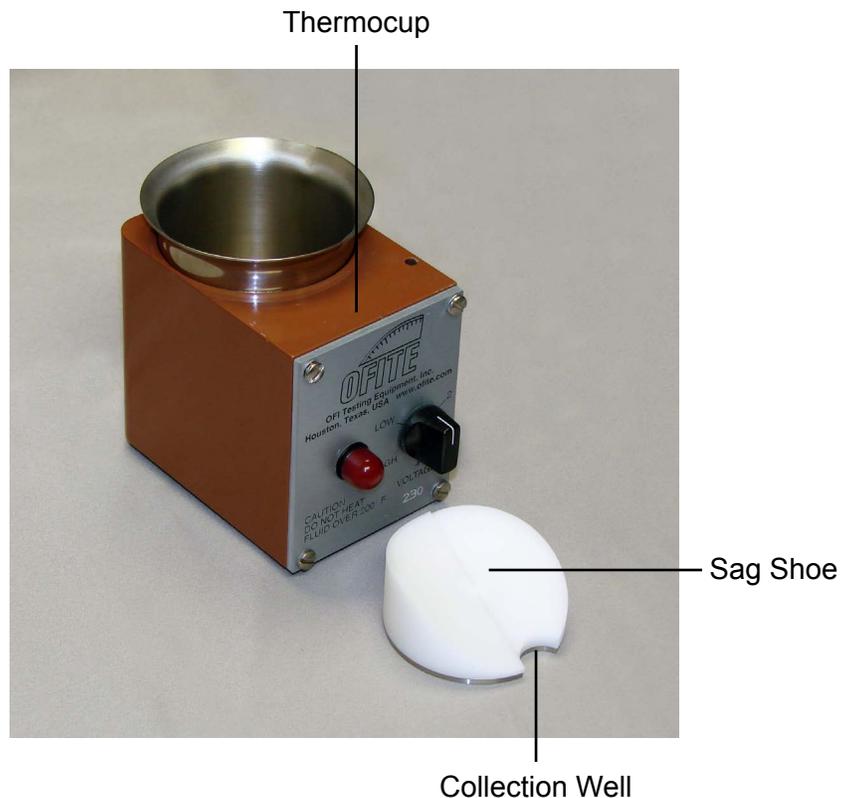
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Intro

The Viscometer Sag Shoe Test (VSST) is a well site and laboratory test that measures the weight material sag tendency of field and lab-prepared drilling fluids under dynamic conditions. The VSST provides an intrinsic fluid property without regard to the conditions under which the fluid has been or will be used. As such, results must be combined with operational factors to correlate results with sag experienced in the field.

The VSST designation is derived from the rotational viscometer used as a mixer and the thermoplastic insert (Sag Shoe) designed to concentrate sagged weight material in the bottom of a viscometer thermocup. Sag tendency is determined by the density increase of samples extracted from the collection well over a 30-minute period at a standard temperature and under a consistent rate of shear.

Weight-material bed pickup can be run as an optional measurement to characterize bed removal by higher shear levels. Results can be used to suggest opportunities for bed removal in the field prior to tripping out of the hole.



Apparatus



Note

Recommended Equipment:

- VSST Sag Shoe (#130-22)
- Direct-indicating API rotational viscometer capable of operating at 100 and 600 RPM
- Viscometer thermocup, with temperature control

The VSST Sag Shoe should fit inside of the thermocup without being too tight.

- 10 mL Luer Syringe (153-62)
- Cannula with luer connection (151-20-2)
- Timer capable of measuring ± 1 second
- Balance with 0.01 g resolution
- Pycnometer, retort cup, or weigh boat

Setup

1. Insert the Sag Shoe into the thermocup and place both on the viscometer plate.
2. Raise the plate until the top of the Shoe touches the bottom of the viscometer sleeve. Mark the support leg at the upper edge of the locking mechanism.
3. Lower the plate and thermocup to the base. Mark the support leg 7 mm ($\frac{1}{4}$ ") below the first mark.
4. Calibrate the syringe with the cannula attached using distilled water and the balance.

Procedure

1. Insert the Sag Shoe into the thermocup with the collection well positioned for easy access by the syringe.
2. Pre-heat the thermocup to 49°C (120°F).
3. Collect a 350 mL mud sample. Pour approximately 140 mL into the thermocup.
4. Raise the viscometer plate to the lower mark on the support leg. The top of the Shoe should be 7 mm below the viscometer sleeve.
5. Set the viscometer at 100 RPM and start the 30-minute timer.
6. Clear the syringe and cannula of air. Draw slightly more than 10 mL of sample from the original sample. Carefully clear syringe and cannula of residual air and push the plunger to the 10 mL calibration mark. Wipe the cannula and syringe surfaces clean.
7. Weigh the mud-filled syringe and record the weight in grams as WT1.



Note

For pycnometer or retort cup use, transfer the mud from the syringe, weigh all, and record the total weight in grams as WT1.

8. Stop the viscometer at the end of the 30-minute test.
9. Repeat step 6, except take the sample from the collection well of the Sag Shoe. Use the cannula tip to find the collection well.
10. Weigh the mud-filled syringe and record the weight in grams as WT2.



Note

For pycnometer or retort cup use, transfer the mud from the syringe, weigh all, and record the total weight in grams as WT2.

Calculation

Bed Pickup Measurement (Optional)

1. Gently return the 10-mL sample from the mud-filled syringe obtained in step 9 above to the Sag Shoe collection well.
2. Run the viscometer at 600 RPM for 20 minutes.
3. Collect a sample from the Shoe collection well as in step 9 above.
4. Weight the mud-filled syringe and record the weight in grams as WT3.

1. Calculate the VSST using the following equation:

$$\text{VSST (lbm / gal)} = 0.833 \times (\text{WT2} - \text{WT1})$$

2. Calculate optional VSST BPU using the following equation:

$$\text{BPU (\%)} = 83.3 \times (\text{WT2} - \text{WT3}) / \text{VSST}$$

Warranty and Return Policy

Warranty:

OFI Testing Equipment, Inc. (OFITE) warrants that the products shall be free from liens and defects in title, and shall conform in all respects to the terms of the sales order and the specifications applicable to the products. All products shall be furnished subject to OFITE's standard manufacturing variations and practices. Unless the warranty period is otherwise extended in writing, the following warranty shall apply: if, at any time prior to twelve (12) months from the date of invoice, the products, or any part thereof, do not conform to these warranties or to the specifications applicable thereto, and OFITE is so notified in writing upon discovery, OFITE shall promptly repair or replace the defective products. Notwithstanding the foregoing, OFITE's warranty obligations shall not extend to any use by the buyer of the products in conditions more severe than OFITE's recommendations, nor to any defects which were visually observable by the buyer but which are not promptly brought to OFITE's attention.

In the event that the buyer has purchased installation and commissioning services on applicable products, the above warranty shall extend for an additional period of twelve (12) months from the date of the original warranty expiration for such products.

In the event that OFITE is requested to provide customized research and development for the buyer, OFITE shall use its best efforts but makes no guarantees to the buyer that any products will be provided.

OFITE makes no other warranties or guarantees to the buyer, either express or implied, and the warranties provided in this clause shall be exclusive of any other warranties including ANY IMPLIED OR STATUTORY WARRANTIES OF FITNESS FOR PURPOSE, MERCHANTABILITY, AND OTHER STATUTORY REMEDIES WHICH ARE WAIVED.

This limited warranty does not cover any losses or damages that occur as a result of:

- Improper installation or maintenance of the products
- Misuse
- Neglect
- Adjustment by non-authorized sources
- Improper environment
- Excessive or inadequate heating or air conditioning or electrical power failures, surges, or other irregularities
- Equipment, products, or material not manufactured by OFITE
- Firmware or hardware that have been modified or altered by a third party
- Consumable parts (bearings, accessories, etc.)

Returns and Repairs:

Items being returned must be carefully packaged to prevent damage in shipment and insured against possible damage or loss. OFITE will not be responsible for equipment damaged due to insufficient packaging.

Any non-defective items returned to OFITE within ninety (90) days of invoice are subject to a 15% restocking fee. Items returned must be received by OFITE in original condition for it to be accepted. Reagents and special order items will not be accepted for return or refund.

OFITE employs experienced personnel to service and repair equipment manufactured by us, as well as other companies. To help expedite the repair process, please include a repair form with all equipment sent to OFITE for repair. Be sure to include your name, company name, phone number, email address, detailed description of work to be done, purchase order number, and a shipping address for returning the equipment. All repairs performed as "repair as needed" are subject to the ninety (90) day limited warranty. All "Certified Repairs" are subject to the twelve (12) month limited warranty.

Returns and potential warranty repairs require a Return Material Authorization (RMA) number. An RMA form is available from your sales or service representative.

Please ship all equipment (with the RMA number for returns or warranty repairs) to the following address:

OFI Testing Equipment, Inc.
Attn: Repair Department
11302 Steeplecrest Dr.
Houston, TX 77065
USA

OFITE also offers competitive service contracts for repairing and/or maintaining your lab equipment, including equipment from other manufacturers. For more information about our technical support and repair services, please contact techservice@ofite.com.