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Electrical Stability Meter

Part No. 131-50

Instruction Manual

Updated 8/30/2024

Ver. 4

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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Intro

The OFITE Electrical Stability Meter (ES) is a sine wave instrument. It is manufactured in accordance with the American Petroleum Institute (API) "Recommended Practice Standard Procedure for Field Testing Oil-Based Drilling Fluids", 13B-2. It is accurate, compact, and portable and is intended for routine field and laboratory use to measure the relative electrical strength of drilling fluids having a continuous oil phase.

The ES Meter is self contained and consists of a meter and probe, and it operates on four 9 volt alkaline batteries which are readily obtainable. Two calibration standards (high and low) are included with each unit to ensure accuracy.

Description

The dielectric breakdown voltage is the point at which the drilling fluid becomes electrically conductive. The DC power source of the batteries provides an AC voltage to the electrodes at a low frequency. The unit provides a constant rate of voltage increase until the emulsion becomes electrically conductive. A current flow of 61 micro amps (61 mA) across the electrodes will cause the display to stop and the reading will be held as long as the switch is depressed. The reading is called the electrical stability, emulsion stability or ES value of the fluid.

The electrical stability value will decrease with increasing testing temperature. The recommended API test temperature is either $120^{\circ} \pm 5^{\circ}\text{F}$ ($50^{\circ} \pm 2^{\circ}\text{C}$) or $150^{\circ} \pm 5^{\circ}\text{F}$ ($65^{\circ} \pm 2^{\circ}\text{C}$), depending on the temperature of the well.

The chemical composition and the shear history of a drilling fluid control the absolute magnitude of the ES in a complex fashion. Therefore, interpreting the oil-wet state of a mud from a single ES measurement is not appropriate. Only trends in ES should be used in making treatment decisions.

Components

- #131-01 Probe with Cable
- #131-51 High/Low Calibration Standard
- #147-02 9-Volt Alkaline Battery

Optional:

- #110-10 Marsh Funnel Viscometer or 12 mesh screen
- #130-38 Thermocup, 115 Volt
- #130-38-1 Thermocup, 230 Volt
- #154-01 Dual-Scale Thermometer with Metal Dial; 5" Stem; 0 - 220°F; -10 - 100°C
- #154-22 Pocket Thermometer; 1"; 0° - 220°F

#131-50-SP: Spare Parts for #131-50:

- #131-01 Probe with Cable
- #147-02 9-Volt Alkaline Battery; Qty: 8

Specifications

Meter:

Wave form:	Sine, < 5% total harmonic distortion
AC Frequency:	340 ± 10 Hz
Output Units:	Peak Volts
Ramp Rate:	150 ± 10 Volts per second, automatic operation
Minimum Output Range:	3 - 2,000 Volts (Peak)
Trip Current:	61 ± 5 mA
Size:	9.5" × 6.5" × 3.5" (24.1 × 16.5 × 8.9 cm)
Weight:	2 lb 15 oz (1.3 kg)
Shipping Size:	11" × 11" × 7" (28 × 28 × 18 cm)
Shipping Weight:	10 lb (4.54 kg)

Electrode:

Housing:	Material resistant to oil mud components up to 220°F (105°C)
Material:	Corrosion-resistant metal
Diameter:	0.125" ± 0.001" (3.18 ± 0.03 mm)
Spacing (gap):	0.061" ± 0.001" (1.55 ± 0.03 mm) at 72°F (22°C)



The probe, standards, and batteries are stored inside the ES Meter case. Twist the lock to open the door and access these items.

Procedure



1. Inspect the electrode probe and cable for any evidence of damage. Ensure that the entire electrode gap is free of deposits and that the connector to the instrument is clean and dry. Clean the electrode body thoroughly by wiping with a clean paper towel. Be sure to clean the electrode gap. Swirl the electrode probe in the base oil used to formulate the mud. If the base oil is not available, another oil or mild solvent like Isopropanol is acceptable. Do not use a detergent solution or aromatic solvents such as xylene to clean the electrode. Clean and dry the electrode probe as before.
2. Pre-heat the oil mud sample to $120^{\circ} \pm 5^{\circ}\text{F}$ ($50^{\circ} \pm 2^{\circ}\text{C}$) or $150^{\circ} \pm 5^{\circ}\text{F}$ ($65^{\circ} \pm 2^{\circ}\text{C}$), depending on the temperature of the well.
3. Pour the sample through a 12-mesh screen or Marsh Funnel screen into a glass or plastic container. **Do not use a metal container.** Record the mud temperature on the Drilling Mud Report Form.
4. Hand stir the sample with the electrode probe for approximately 10 seconds. This will help create a uniform composition and temperature. Position the electrode probe so that it does not touch the bottom or sides of the container. Be sure the electrode surfaces are completely covered by the sample.
5. Push the button to begin the voltage ramp. Do not move the electrode during the voltage ramp.
6. At the conclusion of the ramp test, note the ES value displayed on the readout.
7. Repeat the above procedure with the same mud sample. The two ES values should not differ by more than 5%. If they differ by more than 5%, the meter or electrode should be checked.
8. Record the average of the two ES measurements on the Drilling Mud Report Form.

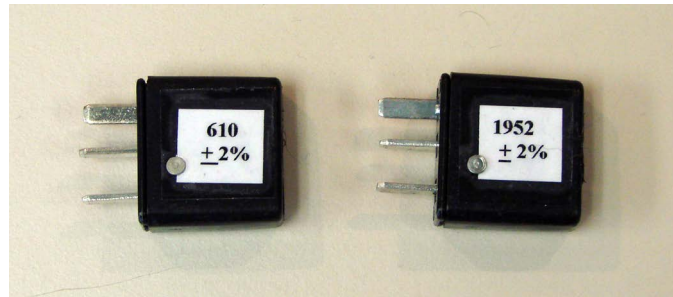
Calibration - Performance Test

1. Inspect the electrode probe and cable for evidence of damage. Make sure the entire electrode gap is free of deposits and the connector to the instrument is clean and dry.
2. Disconnect the electrode probe from the meter and push the button to run a voltage ramp test. If the meter is working properly, the ES reading should reach the maximum voltage permitted by the instrument.
3. Plug the high calibration standard into the same port the probe was in. Run the voltage ramp test. The ES value should be within 2% of the value marked on the standard. Repeat this process with the low calibration standard. Again, the ES value should be within 2% of the value marked on the standard.



Note

If either reading is not within the specified range, the unit will require service from a trained technician.



Calibration Standards

4. Reconnect the electrode to the meter and repeat the voltage ramp test using tap water. The ES reading should not exceed 6 volts. If the reading does exceed 6 volts, clean the electrode probe again using a solvent (Isopropanol, etc.) and carefully check the electrical connector for damage or wear. If the unit is still not functioning properly, the electrode and cable may be replaced by calling OFITE and ordering a new electrode (part no. 131-01).



Note

These procedures do not check the waveform, AC frequency or ramp rate. The ES meter must be periodically checked by a qualified technician to ensure that all units meet specifications. OFITE recommends returning the ES Meter once a year for a thorough calibration check.

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.