



INMOTION ENERGY (OPC) PRIVATE LIMITED

50 ml Laboratory Retort Kit

Complete Field & Laboratory Kit for Determining Oil, Water, and Solids Content of Drilling Fluids by the Retort Method

Model No: IM-RT-50ML

Compliance & Target Standard: API RP 13B-1 & API RP 13B-2 (Retort Method)

INSTRUCTION MANUAL

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Introduction

Knowing exactly how much oil, water, and solids make up a drilling fluid is fundamental to keeping that fluid on specification. Get the balance wrong and a chain of problems follows — barite settling out, viscosity drifting off target, or contamination going unnoticed until it has already cost time on the rig. The retort test is the standard, direct way mud engineers pin these fractions down, and it needs to be run often enough that speed and repeatability matter as much as accuracy.

A retort kit makes that measurement possible without a full analytical laboratory. A precisely measured sample of drilling fluid is heated until its liquid components vaporize, condensed back to liquid, and collected in a graduated cylinder — leaving the solids fraction to be calculated by difference. It is a self-contained, repeatable way to check mud composition at the rig site or in the lab, whenever the mud report calls for it.

Description

The Inmotion 50 ml Laboratory Retort Kit works on the outside-heat distillation principle described in both API RP 13B-1 (water-based fluids) and API RP 13B-2 (oil-based / nonaqueous fluids). A 50 mL sample of drilling fluid is loaded into the distillation cup, sealed into the distillation body, and heated externally within the retort's heating chamber. As the sample's liquid components — water and oil — reach vaporization temperature, they pass up through the diversion tube into the condensation body, where they cool back to liquid and drip into a graduated cylinder.

Because heat is applied from outside the distillation cup rather than by an internal element, the sample comes up to temperature evenly, which reduces the risk of scorching the retained solids. Once no further liquid drips from the condensation body, the run is complete: oil and water volumes are read directly from the graduated cylinder, and the solids fraction is obtained by difference against the known 50 mL sample volume.

- **Kit contents:** stainless steel distillation body and condensation body assembly, external heating chamber with a thermostatically controlled heating element, power switch, and heating-indicator light, clear graduated receiver cylinder, cleaning tool set (spatula, bottle brush, wire brush and condenser cord), oil-free fine steel wool, silicone oil, high-temperature thread grease, carried in a lockable stainless steel field case.

Components

Part Number	Description
IM-RT-50ML-01	Distillation Body Assembly — Cup, Casing & Diversion Tube, Stainless Steel
IM-RT-50ML-02	Condensation Body, Stainless Steel with Insulated Cover
IM-RT-50ML-03	Heating Chamber — Thermostatic Control, Power Switch & Heating-Indicator Light
IM-RT-50ML-04	Clear Graduated Receiver Cylinder, 50 mL, with Measuring Cover
IM-RT-50ML-05	Cleaning Tool Set — Spatula, Bottle Brush, Wire Brush & Condenser Cord
IM-RT-50ML-06	Lockable Stainless Steel Field Case
IM-RT-50ML-07	Steel Wool, Grade 000 Extra-Fine, Oil-Free (Pack of 4) — Consumable
IM-RT-50ML-08	High-Temperature Thread Grease (Tube) — Consumable
IM-RT-50ML-09	Silicone Oil, Dropper Bottle — Consumable



Fig. 1 — The Inmotion 50 ml Laboratory Retort Kit: distillation/heating assembly, graduated receiver tube, and cleaning accessories (spatula, brushes, silicone oil, thread grease, condenser cord, and steel wool)

Features

- **Complete Test Kit** — supplied with everything needed to run a retort test in the field: distillation body, condensation body, heating chamber, graduated cylinder, and cleaning accessories.
- **Outside-Heat Distillation** — the sample is heated from outside the distillation cup rather than by an internal element, bringing it to temperature evenly and reducing the risk of scorching the solids.
- **Simple Thermostatic Control** — a power switch and heating-indicator light make the unit straightforward to operate.
- **Corrosion-Resistant Construction** — the distillation body, condensation body, and outer case are built from stainless steel to withstand repeated exposure to drilling fluids in the field.
- **High Liquid Recovery** — a recovery rate greater than 98% keeps the oil and water readings dependable, run after run.
- **Two Voltage Builds Available** — AC220V 50Hz (standard) or AC120V 60Hz (export/USA build, fitted with a voltage-matched heating element), $\pm 10\%$. Specify the build required at the time of order; the two are not interchangeable in the field.
- **Compact Field Case** — all components pack into a lockable stainless steel case for safe transport between rig floor and lab.

Specifications

Sample Volume	50 $\pm$ 0.2 mL
Liquid Recovery Rate	>98% for refined oil/water systems; lower and less predictable recovery is normal when testing crude-oil-based fluids
Maximum Operating Temperature	500°C $\pm$ 20°C
Graduated Cylinder	50 mL, Borosilicate Glass, Accuracy ± 0.25 mL
Power Supply	AC220V 50Hz (standard build) or AC120V 60Hz (export/USA build with voltage-matched heating element), $\pm 10\%$ — specify at order; not field-interchangeable
Power Rating	1000 W (220V build)
Material of Construction	Corrosion-resistant stainless steel (distillation & condensation bodies); borosilicate glass (cylinder)
Applicable Standard	API RP 13B-1 & API RP 13B-2 (Retort Method — Oil, Water & Solids Content)
Case	Lockable stainless steel field case (included)

Operation

1. Take a fresh, representative drilling fluid sample and cool it to approximately 26°C (80°F). Pass it through a 12-mesh screen to remove cuttings or debris, then mix thoroughly to disperse entrained air and ensure a uniform sample.
2. With the distillation cup held level, use a clean syringe to inject the sample slowly and directly into the cup until full.
3. Fit the measuring cover carefully, allowing excess sample to overflow through the cover holes — this confirms the cup holds its full 50 mL volume. Tighten the measuring cover down and wipe away any overflow from the outside of the cup and cover. Then gently remove the measuring cover and return any sample stuck to it to the surface of the sample in the cup.
4. Lightly pack a small ring of the supplied oil-free, fine steel wool into the distillation casing's upper chamber, just above where the cup will sit. Use only enough to catch solids that splash or foam upward during heating — packing too tightly restricts vapor flow and will distort the reading.

✓ TIP

The steel wool is a single-use consumable. Fit a fresh piece for every run, and never reuse a piece that has already been through a heating cycle.

5. Wipe the distillation casing's threaded fitting with a clean, dry cloth, apply a light film of the supplied high-temperature thread grease to the threads, and tighten the distillation casing onto the cup.

✓ TIP

A light film of grease on the threads is enough to seal the joint. Over-applying grease can foul the diversion tube or contaminate the sample.

6. Adjust the handle and insert the distillation body's diversion tube fully into the condensation body's insulated cover, then tighten the handle to seal the connection.
7. Open the insulation cover on the heating chamber, lower the assembled distillation body – condensation body unit onto the support bracket, and close the insulation cover.



Fig. 2 — The heating chamber's insulated cover and insertion port, which receives the assembled distillation/condensation body

8. Position the graduated cylinder upright beneath the condensation body's filtrate outlet.

⚠ IMPORTANT

Drilling fluids and the fine barite or clay solids they carry can be caustic or irritating on contact, and the heating chamber and distillation body reach very high temperatures during a run. Gloves and eye protection should be worn any time samples are handled, and hot surfaces should not be touched until the unit has fully cooled. Operate the kit in a well-ventilated area, as vapours from oil-based fluids at high temperature can be irritating, and treat the condensation body, graduated cylinder and recovered liquid as hot until they have cooled.

9. Connect the unit to power and switch the heater on at the power switch. The red indicator light confirms the heating element is energized.



Fig. 3 — Power switch and heating-indicator light on the unit's control panel

10. Watch for liquid dripping from the condensation body. Once dripping stops, continue heating for a further 10 minutes to ensure complete recovery, then switch off power.
11. Allow the recovered liquid to cool to room temperature, then read the total liquid volume and, where an oil–water interface is visible, the separate oil and water volumes from the cylinder. Add 1–2 drops of demulsifier if the interface is unclear, or a drop of wetting agent if the meniscus is hard to read — always read from the lowest point of the meniscus.
12. Record the readings and calculate the solids content by difference (see Reporting Results, below).
13. Let the retort cool completely before disassembly. Clean the distillation cup, casing threads, and condensation body with the supplied cleaning tool set, and dry all components thoroughly before returning them to the case.

Reporting Results

Report the results as percent by volume of the original 50 mL sample:

Water volume (%): $V_w = 100 \times (\text{water volume, mL}) / (\text{sample volume, mL})$

Oil volume (%): $V_o = 100 \times (\text{oil volume, mL}) / (\text{sample volume, mL})$

Solids volume (%): $V_s = 100 - (V_w + V_o)$

Total solids include both suspended solids (low-gravity solids and weighting material) and dissolved solids such as salt. Splitting suspended solids from dissolved solids, and further into low-gravity and weighting-material fractions, requires the mud's density and chloride concentration and follows the standard API RP 13B-2 calculation — refer to the standard for the full procedure when that level of detail is required for the mud report.

Calibration & Verification

Periodic Verification

1. Using a clean, dry graduated cylinder or pipette, measure a known volume of water and pour it into the empty, dry retort's graduated cylinder to confirm the liquid meniscus lines up with the corresponding graduation.
2. Weigh the empty, dry distillation cup, fill it with water at room temperature using the measuring cover as described in Operation, and weigh it again. The water should weigh approximately 50 g (about 1 g per mL); a clearly different result points to a damaged or worn cup or measuring cover, which should be taken out of service.
3. With the unit running and up to temperature, insert a calibrated reference thermometer or thermocouple into the heating chamber (where the sample assembly normally sits) and confirm it reads within the stated $500^{\circ}\text{C} \pm 20^{\circ}\text{C}$ range. Wear heat-resistant gloves, and note that this checks the chamber temperature, not the sample temperature.
4. Run a known reference fluid (a sample of known oil, water, and solids content) through a complete test and confirm the recovered volumes agree with the known composition of the reference fluid.

✓ TIP

If the kit sees heavy use, or if readings begin drifting from a known reference sample, verify the cylinder, the cup volume, and the chamber temperature together rather than checking just one — this catches a slipping seal or a drifting thermostat that a single check would miss.

When to Verify

- Before any critical or disputed test run.
- After the distillation cup or graduated cylinder has been dropped, chipped, or otherwise physically stressed.
- If oil, water, or solids readings no longer track with a known reference sample or a second kit.
- On whatever routine schedule your facility's QA/QC program calls for.

⚠ IMPORTANT

A chipped or cracked graduated cylinder, or a distillation cup with damaged threads, should be taken out of service. Hairline damage can distort a reading or compromise the seal even when the component still appears to hold liquid without leaking.

Maintenance

1. Inspect the distillation cup, casing threads, condensation body, and graduated cylinder before each run — the cylinder should be free of chips or cracks, and the casing threads free of damage.
2. Clean the distillation cup and condensation body thoroughly after every test, and clear the condenser passage with the supplied condenser cord. Dried mud solids are far harder to remove and can affect the thread seal, block the diversion tube, or reduce condensation efficiency on the next run.
3. Renew the high-temperature thread grease on the casing threads periodically to maintain a tight, vapor-proof seal. Fit a fresh piece of steel wool for every run — it is a single-use consumable, not a reusable component.
4. Check the heating chamber's insulation cover and support bracket for wear, and confirm the power switch and indicator light operate normally before each run.
5. Dry all components completely before returning them to the case.
6. Re-run the Periodic Verification check (page 9) any time a component is replaced or readings start to look inconsistent.

NOTE

Never force a stuck threaded connection. If the distillation casing will not seat smoothly, back it off, clean and re-grease the threads, and try again — forcing a stuck thread can crack the cup or strip the casing.

Troubleshooting

Symptom	Possible Cause	Recommended Action
Low liquid recovery / low reading	Incomplete seal at the casing threads, or the run was interrupted before recovery finished	Re-grease and re-tighten the threaded connection; repeat the run with a fresh sample, allowing dripping to fully stop before cutting power
Sample boils out through the diversion tube	Distillation cup overfilled, air trapped in the sample, or steel wool missing or packed too lightly	Remove entrained air from the sample, fill the cup exactly as described in Operation, fit fresh steel wool, and repeat the run with a fresh sample
Solids result looks abnormally high	Not all liquid was recovered before power was cut off	Continue heating for the full 10 minutes after dripping stops before ending the run
Oil–water interface unclear	Emulsified sample	Add 1–2 drops of demulsifier to the collected liquid and allow it to settle before reading
Unit won't reach operating temperature	Heater element open circuit, or a faulty thermostat	With power disconnected, test the heating element with an ohmmeter; if it shows an open circuit, or the thermostat does not respond, arrange a repair — do not attempt to bypass the thermostat
Unit does not power on	Plug not seated, breaker tripped, or fuse melted	Check the power connection and the site's breaker/RCD; inspect the fuse and replace it if melted
Liquid leaking from the casing threads	Worn or missing thread grease, or a damaged thread	Reapply high-temperature thread grease; inspect the threads and casing seal, and replace if worn
Solids or mud carry over into the condensation body	Steel wool packing too light, or missing entirely	Increase the amount of steel wool packed above the sample cup (without overpacking) and repeat the run with a fresh sample
Low recovery on a crude-oil-based sample	Crude-oil-based fluids do not recover as completely as refined oil/water systems — this is expected, not necessarily a fault	Cross-check against a known reference sample before assuming the kit is at fault

Still stuck after trying the above? Set the kit aside and get in touch with Inmotion Energy (see Company & Contact Information, page 13).

Warranty and Return Policy

Warranty

Inmotion Energy (OPC) Private Limited stands behind the materials and workmanship of every kit it ships. For eighteen (18) months from the invoice date, if a product turns out not to meet its stated specifications through no fault of the buyer, and we're notified in writing once the issue is found, we'll repair or replace it at our discretion, subject to the exclusions below.

This coverage assumes normal use, in line with the operating conditions described in this manual. It does not stretch to cover use outside those conditions, nor to flaws that were plainly visible on arrival but went unreported.

Beyond what's stated here, Inmotion Energy doesn't offer any other express or implied warranty — including, to the extent the law allows, implied warranties of merchantability or fitness for a particular purpose.

Coverage does not extend to damage or loss caused by:

- Installation, operation, or upkeep that doesn't follow this manual
- Misuse, carelessness, or accidental damage — including a dropped or chipped graduated cylinder
- Adjustment or repair carried out by anyone other than Inmotion Energy or an authorized service provider
- Storage conditions or exposure beyond what normal field use implies
- Parts or components sourced from outside Inmotion Energy
- **Ordinary wear and consumable items** — the heating element, thread grease, steel wool, gaskets, and graduated cylinder, for example

Returns and Repairs

Pack anything you're sending back carefully — Inmotion Energy can't take responsibility for damage caused by inadequate packaging in transit, particularly for the graduated cylinder.

If you're returning a unit that isn't defective, do so within thirty (30) days of your invoice; a restocking charge may apply, and the item needs to arrive in its original condition to qualify for a refund.

Before shipping anything back, reach out to us with your invoice number, a description of the issue, and your contact details so we can set expectations. Send equipment to:

Inmotion Energy (OPC) Private Limited

Attn: Service & Repair

186, 1st Main Road, Vijaya Bank Layout, Bilekahalli

Bangalore, Karnataka – 560076, India

Questions before then? Reach our support team at info@inmotionenergy.in.

Ordering & Replacement Parts

Replacement parts for the 50 ml Laboratory Retort Kit are supplied directly by Inmotion Energy. Spare distillation cups, graduated cylinders, casing seals, and heating elements are available on request.

Have this ready when you reach out:

- Model / catalog number (IM-RT-50ML)
- The part number and description you need (see Components, page 4)

- How many you need
- Your company name, shipping address, and a contact point

Company & Contact Information

Inmotion Energy has spent years supplying precision testing instruments and drilling tools to operators working with drilling fluids, cements, and completion fluids. Working out of our Bangalore facility, we serve customers across India and the Middle East. Being an independent manufacturer means our customers come first, not a parent company's agenda.

Industries We Serve

- Onshore & offshore drilling contractors
- National & independent oil companies
- Mud engineering & testing laboratories
- Well completion & workover operations

Why Choose Us

- Every kit goes through rigorous checks before it ships
- Spares and replacements move fast, so downtime doesn't stack up
- Designs proven in the field, built to keep working

Contact Details

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