



VACUUM DISTILLATION APPARATUS

Vacuum Distillation Apparatus TT-1160

Vacuum Distillation Apparatus TT-1160 adheres to the ASTM D1160 Standard Test Method for Distillation of Petroleum Products at Reduced Pressure.

Vacuum Distillation Apparatus TT-1160 is utilized for measuring, at reduced pressures, the range of boiling points for petroleum products and biodiesel that can be partially or completely vaporized at a maximum liquid temperature of 400°C. The apparatus comprises a distillation column, pressure detecting system, receiver cabin, vacuum pump, cold trap, refrigeration unit, press, and other components.

APPLICATIONS

The primary application of the Vacuum Distillation Apparatus TT-1160 is to determine the boiling point range of petroleum products and biodiesel under reduced pressure (vacuum), in compliance with the ASTM D1160 standard. This method is necessary for heavy or heat-sensitive materials, such as lubricating oils, that would thermally decompose (crack) if distilled at atmospheric pressure. The test provides important data on the volatility and composition of these products up to a maximum liquid temperature of 400°C.

Key Industries

- **Petroleum Refining:** This is a fundamental test for characterizing the heavy fractions of crude oil, such as lubricating oil base stocks, heavy gas oils, and residual fuels. Vacuum distillation is a core process in refineries, and this lab-scale apparatus is important for quality control and process optimization.
- **Lubricant Manufacturing:** The distillation characteristics of base oils directly impact the performance of finished lubricants (e.g., engine oils, industrial oils). Manufacturers use this test to ensure their base stocks meet the precise volatility and composition requirements for formulating high-quality products.

- **Re-refining of Used Oils:** Companies that recycle and re-refine used lubricating oils rely on vacuum distillation to separate the valuable base oil from accumulated contaminants and degraded additives. This apparatus is important for quality control of the recovered base oil, supporting it is suitable for producing new lubricants.

FEATURES

- High precision thin diaphragm vacuum differential pressure gauge replaces mercury differential pressure gauge.
- Digital LCD displays pressure results clearly.
- High precision needle valve controls pressure.
- Temperature display: digital temperature controller.
- PID temperature control technology ensures temperature accuracy, with precision within $\pm 0.1^{\circ}\text{C}$.
- Pressure range: 760mmHg to 0.1mmHg.
- Portable-type electric furnace regulation device for easy operation.
- The receiver is equipped with a flow nappe, supporting a more equal flow rate.

THEORY & METHOD

Vacuum distillation separates and purifies liquids by boiling them under reduced pressure. Lowering the pressure lowers the boiling point, which allows high-boiling or heat-sensitive materials to be distilled without the high temperatures that would damage them.

Why Reduced Pressure Helps

A liquid boils when its vapor pressure equals the surrounding pressure. By using a vacuum pump to lower the pressure inside the apparatus, the liquid reaches that balance at a much lower temperature. This is necessary for materials such as heavy

petroleum fractions and delicate organic compounds that would decompose if heated to their normal boiling points.

Separating the Components

As the sample is heated gently under vacuum, each component evaporates at its reduced boiling point, travels to a cooled condenser, and returns to liquid form in a separate receiver. This separates the mixture into fractions by boiling range. In petroleum laboratories the method follows ASTM D1160, which defines vacuum distillation of heavy petroleum products.

TECHNICAL SPECIFICATIONS

1. Applicable standards: ASTM D1160 and ISO6616.
2. Heating power: 1200W.
3. Temperature sensor: Glass Pt100.
4. Pressure display: Digital display.
5. Pressure adjustment method: Precision needle valve.
6. Cooling temperature: Below -45°C.
7. Cooling method: Compressor refrigeration.
8. Water level control: Alarm.
9. Temperature control method: PID precision temperature control instrument.
10. Cycle method: Circulating method.
11. Cooling mode: Air cooling.



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