

Scientific Application

The Davis-Villinger Temperature Probe (DVTP) is designed to take heat-flow measurements in semiconsolidated sediments that are too stiff for the Advanced Piston Corer Temperature (APCT) tool. Coring must be interrupted to take a temperature measurement. The DVTP can also be run on wireline and hung below the bit (when the bit is off bottom) as a temperature logging tool for borehole fluids.

Tool Operation

The DVTP is run through the drill string on a dedicated coring wireline round trip. The DVTP is typically run with the colleted delivery system, which latches into the bottom-hole assembly (BHA). The DVTP probe extends 1.4 m below the bit and is pushed into bottom sediment by the driller with 5000–15,000 lbs and held there for 10 min.

Design Features

1) Compatibility

The tool latches into either the Advanced Piston Corer/Extended Core Barrel (APC/XCB) or Rotary Core Barrel (RCB) BHA.

Benefit: The tool latches into both major coring BHAs, increasing functionality.



A. Inserting the DVTP tool in the top of the drill pipe to take a temperature measurement. B. Schematic of the DVTP tool showing the robust probe tip with thermistor and electronics package. The tool is run on wireline using the colleted delivery system, which is above the quick release.

2) Probe Length

The robust probe extends 1.4 m below the bit.

Benefit: The probe penetrates into relatively undisturbed sediments ahead of the bit.

3) Decoupled from Heave

The DVTP is deployed on the colleted delivery system, which allows the probe to be disengaged from the BHA after it is pushed into the sediments.

Benefit: This prevents drill string movement (from ship heave) from disturbing the probe while recording formation temperature.

4) Tool Disturbance

An onboard accelerometer monitors tool disturbance while a thermistor records formation temperature.

Benefit: Measures potential tool movement during data recording to assist in interpreting temperature data.

5) Data Collection

The tool is capable of storing eight channels of data for 24 hr when sampling at 3-s intervals. After the tool is recovered, the data is downloaded and calibrated on a computer running ODP LabView software.

Benefit: The DVTP provides sufficient measurement detail and recording time to assure goodquality data.

DVTP Specifications

16-bit analog-to-digital converter

496 Kb of RAM memory

Programmable sample interval from 3 to 10 s

51,000 ohm thermistor temperature sensor

Temperature accuracy ±0.02°C

Acceleration accuracy ± 2 G

Conical probe tip continuously tapered at 2.5° from 55.5 to 8 mm in diameter

Typical Operating Range

-5°C to 105°C temperature measurement range

Soft to semiconsolidated sediments (e.g., chalks or firm clays)

Limitation

Not used in hard rocks (e.g., chert, dolomite, limestone, or basalts)