

TLS-100 | Portable

Portable thermal conductivity meter for soil, rock, concrete and polymers.

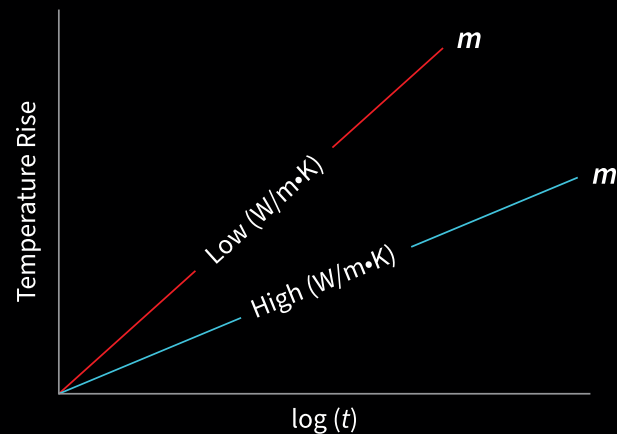
ASTM D5334-22a, IEEE 442-1981, IEEE 442-2017.



FEATURED CAPABILITIES

The TLS-100 is a portable meter used to measure thermal conductivity and thermal resistivity of a variety of samples, including soil, rocks, concrete and polymers. Tests are performed with the push of a button and results are displayed instantly. The TLS-100 features sensors that are auto-recognized with corresponding testing parameters automatically loaded.

The TLS-100 follows ASTM D5334-22a and IEEE 442-2017. The sensor needle consists of a thin heating wire and temperature sensor sealed in a 150, 100 or 50 mm steel tube. The sensor is completely inserted into the sample to be tested. Heat is delivered to the sample using a constant current source (q) and the temperature rise is recorded over a defined period of time. The slope (a) from plot of temperature rise versus logarithm of time is used in the calculation of thermal conductivity (k). The higher the thermal conductivity of a sample, the lower the slope. For samples of low thermal conductivity, the slope will be higher.



$$k = \frac{q}{4\pi a}$$

k = Thermal Conductivity (W/m·K)

q = Heating Power (W/m)

a = Slope

- Follows international standards: ASTM D5334-22a and IEEE 442-2017
- Economical, smart and accurate
- Easy to use
- Standard 100 mm / 150 mm sensor for soft materials
- Optional 50 mm sensor for hard materials

INCLUDED WITH
TLS-100



Standard 100 mm Sensor

Each TLS-100 comes equipped with the standard 100 mm sensor for testing of soil, soft materials, polymers, and easy to drill materials. The needle sensor is fully inserted into an isothermal sample and a measurement is made with the push of a button. After 180 seconds, results are displayed for thermal conductivity and thermal resistivity. Saved results can also be exported to a computer, via convenient utility software and USB connection.



Soil thermal dryout curves can be prepared by measuring the thermal conductivity of a sample at different moisture contents, as the sample dries from saturation. The typical drying approach involves heating the soil at an elevated temperature. The sample is removed, weighed, and measured for thermal conductivity at different time intervals, until it is fully dried.



Standard 50 mm Sensor

The 50 mm sensor was designed for testing hard samples, like rock and concrete. Drilling the required 4 mm diameter x 50 mm hole in rigid samples is easy with the provided masonry drill bit. When testing hard samples, a thermal contact grease is used to enhance contact between the sensor and sample.



Concrete



Rock



Polymers



Standard 150 mm Sensor

The optional 150 mm sensor is used for in-lab and in-field testing of soil and soft materials according to IEEE 442-2017. The needle is fully inserted into an isothermal sample and measurement is made with the push of a button. After 180 seconds, results are displayed for thermal conductivity and thermal resistivity.



Soil



Pastes



Powders



Solids

SPECIFICATIONS

Method	TLS-100 (Included)	TLS-50	TLS-150
Materials	Soils, pastes, powders and solids	Concrete, rocks and polymers	Soils, pastes, powders and solids
Measurement capabilities	Bulk properties	Bulk properties	Bulk properties
Thermal conductivity (W/m·K)	0.1 to 5	0.3 to 5	0.1 to 3
Thermal resistivity (mK/W)	0.2 to 10	0.2 to 3.3	0.3 to 10
Measurement time	3 minutes	3 minutes	3 minutes
Smallest sample size	100 mm in length, 50 mm in diameter	50 mm in length, 50 mm in diameter	150 mm in length, 50 mm in diameter
Largest sample size	Unlimited	Unlimited	Unlimited
Accuracy	5%	5%	5%
Reproducibility	2%	2%	2%
Temperature (°C)	-40 to 100	-40 to 100	-40 to 100
Standard	ASTM D5334-22a, IEEE 442-1981	Modified ASTM D5334-14	ASTM D5334-14, IEEE 442-2017



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