



Datasheet



0370 330 6021
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TLS-100 Transient Line Source

Portable Thermal Conductivity Meter for
Soil, Rock, Concrete, and Polymers.

Conforms to ASTM D5334 and IEEE
442-2017



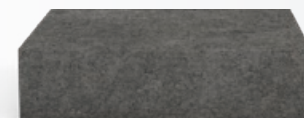
Soil



Rock

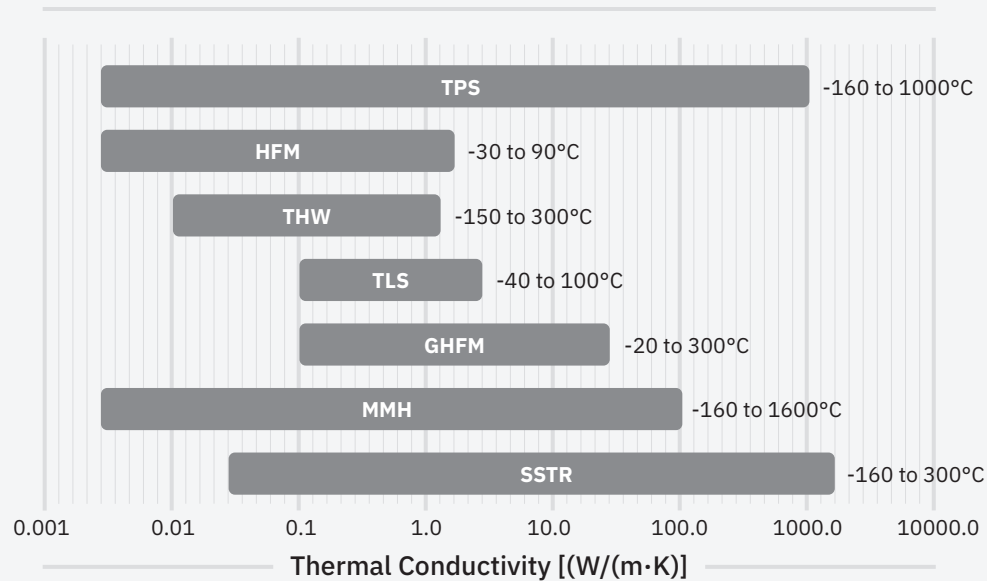


Concrete



Polymers





- MP-1** (Measurement Platform)
- MP-1: TPS (Transient Plane Source)
 - MP-1: THW (Transient Hot Wire)
- HFM-100** (Heat Flow Meter)
- THW-L1** (Transient Hot Wire)
- GHFM-01** (Guarded Heat Flow Meter)
- MMH-1600** (Monotonic Heating)
- SSTR-F** (Steady State Thermoreflectance)



- TLS-100** (Transient Line Source)
- THW-L2** (Transient Hot Wire)
- TPS-EFF** (Transient Plane Source)
- GHFM-02** (Guarded Heat Flow Meter)
- MP-2** (Measurement Platform)
- MP-2: TPS (Transient Plane Source)
 - MP-2: THW (Transient Hot Wire)
 - MP-2: TLS (Transient Line Source)
- HFM-25** (Heat Flow Meter)

Thermtest has been advancing the measurement of thermal conductivity, thermal diffusivity, and specific heat since 2005. With more than 2000 satisfied customers worldwide, our unique combination of advanced thermal conductivity instrumentation for the laboratory, portable meters for the field, and accessories enables us to provide ideal solutions to fit any material testing application and budget.

Featured Transient Line Source 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 can be performed with the push of a button and results displayed instantly. The second generation TLS-100 has many advancements, such as sensors which are auto-recognized, with corresponding testing parameters automatically loaded.

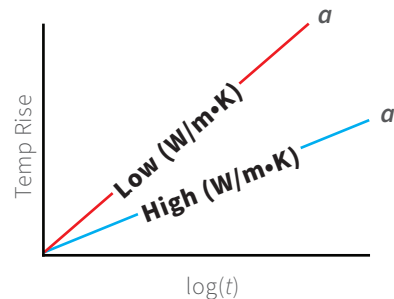
The Transient Line Source (TLS) meter follows ASTM D5334 and IEEE 442-2017. The sensor needle consists of a thin heating wire and temperature sensor sealed in a 150, 100 or 50 mm steel tube. The sensor is completely inserted into the sample to be tested. Heat is delivered to the sample using a constant 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 and IEEE 442-2017
- Portable, Economical, and Accurate
- Easy to use
- Standard 100 mm / 150 mm sensor for soft materials
- Optional 50 mm sensor for hard materials

TLS-100 mm Sensor Specifications

Materials	Soil, Rock, Concrete, and Polymers
Measurement Capabilities	Bulk Properties
Thermal Conductivity	0.1 to 5 W/m•K
Thermal Resistivity	0.2 to 10 m•K/W
Measurement Time	3 min.
Reproducibility	± 2%
Accuracy	± 5%
Temperature Range	-40 to 100°C
Largest Sample Size	Unlimited
Standards	100 mm: ASTM D5334, and IEEE 442-1981
	150 mm: ASTM D5334, IEEE 442-1981, and IEEE 442-2017

Portable . Economical . Accurate



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

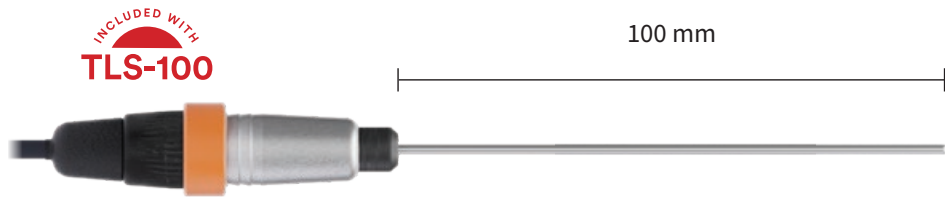
The 50 mm sensor was designed for testing hard samples, like rock and concrete. Drilling the required 4 mm diameter x 50 mm hole in rigid samples is easy with the provided masonry drill bit. When testing hard samples, a thermal contact grease is used to enhance contact between the sensor and sample.



Optional 150 mm Sensor

Optional 150 mm sensor 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.

Transient Line Source (TLS 100 mm and TLS 50 mm)



Materials	Soils, Pastes, Powders, and Solids
Measurement Capabilities	Bulk Properties
Thermal Conductivity	0.1 to 5 W/m•K
Thermal Resistivity	0.2 to 10 mK/W
Measurement Time	3 min.
Reproducibility	± 2%
Accuracy	± 5%
Temperature Range	-40 to 100°C
Minimum Sample Size	100 mm in length, 50 mm diameter
Largest Sample Size	Unlimited
Standards	ASTM D5334, IEEE 442-1981

For IEEE 442-2017 see 150 mm Sensor



thermtest.com/applications/tls100mm

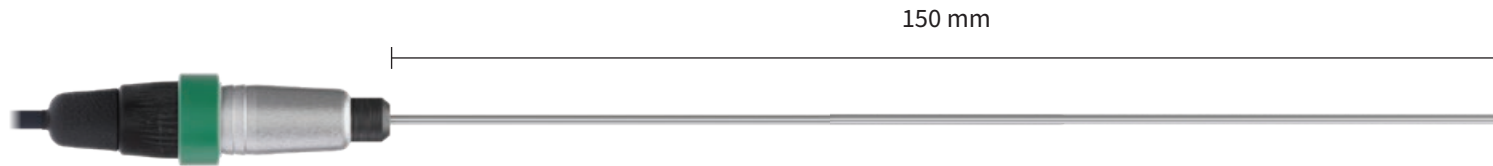


Materials	Concrete, Rock, and Polymers
Measurement Capabilities	Bulk Properties
Thermal Conductivity	0.3 to 5 W/m•K
Thermal Resistivity	0.2 to 3.3 mK/W
Measurement Time	5 min.
Reproducibility	± 2%
Accuracy	± 5%
Temperature Range	-40 to 100°C
Minimum Sample Size	50 mm in length, 50 mm diameter
Largest Sample Size	Unlimited
Standards	Modified ASTM D5334



thermtest.com/applications/tls50mm

Transient Line Source (**TLS 150 mm**)

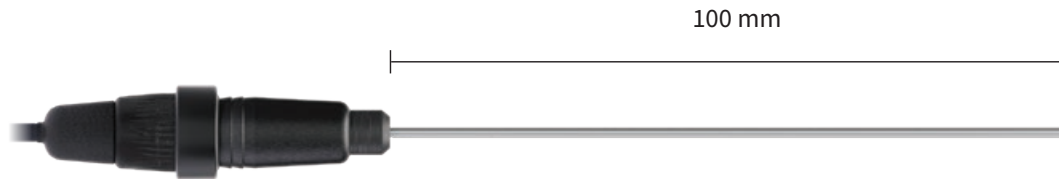


Materials	Soils, Pastes, Powders, and Solids
Measurement Capabilities	Bulk Properties
Thermal Conductivity	0.1 to 3 W/m•K
Thermal Resistivity	0.3 to 10 mK/W
Measurement Time	3 min.
Reproducibility	± 2%
Accuracy	± 5%
Temperature Range	-40 to 100°C
Minimum Sample Size	150 mm in length, 50 mm diameter
Largest Sample Size	Unlimited
Standards	ASTM D5334, IEEE 442-2017



thermtest.com/applications/tls150mm

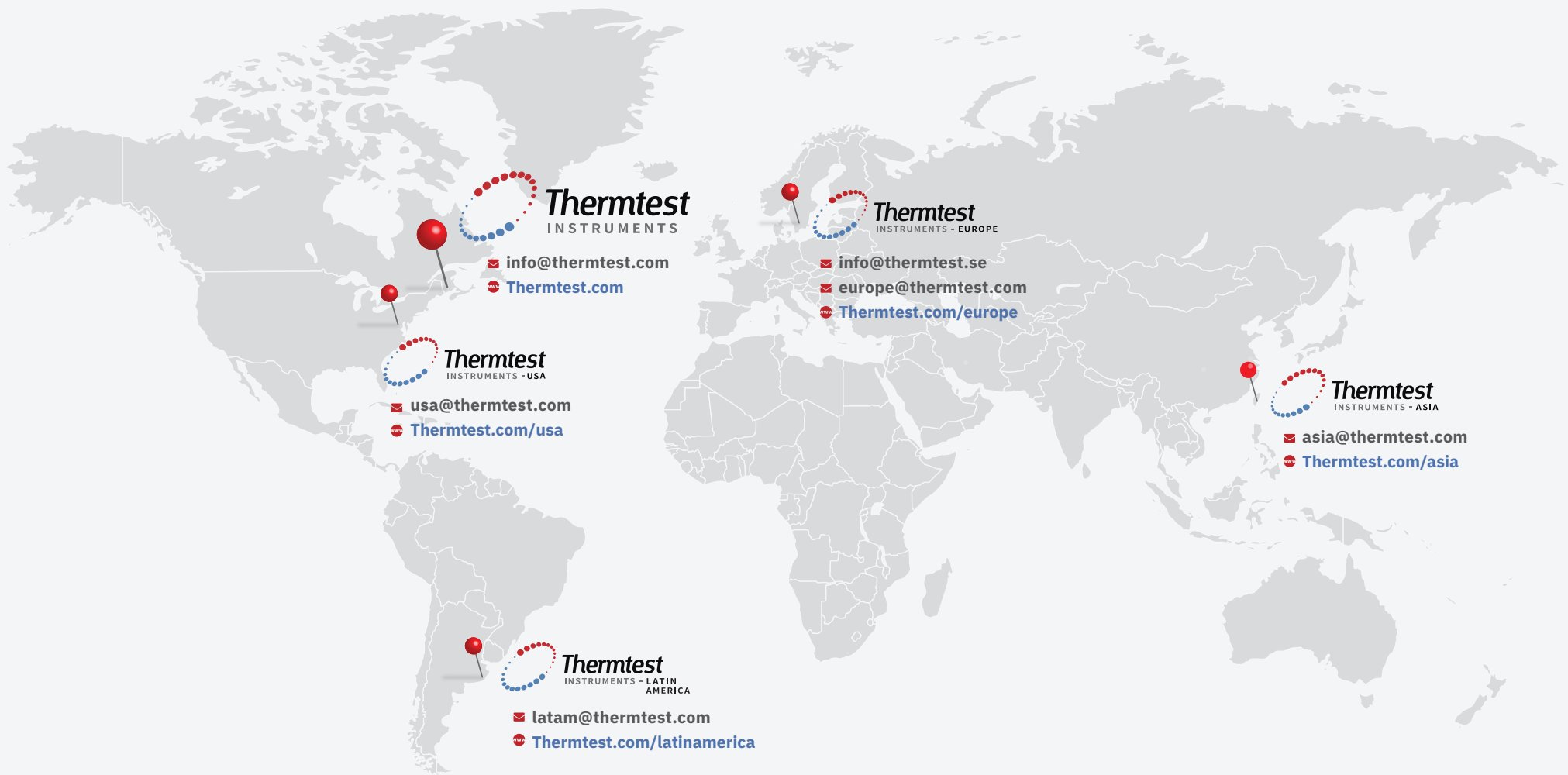
Transient Line Source (TLS 100 mm - vCp)



Materials	Soils, Pastes, Powders, and Solids
Measurement Capabilities	Bulk Properties
Thermal Conductivity	0.1 to 5 W/m·K
Reproducibility	± 2%
Accuracy	± 5%
Thermal Diffusivity	0.05 to 1.5 mm ² /s
Accuracy	± 10%
Volumetric Specific Heat	Up to 2.5 MJ/m ³ K
Accuracy	± 15%
Temperature Range	-40 to 100°C
Minimum Sample Size	100 mm in length, 50 mm diameter
Largest Sample Size	Unlimited
Standards	ASTM D5334



thermtest.com/applications/tls100-vCp



HEADQUARTERS

Thermtest Inc.
Fredericton, New Brunswick
Canada

Phone: +1 506 458 5350
Email: info@thermtest.com
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