METER
ENVIRONMENT

THERMAL PROPERTIES: WHAT YOU SHOULD KNOW BEFORE MEASURING YOUR SOIL, MASONRY, FLUID, OR OTHER MATERIAL

Using METER's TEMPOS thermal properties analyzer is simple, but there are some things that are important to know before making thermal properties measurements. We have created resources for each measurement and sample type. Click on the categories below to understand all the equipment and knowledge needed to measure the thermal properties of your soil, masonry, fluid, or other material.

SOILS

Soil is dynamic. Water movement, salts, microbes, organic content, mineral content, and temperature, among other factors can all change the thermal properties of a soil. For the most thorough understanding of a soil sample, we recommend creating a thermal dryout curve to characterize the thermal properties on a range from oven-dry to saturated moisture content.

ROCK AND CONCRETE

There is a correlation between various concrete aggregates and the thermal properties of the mixture. Rock, though formed through natural processes, is much the same.

FLUIDS

Using the transient heat source method, it is possible to measure the thermal conductivity and thermal resistivity of a liquid sample. However, this is dependent on the viscosity and temperature of the sample. With fluid samples, it is vitally important that there is no convection or bulk movement while a sample is being tested.

WATCH BEST PRACTICES FOR MEASURING THERMAL PROPERTIES OF FLUIDS

After discussing limitations of the transient line heat source method, Dr. Cobos gives practical considerations to improve the quality of fluid measurements.

MATERIALS

Our thermal properties instruments have been used on a number of materials. From building supplies to organ tissue—as long as there is enough of a sample to take a measurement, our instruments can be used.

LEARN MORE ABOUT THERMAL PROPERTIES MEASUREMENTS

For a more in-depth knowledge of thermal properties measurements explore the links below.

THERMAL PROPERTIES: WHY THE TEMPOS METHOD OUTPERFORMS OTHER TECHNIQUES

There's no way to measure the properties of moist, porous materials with the steady state method (guarded hot plate). The transient line heat source method, however, is able to measure the thermal properties of moist, porous materials, and it can even measure thermal conductivity and thermal resistivity in fluids.

THERMAL RESISTIVITY–REAL RHO VALUES FOR THE PROFESSIONAL ENGINEER

Many engineers who have used "90" as a safe and typical rho value have discovered the NEC is simply wrong.

TEMPOS COMPLIANCE TO ASTM AND IEEE STANDARDS

See how the TEMPOS meets or exceeds ASTM and IEEE standards.

USING THE TEMPOS TO MEASURE THERMAL PROPERTIES OF FLUIDS

Practical considerations to improve the quality of fluid measurements.

HOW TO PRODUCE THERMAL DRYOUT CURVES FOR BURIED CABLE APPLICATIONS

Methods used to obtain thermal dryout curves and a simple method, combining two of them, which will give reliable results.

FINDING THE R VALUE OF INSULATION USING THE TEMPOS

How to measure the resistivity of a material with the TEMPOS and how to compute the R value from that measurement.

ESTIMATION OF THERMAL STABILITY

Understand the conditions under which thermal stability is obtained and the conditions likely to lead to thermal instability.

UNDERSTANDING HOW RHO CHANGES WITH CHANGING DENSITY, TEMPERATURE, COMPOSITION, AND WATER CONTENT OF BACKFILL

Insight into the factors that affect thermal resistivity of porous materials so measurements made with the TEMPOS can be as accurate as possible.

WHY UNDERGROUND POWER CABLE INSTALLATIONS NEED SOIL THERMAL RESISTIVITY MEASUREMENTS

Soil physics is increasingly critical in the design and implementation of underground power transmission and distribution systems.

HOW TO COLLECT SAMPLES FOR THERMAL ANALYSIS

There are two major factors that can be changed during sample collection and delivery that affect the thermal properties (conductivity, resistivity, heat capacity) of soil and other porous materials like grout, FTB, and concrete. These are the water content and the compaction (or bulk density) of the material.

WEBINAR: BEST PRACTICES FOR MEASURING THERMAL PROPERTIES IN FLUIDS

Dr. Doug Cobos discusses the theoretical limitations of the transient line heat source technique, which define the type of fluids that can be measured and which thermal measurements can be performed with the KD2 Pro (now called TEMPOS). He then gives practical considerations to improve the quality of fluid measurements.

THERMAL RESISTIVITY APP GUIDE

Electricity flowing in a conductor generates heat. Any resistance to heat flow between the cable and the ambient environment causes the cable temperature to rise. When cables are buried, soil forms part of the thermal resistance, and thus soil thermal properties become an important part of cable design.

THERMAL RESISTIVITY FAQS

Search our most frequently asked questions.

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