Option for ResTest equipment

How to ascertain the conductivity / resistivity value of rods and drawn wires?

DESCRIPTION

The conductivity / resistivity measurement is the first step in electrical cable production monitoring, although maybe the most critical. The measurement requires specific precautions. The mastery of influencing factors is crucial. Paradoxically, the Conductivity / Resistivity is rarely measured today and theoretical values (extracted from tables) are used instead.

AESA recently introduced a true, straightforward, three steps novel solution to experimentally measure the conductivity / resistivity of class 1 sample conductors.

- Resistance & Temperature
- Length
- Section (volume)

Measurement's uncertainties due to imperfections in sample dimensional geometric shape are eliminated, leading to an accurate determination of these physical parameters.

KEY FEATURES

- Direct results without post calculation
- Results based on concrete measurements
- For any type of rods and drawn wires
  - round conductors
  - Sector shaped conductors
- For any equipment of the ResTest family

AESA Cortaillod

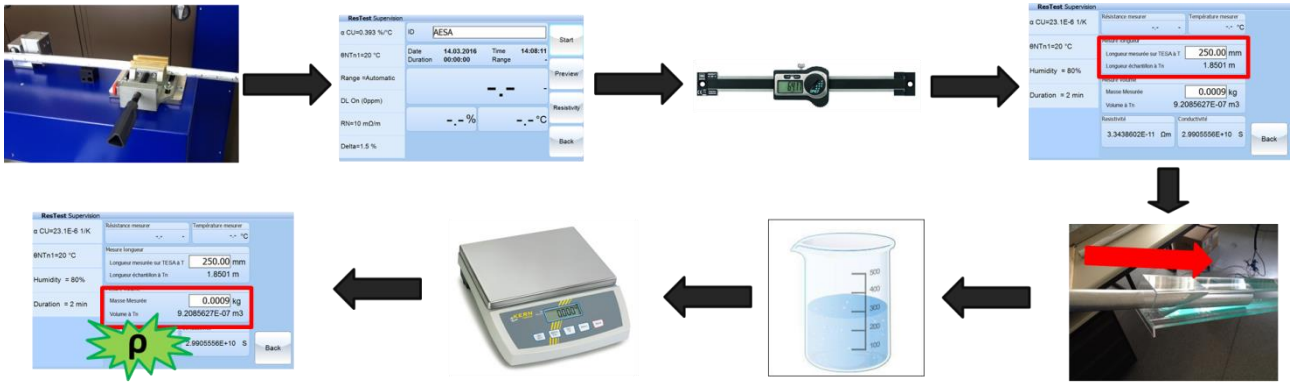
TECHNICAL SPECIFICATIONS

Cable type	Class 1
Sample's diameter [mm]	∅ 8 – 25 (40 on request)
Sample's length [mm]	1800 ±100
Global accuracy	< ± 0.20 %
Delivery package	▪ Calibrated ruler for the length measurement ▪ Water bath and weighing scale for volume measurement ▪ Software upgrade (resistivity module) ▪ AESA guided method with step-by-step recommendations

COMPONENTS

We deliver:

- Ruler for long samples
- Volume measurement
- Weight measurement
- ResTest in mandatory
  (not included in the option)



AESA proposes specific equipment for the linear resistance measurement in the laboratory & directly on the production line.

The conductivity / resistivity measurement is the first step in electrical cable production monitoring, although maybe the most critical. The measurement requires specific precautions. The mastery of influencing factors is crucial.

The Resistivity (ρ), by definition, *"is an intrinsic property that quantifies how strongly a given material opposes the flow of electric current".* For conductors of uniform cross-section such as wires, the Pouillet's Law gives the relation between the resistance R in [Ω] and the resistivity ρ in [Ωm] as follows:

$$R = \rho \frac{l}{S} \ [\Omega]$$ where (l) is the length in [m] and (S) the cross-section in [m²].

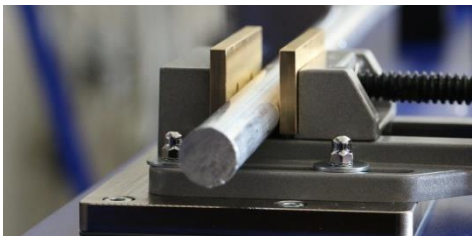
The Conductivity (σ) in [siemens/meter] is the reciprocal of resistivity (σ=1/ρ).

Thus, the parameters to be measured for calculating the resistivity and the conductivity are the resistance (*R*) at a reference temperature, the length (l), and the section (S).

AESA Cortaillod has developed a new option to measure the conductivity / resistivity according to the norm IEC 60228. This option is user-friendly, fast and accurate and can be utilized with any of the AESA ResTest family equipment. The measured parameters are key-in via a user interface and the conductivity / resistivity are then automatically computed and displayed.

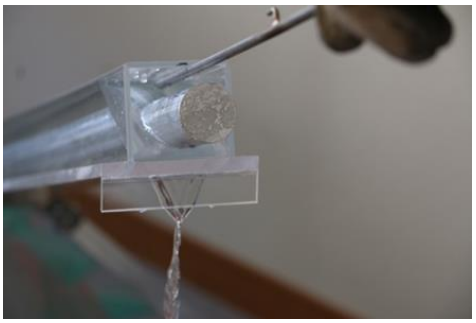
MEASUREMENT IN 3 STEPS

The resistance (R) at temperature (T) is measured with a Linear Resistance Bridge. AESA Cortaillod offers a full range of high accuracy R-bridges (ResTest family). All of them are fully integrated to accurately measure R (directly displayed in [Ω/m at 20°C]).



The length (*l*) is measured using a special ruler for long samples with all uncertainties parameters taken into consideration. The ruler is calibrated and the value is automatically transferred in to the software.

The section (S) is usually derived from the measurement of the conductor diameter. However, this approach is very time consuming given that a mapping of the sample on the full conductor length of is necessary to reduce uncertainties. AESA proposes a novel unequivocal and true approach based on **volume measurement**. The volume of the sample is determined in an inclined water bath through the weight measurement of a liquid whose density is known at a defined temperature.



This new option fills a gap in the precise conductivity / resistivity measurement for all type of class 1 conductors (round, sectoral) with diameter of 8 [mm] and larger.

ResTest 1: the conductivity / resistivity option is designed for any equipment of the ResTest family (laboratory resistance bridge). Nevertheless, if the user doesn't have such an equipment, AESA recommends ResTest 1, specially designed for measuring class 1conductors.