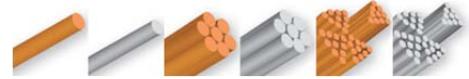


ResTest 8135



Sole system able of accurately measuring aluminium & copper conductors on the stranding machine



DESCRIPTION

Cables are usually supplied with unnecessary and expensive excess material (at least 2 - 5% safety margin). A reliable and non-destructive measurement directly on the stranding machine allows reducing the safety margin, thus generating significant savings.

Measuring aluminium remains a very difficult operation. To obtain reliable measurements, high pressure must be applied to uniformly distribute the current through the conductor. On the other hand, the conductor must not be damaged. ResTest 8135 meets both these requirements by using a hydraulic pump and jaw shells adapted to the conductor cross-section.

ResTest 8135 avoids cutting samples for the laboratory. It allows rapid results, even at high temperature and of extremely compacted strands. AESA's dry heating system drastically reduces the temperature stabilisation time. The patented measuring method of ResTest 8135 doesn't require insulating from ground potential the pull-off capstan and the winding spool (costly and dangerous modification).

KEY FEATURES

- **Optimized for aluminium conductors**
- **Important savings in production**
 - raw material savings enable pay-back in less than one year
 - testing without generation of any scrap
 - rapid check of production adjustment effects thanks to a short feedback loop
- **Directly on the stranding machine**
 - our patented measuring method allows reliable measurements directly on the line
 - unlike other solutions on the market, it is not needed to insulate the production line
- **Dry temperature stabilization system**
 - fast heating system and stabilisation at the conductor's temperature without coolant / water
- **Overall accuracy**
 - our specification relates to the overall measurement, not only to the instrument



AESA Cortaillod

TECHNICAL SPECIFICATIONS

Measuring range		9 $\mu\Omega$ - 7000 $\mu\Omega$					
Measuring length		1000 mm					
Mechanical capability		Max \varnothing 60 mm / 2.36"					
Sections		Copper			Aluminium		
		2.5 – 2'000 mm ² 13 AWG – 4'000 MCM			6 – 1200 mm ² 9 AWG – 2'400 MCM		
Accuracy (\pm 3 digits)	Class 1 (solid)	< 1'000 mm ² < 2'000 mm ²	< 2'000 MCM < 4'000 MCM	\pm 0.1% \pm 0.2%	< 1'000 mm ² < 2'000 mm ²	< 2'000 MCM < 2'400 MCM	\pm 0.1% \pm 0.2%
	Class 2 (stranded)	< 1'000 mm ² < 1'800 mm ²	< 2'000 MCM < 3'200 MCM	\pm 0.1% \pm 0.2%	< 1'000 mm ² < 1'200 mm ²	< 2'000 MCM < 2'400 MCM	\pm 0.2%
	Sectors	<800 mm ²	< 1'600 MCM	\pm 0.1%	< 630 mm ²	< 1'250 MCM	\pm 0.2%
		\pm 0.4% with microprocessor heating facility <i>Note: The accuracy may depend on the corrosion level and construction characteristics of the tested strand</i>					
Measuring method		Kelvin (4 points) performs the measurement responding to the norms IEC 60468 and IEC 60228					
Resolution		4 ½ digits					
Operating modes		<ul style="list-style-type: none"> Operator mode for production use (Start-Stop button) Advanced mode for supervisor use (touchscreen with password locked screens) 					
Display		State-of-the-art interface thanks to a 10" touchscreen					
Conductor temperature		5 - 65°C					
Stabilization time		Depends on the temperature of the conductor (usually 3 to 20 minutes)					
Supply voltage		Total consumption: 6 KW (230 W without controlled heating) <ul style="list-style-type: none"> European version: 3 x 400V (340-440V) 50Hz US & Japanese version: 3 x 205V (175-225V) 50-60Hz 					
Components		<ul style="list-style-type: none"> Measuring ruler with all integrated components (temperature probes, voltage and current knives) Movable and adjustable trolley (height & inclination) Hydraulic pump Control unit (with embedded touchscreen, PC, metrology,...) ISO 17025 Certificate 					
Interfaces		2x USB (e.g. for printer) 1x Display Port connector for external monitor 2x RJ45 for LAN connection					
Dimensions		2450 x 950 x 1230 mm (96.5" x 37.4" x 48.4")					
Weight		≈250 kg (550 lb)					
Article No		31.8135.0001.0					

OPTIONS

- ISO 17025 control box
- ISO 17025 copper rod
- Printer (for labels or full page)
- Protective cover
- Accessories for measurement (see options list)
- Maintenance contract

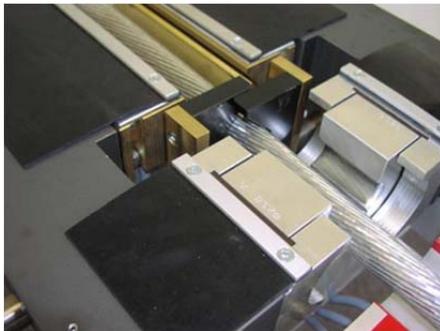
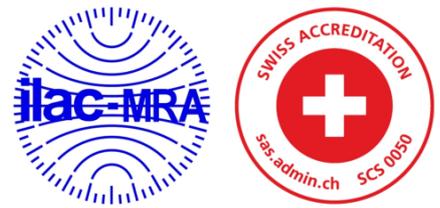
ALTERNATIVES

- on-the-line ResTest 8134 for copper (without hydraulic jaws)
ResTest 8136 for copper when space is limited (short version)
- for samples Several models for production and laboratory (see specific ResTest family brochure)

KEY BENEFITS



ISO 17025 ACCREDITED



AESA SA	
AESA ResTest Resistance Bridge	
ID: AESA310	Sn: 1#05659
Date: 4/15/2011	Time: 8:49:00 AM
α _{CU} : 0.393 %/°C	θ _{N1} : 20 °C
R _{mes} : +3.8109 Ω/km	Duration: 00:00:14 / 2
T _{mes} : +20.70 °C	

ROI < 1 year

thus rapidly generating significant savings

Testing ON-THE-LINE generates profits

USERFRIENDLY

- ResTest is multilingual
- Direct results without post calculation
- Simple Start/Stop button for use in production
- Advanced mode for supervisor use

ACCURATE

- The equipment is certified ISO 17025
- Specifications apply to the overall measurement
- All uncertainties are mastered, the risk of human error is reduced to its minimum

EFFICIENT

- Measurement directly on the stranding machine
- Intermediate measurement can be performed during the production
- Connecting system optimised for aluminium
- Elimination of destructive sample cutting
- Usable on several production lines (trolley)
- Short measuring time (integrated heating system)
- No need for water for temperature stabilisation
- No need for earth/ground insulation

SMART

- All data (results and conditions) are saved in the internal PC
- Labels can be printed directly on site
- Data can be exported through the LAN
- Traceability is easily managed

COST EFFECTIVE

- Fast ROI, therefore savings at short term
- Simplicity of use reduces operational costs
- Reliable information allows process improvement
- On-the-line measurement allows raw material savings. Example of financial benefits :
 - Annual consumption 5'000 tons
 - Copper price (May 2021) USD 9'960.-/ton
 - Decrease in margin 50 tons (1%)
 - Savings USD 498'000 / year

The purchase of ResTest 8135 is not a cost but a rewarding investment

DESCRIPTION

Temporary stop the production line, position and adjust the equipment towards the rope (height and slope). Tighten the jaws and close the cover. Set the basic data and start the measurement.

The equipment measures the rope temperature and the heating elements enable the whole area surrounding the measurement setup to quickly be brought up to the temperature of the conductor. All the heating elements are electronically regulated and controlled by microprocessor. After a few minutes only, the temperature is stabilized.

The equipment induces a regulated alternative current in the conductor and measures the difference of potential over a predetermined length. The resistance is calculated from the voltage to current ratio. The built-in probe measures the temperature of the conductor under test in order to display the corrected resistance value as function of the chosen nominal temperature.

A signal notifies the operator when the displayed measuring value is valid. The value can be read or printed. At the end of the measurement, the operator may remove the equipment to continue the production.

Of course, ResTest 8135 can also measure samples (use of a tensioner is recommended).

Whereas resistance measurements are generally unproblematic on copper conductors, they can be prone to significant error on an aluminium cord. Experience shows that a standard system may not give consistently satisfactory precision on large-section aluminium cords. This is because of uneven current distribution among the strands in the cord layers: when aluminium is exposed to the air, a very thin layer of insulating aluminium oxide forms on the surface and this can cause unpredictable variations in the radial conductivity between strands.

The ResTest 8135 variant addresses this difficulty. The system implements a specially tested cable grip method that locally breaks down the insulating oxide layer on the strands without damaging the cord. It ensures the contact across the strands from the outer layer to the inner layers.

Since very substantial grip forces are required (up to several tonnes for large-diameter cords), the progressive-deformation grips are specially shaped to reduce stress at the gripping ends thus preventing any risk of permanent damage to the cable. The grips are applied symmetrically over the cord thanks to a high-pressure hydraulic driven system. In addition to the main grips, the machine uses auxiliary rings, precisely fitted to the cord circumference, to ensure good current distribution in the outer layer to further enhance the precision...

INTERFACE

ResTest 8135 measurer is supplied with a 10" lighted screen PCT-sensor covered with a protection glass (unbreakable), perfectly suitable for a production use. Interface can be supplied in the language of your choice (English, French, Chinese, Arabic, Russian etc.) and changed directly by the user if needed.

The front panel is made of the screen and an illuminated button giving indication of the measurement status. This button is specially designed for production use, where the operator can easily start/stop the measurement

On the back panel, 2 USB ports are available to connect a printer, keyboard or mouse. 2 x RJ-45 allow the connection to another computer in your network or during a possible remote maintenance with AESA using TeamViewer. One Display Port connector can be used to connect an external monitor (laboratory use for example).

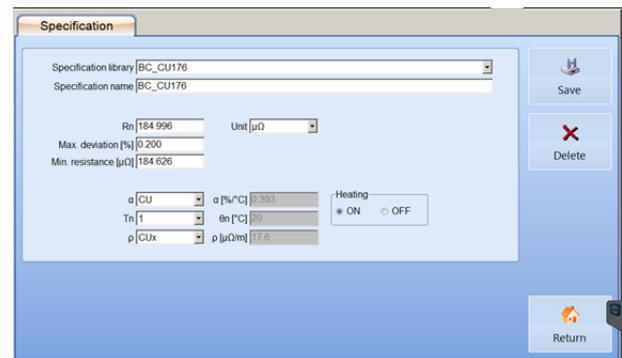


INTEGRATED FUNCTIONS

Creation of a library of strand specifications

Each specification includes:

- A specification name
- The nominal resistance
- The maximum allowed deviation
- The nominal temperature
- The material being used and its physical constants α (temperature coefficient) and ρ (resistivity)



Starting a measurement

The users can access to two different menus:

1. **Direct measurement:** All parameters can be modified (as α : Temperature coefficient, ρ Resistivity, allowing to show the section of the conductor in [mm²], Θ_n : Nominal temperature at which the resistance value is given (generally 20 [°C] etc.) Libraries of these coefficients are available in a dedicated Menu. They can be completed depending on your needs.
2. **Specification measurement:** The operator preselects a specification (created previously by a supervisor). Graphical information is also available. It is possible to select previous measurement and to print the last value measured.

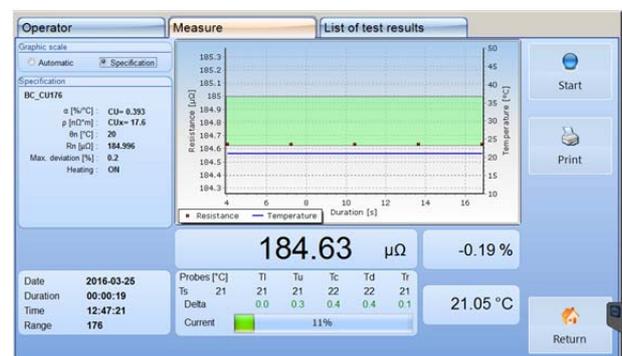
All measurements are stored thanks to an internal PC.

The data can be used for post-analysis, measurement verifications or printing if needed.

Graphical display

The measurement window allows following, second after second, the evolution of the resistance and temperature values as the automatic temperature stabilization process moves on. All possible data are given in this window, including:

- The measurement status versus the specification at the end of the process,
- The deviation to the specification,
- The margin in percentage to the limit (the raw material given away)
- The measurement duration
- Cross-section in mm²



Reporting

The user has the possibility to create its own report, with a title and the company logo, a set of freely definable fields and all available information related to the measurement itself.

The report can be generated as a printed page or, in a condensed format, on a sticker.

AESA offers a dedicated sticker printer as an option.

The size of the stickers can be defined in the AESA software.



Maintenance

The “AESA support” button allows launching Teamviewer for a remote connection.

A button give you access to the user manual in PDF file.

ACCESSORIES AND OPTIONS

*Note for positions 1, 2 and 3: jaws are plugged inside the basic clamps.
The basic clamps themselves can be used without additional jaws for:*

- Copper from 500 mm² to 1800 mm²
- Aluminium from 500 mm² to 1200 mm² (but the equalization rings are required).

1. Teeth-shaped reducing jaws

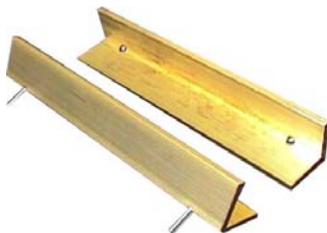
Article No: [51.0030.0025.0](#)

This type of jaws is used for small cross-sections, typically between 2.5 mm² to 95 mm²



2. V-shaped reducing jaws

When measuring directly on the stranding machine, the teeth-shaped jaws may damage the strand under test, due to the large pressure applied. To avoid this problem, AESA proposes polished V-shaped jaws. Two sets of these jaws are sufficient to cover the range from 90 mm² to 300 mm².



- o Large jaws for $\varnothing > 18$ mm
- o Medium jaws for $\varnothing > 12$ mm
- o Small jaws for $\varnothing > 8$ mm:

Article No: [51.0030.0029.0](#)

Article No: [51.0030.0027.0](#)

Article No: [51.0030.0028.0](#)

3. Jaws with geometry adapted to the sector under test

These jaws are adapted to the sector shaped conductor under. They are customised to your needs (straight or twisted preformed sector, section,...). One set is required for each produced strand type.



4. Tension equalization ring (adapted to the strand under test).

Article No: [51.0030.0023.0](#)

This option is necessary to measure aluminium conductors larger than 300 mm².

Rings precisely fit to the cord circumference to ensure good current distribution in the outer layer to further enhance the accuracy.



5. ISO 17025 certified control box type 7394

Article No: 45.7394.0001.0

This option is required to check the accuracy of each range of the ohmmeter.
 This option also allows to simulate various test conditions in order to check the device.



Delivered with ISO 17025 ACCREDITED



6. ISO 17025 copper rod 11mm length 2.5 m

Article No: 45.0030.0008.0

This option is required to verify the overall accuracy of the equipment (including the ruler).

ISO 17025 ACCREDITED



Delivered with ISO 17025 certificate

7. Label printer type Brother QL-700

Article No: 51.0500.0012.0

This printer is directly connected to the USB port and prints the measured data and test conditions on labels (example here below).



AESA SA			
AESA ResTest Resistance Bridge			
ID	AESA310	Sn :	1#05659
Date	4/15/2011	Time	8:49:00 AM
α_{CU}	0.393 %/°C	θ_{N1}	20 °C
Rmes	+3.8109 Ω /km	Duration	00:00:14 / 2
Tmes	+20.70 °C		

8. Full page printer

This printer is directly connected to the USB port and prints the measured data and test conditions on full pages. It takes place on a specially adapted support fixed on the ResTest 8135 trolley.



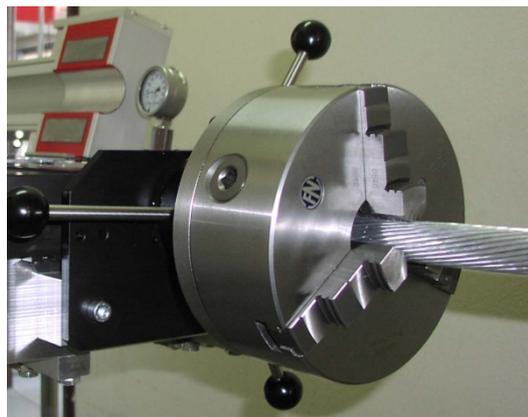
HP LaserJet P2035 printer
Adapted support for printer

Article No: 51.0500.0018.0
Article No: 51.0001.0031.0

9. Cable tensioner for sample measurement (off-the-line)

Article No: 51.0030.0043.0

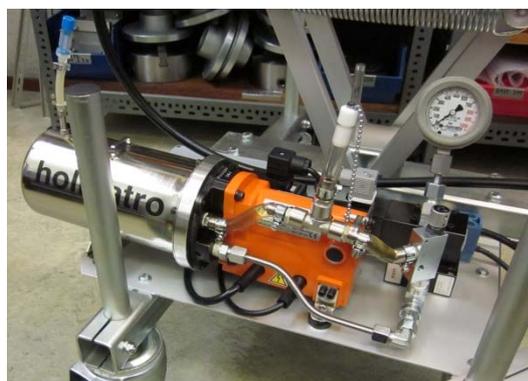
Specially designed for laboratory purposes (sample testing), this tool allows a very accurate copper and aluminium measurement by straightening the sample and twisting it if need be (note: the force is not quantifiable).



10. Electric pump

Article No: 51.0900.0003.0

The ResTest 8135 standard version is equipped with a manual hydraulic pump. This option consists in upgrading the manual pump with an electrical one.



11. Support for 8135 boxes / accessories

Article No: 51.0030.0082.0

This support is specially designed to fit the ResTest 8135 trolley and allows storing accessories.



12. Protective cover

Article No: 51.0030.0077.0

This option covers the complete system in order to protect it when not in use.



13. Commissioning

Article No: 61.0001.0001.0

The commissioning will be performed on site. It will be organised as soon as the equipment is arrived at the end-user plant. The commissioning includes the installation of the equipment as well as the training of the operators.

14. Services

AESA offers also several additional services like:

- Warranty extension (standard = 24 months)
- Maintenance contract
- Upgrade, calibration, remote assistance, expertise, specific training, ...

Article No: 61.0100.0001.0

Article No: 61.0100.0011.0