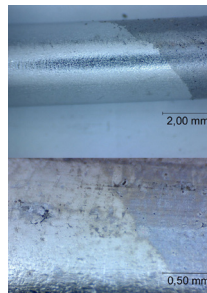


MICROSCOPE



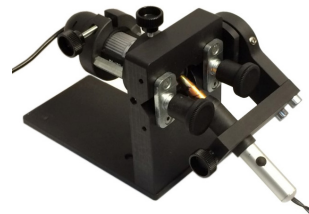
The microscope station is used for the inspection of wire surfaces and contact tips. The microscope is particularly suitable as a supplement to GEO'S WWTE welding wire inspection system and can be used as a mobile unit due to its small dimensions.

Images of wire surfaces or contact tip holes can be viewed in 2 megapixel size at 20x or 200x magnification on a computer or laptop. With the special software, true-to-scale measurements in the micrometer range can be performed.



To examine wire surfaces, a section of wire (max. Ø 4.5 mm) is inserted into the station and fixed with locking pins. The position of the wire can be centered on the image and aligned at any angle on the screen.

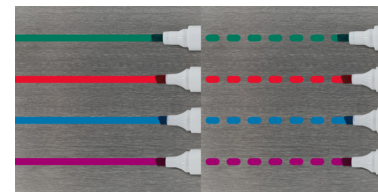
To examine contact tips, they are clamped in a swiveling mount in which the contact tip bore is aligned and fixed in the focus of the microscope.



TEST INKS



The measurement of surface energy with test inks is a test frequently used in industry. It offers the possibility of testing the quality of a surface treatment in the series production process in a way that is not harmful to the health of the employees.



For the measurement, a colored liquid („test ink“) with a defined surface tension (specified values in mN/m) is applied to the surface to be tested using a brush, cotton swab (Q-tip®) or test pen. If the ink contracts, the wettability of the substrate is lower than that of the test ink. If the ink remains in the form of the line for at least 2 seconds, the surface energy of the substrate is equal to or greater than that of the ink.

For example, the degree of contamination of metal surfaces can be determined, as there is a direct correlation between the degree of cleanliness and the display value of the test inks. Oily surfaces have a value of about 30 mN/m, clean ones over 40 mN/m. The recommended guide value for solderability is at least 35 mN/m. Basically, the cleaner the surface, the higher the surface energy.

QUALITY INSPECTION / ACCESSORIES WIRE & CABLE PRODUCTION

- ▶ **Welding Wire Test Systems**
- ▶ **Residual Hydrocarbons „Smoke Test“**
- ▶ **Paper Test Hand-held Unit**
- ▶ **Microscope**
- ▶ **Test Inks**



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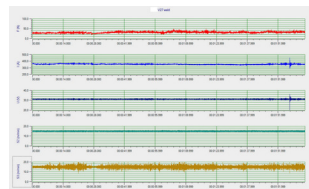
WELDING WIRE TESTING WWTE



The design of the WWTE measuring device for welding wires is based on the fact that the quality of a weld depends decisively on the quality of the welding wires and the arc. Apart from the metallurgical properties, the surface quality of the wires and their sliding and contact properties in the lining of the hose package play a decisive role.

With the Wire Welding Test Equipment WWTE, the properties relevant for quality assessment, such as feed resistance $F(N)$, welding current $I(A)$, welding voltage $U(V)$ and the wire speed can be measured both directly after the wire feed rollers and directly before the welding gun. It is precisely the ratio of the latter two parameters to each other that, in addition to the feed resistance, can provide information about the weldability of the wire.

By measuring wire speed directly after the feed rolls and directly at the welding gun, micro-welding in the contact tip and slippage in the feed rolls can be reliably detected and sound conclusions drawn for improving wire quality.



The galvanically isolated measurement signals are displayed and stored as measurement curves on a time axis via the supplied software. They can be output or printed out individually, one above the other or superimposed. By creating reference measurements and assigning a tolerance frame, quick measurements for quality assurance can be made during welding wire production.



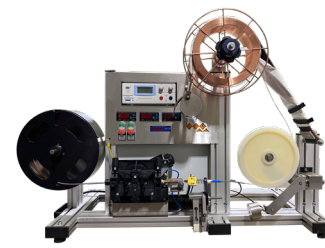
For weld lengths from 500 mm to 20,000 mm, welding is performed on the circumference of a water-cooled rotating drum. The drum can be easily replaced. All parts in contact with water except the drum are made of stainless steel.



The set values for welding current and welding voltage are set on the welding machine. Parameters such as wire speed, welding speed and step length during welding are set on separate displays of the WWTE and can be changed during the welding process.

- The measuring device can be used with all common MIG/MAG welding machines for testing all types of welding wires with $\varnothing 0.8$ to $\varnothing 2.0$ mm
- Welding time uninterrupted up to 20 minutes at 500 A
- Wire speeds adjustable from 2 to 30 m/min
- Welding speeds adjustable from 100 to 1000 mm/min
- Welding in all welding positions according to DIN EN ISO 6947 possible
- Simultaneous recording with 250 kbt/s of the measurement curves of:
 1. $F(N)$ – feed resistance
 2. $I(A)$ – welding current
 3. $U(V)$ – welding voltage
 4. Speed 2 (m/min) - wire speed directly after the wire feed rollers
 5. Speed 3 (m/min) - wire speed directly before the welding gun

MEASURING DEVICE WWTE I



Like the WWTE measuring device, the WWTE I table-top device is used for quality assurance of welding wires. In contrast to the WWTE, testing of the wire properties with

this system takes place without a welding process.

The measurement curves for the feed resistance $F(N)$, the voltage drop $dU(mV)$ at 20 A in the contact tip and the temperature of the contact tip $T(^{\circ}C)$ (20-300 $^{\circ}C$) are recorded simultaneously at 250 kbit/s. The contact tip can be heated from 20 $^{\circ}C$ up to 300 $^{\circ}C$.

The WWTE I is a ready-to-use system with integrated data logger and USB interface. The QuickDAQ software and the required drivers are supplied on data carriers (USB stick or CD) and are installed on a PC (Windows 7/8 / 8.1 / 10 compatible) before the system is commissioned. The freeware can be installed on multiple computers.

- Wire materials: stainless steel, ferrous and non-ferrous materials, flux cored wires
- Testable wire diameter: $\varnothing 0,8 - 1,6$ mm
- Line speed: 5 – 20 m/min (infinitely adjustable)
- Measurable parameter:
 - $F(N)$ – feed resistance
 - Voltage drop in the contact tip $dU(mV)$ at currents 1-20 A and temperatures up to 300 $^{\circ}C$
- Dimensions: 1000 x 400 x 700 mm, mounted on aluminum profiles. Table mounting is possible

SMOKE TEST DEVICE STD



One method of assessing the cleanliness of wires before and after cleaning is the so-called „smoke test“ for the visual determination of residual hydrocarbons. GEO's measuring device STD is

used for the comparative measurement of hydrocarbon quantities on wire surfaces (testable wire diameters 0.5 - 3.0 mm). For this purpose a wire section is heated up to annealing. The resulting amount of smoke can be determined both visually and quantitatively by means of a sensor and data logger.

The STD is a ready-to-use system with integrated data logger and USB interface. The QuickDAQ software and the required drivers are supplied on data carriers (USB stick or CD) and are installed on a PC (Windows 7/8 / 8.1 / 10 compatible) before the system is commissioned. The license-free software can be installed on multiple computers.

PTD (Paper Test Device)



The handheld PTD is a tool for performing so-called „tissue tests“. In these tests, the assessment of contamination of wire surfaces is carried out visually on the basis of

abrasion marks generated by wiping the material surface with a paper or cloth as it passes through.

The PTD ensures that this process is always performed under the same conditions (force and contact area) and that the results are objectively comparable. For the analysis of the abrasion marks, we recommend the use of a microscope (e.g. microscope station GEO item no. 2600000111).