

Sigmatetest 2.070

A practical guide to sigmatest 2.070, covering the reader intent, the relationship to sigmatest 2.070, key evaluation criteria, common risks, and the information the intended project audience should confirm before taking the next step.



Main topic: Main Page
<https://www.level-meters.com/>

In the field of industrial non-destructive testing (NDT) and material science, the Sigmatest 2.070 stands as a primary instrument for measuring the electrical conductivity of non-ferrous metals. For engineers and quality control managers involved in the manufacturing of high-precision components—including the housings and probes used in advanced level measurement systems—understanding the electrical properties of materials is essential. Electrical conductivity is a physical property that provides critical data regarding material composition, heat treatment, and structural integrity.

While the Sigmatest 2.070 is specifically a conductivity meter, its application is deeply intertwined with the reliability of industrial instrumentation. In sectors such as chemical processing, water treatment, and oil and gas, the materials used to construct level sensors must meet rigorous standards to ensure accurate signal transmission and resistance to environmental stressors. This guide examines the technical principles, selection criteria, and practical applications of the Sigmatest 2.070 within the broader context of industrial automation and level measurement.

Measurement Principles of Eddy Current Conductivity

The Sigmatest 2.070 operates on the principle of electromagnetic induction, specifically utilizing eddy current testing. To understand its function, one must first understand the interaction between magnetic fields and conductive materials.

Electromagnetic Induction

When the instrument's probe is placed near a non-ferrous metal, an alternating current flowing through the probe's coil generates an alternating magnetic field. This primary magnetic field penetrates the material and induces circular loops of electrical current, known as eddy currents. These currents, in turn, generate a secondary magnetic field that opposes the primary field.

| Impedance Analysis

The instrument measures the changes in the electrical impedance of the probe coil caused by the interaction of these magnetic fields. Because the strength and distribution of the eddy currents depend directly on the material's electrical conductivity, the Sigmatest 2.070 can calculate the conductivity value with high precision. The results are typically displayed in either % IACS (International Annealed Copper Standard) or MS/m (Megasiemens per meter).

| Frequency and Penetration Depth

A critical aspect of eddy current measurement is the frequency of the alternating current. Higher frequencies result in a "skin effect," where the measurement is concentrated near the surface of the material. Lower frequencies allow for deeper penetration. The Sigmatest 2.070 offers multiple operating frequencies, typically ranging from 60 kHz to 960 kHz, allowing users to adjust the depth of measurement based on the thickness and nature of the workpiece.

| The Role of Material Conductivity in Level Measurement

For manufacturers like Welk, ensuring the material integrity of level measurement instruments is a prerequisite for performance. The Sigmatest 2.070 serves as a bridge between raw material verification and the final reliability of a level sensor.

| Sensor Probe Performance

In capacitive level measurement, the conductivity of the probe material influences the sensor's ability to detect changes in the dielectric constant of the medium. If the probe material has inconsistent conductivity due to alloy impurities or improper heat treatment, the sensor may exhibit signal drift or calibration errors. Using a conductivity meter ensures that the aluminum or stainless steel alloys used in probe construction meet the specified electrical requirements.

| Vessel and Housing Integrity

Level meters, such as radar or ultrasonic sensors, are often mounted in hazardous or high-pressure environments. The housings for these devices are frequently made from non-ferrous alloys to prevent interference or corrosion. Conductivity testing can identify whether a housing has undergone unintended structural changes due to extreme heat or chemical exposure, which could compromise the protection of the internal electronics.

| Verification of Coatings and Cladding

In chemical applications, level probes are often clad in protective materials. Conductivity testing can help verify the thickness and uniformity of these layers, ensuring that the underlying metal is fully protected and that the electrical interface between the sensor and the medium remains consistent.

For those managing complex industrial sites, selecting the right level measurement technology is as important as material verification. You can Review product options and application support to see how different sensor types integrate into varying industrial infrastructures.

| Key Features and Specifications of Sigmatest 2.070

The Sigmatest 2.070 is designed for both laboratory and field use, featuring a rugged design and a high degree of accuracy. Its technical specifications make it a standard tool for B2B quality assurance.

Measuring Range: The device typically covers a wide range from approximately 0.5 to 65 MS/m (1% to 112% IACS).

Accuracy: It maintains high precision, often within +/- 0.5% of the measured value at room temperature.

Temperature Compensation: Since electrical conductivity is highly dependent on temperature, the Sigmatest 2.070 includes internal temperature compensation. It can adjust readings based on the ambient temperature or the temperature of the material being tested via a sensor in the probe.

Data Logging: For industrial documentation and compliance, the device allows for the storage of thousands of measurement points, which can be exported for quality control reports.

Multi-Frequency Operation: As mentioned, the ability to switch between frequencies (e.g., 60, 120, 240, 480, 960 kHz) allows for testing thin materials or detecting sub-surface flaws.

| Selection and Evaluation Criteria

When evaluating a conductivity meter like the Sigmatest 2.070 for an industrial project, several factors must be considered to ensure the tool meets the specific requirements of the application.

| 1. Material Type

The primary consideration is the type of non-ferrous metal being measured. While the device is versatile, the calibration standards used must match the material's expected range. For instance, testing copper (high conductivity) requires different calibration blocks than testing titanium (low conductivity).

| 2. Surface Condition

Eddy current testing is sensitive to surface roughness and geometry. If the components being tested—such as the curved surface of a level sensor housing—have a small radius, specific probe adapters or smaller probe diameters may be required to maintain accuracy.

| 3. Environmental Conditions

In field applications, such as a water treatment plant or an offshore oil rig, the instrument must be able to withstand fluctuations in temperature and humidity. The Sigmatest 2.070 is built for durability, but users must ensure that the temperature compensation is properly calibrated for the specific alloy being tested.

| 4. Regulatory Compliance

In industries like aerospace or nuclear power, conductivity testing must follow strict standards (e.g., ASTM E1004). The Sigmatest 2.070 is designed to comply with these international standards, providing the necessary documentation for audit trails.

| Practical Selection Table: Material Conductivity Ranges

The following table provides approximate conductivity values for common materials used in industrial instrumentation and level measurement components. These values are used to calibrate and verify the Sigmatest 2.070.

Material	Conductivity (% IACS)	Conductivity (MS/m)	Typical Application in Level Sensing
Pure Copper	100 - 102	58.0 - 59.2	Internal wiring and high-conductivity electrodes
Aluminum 6061-T6	40 - 45	23.2 - 26.1	Lightweight sensor housings and mounting brackets
Brass (Yellow)	25 - 28	14.5 - 16.2	Fittings and threaded connectors
Titanium Grade 5	1 - 2	0.6 - 1.2	Corrosion-resistant probes for harsh chemicals
Stainless Steel 316	2 - 3	1.2 - 1.7	Standard probe material for food and beverage

Note: Values are approximate and can vary based on specific alloy composition and heat treatment.

| Installation and Calibration Considerations

Proper use of the Sigmatest 2.070 involves more than just placing the probe on a surface. To achieve reliable data, certain procedural steps must be followed.

| Calibration Procedure

Before each measurement session, the device must be calibrated using certified standards. These are usually two blocks of known conductivity—one at the high end of the expected range and one at the low end. This "two-point calibration" ensures the linearity of the measurement across the specific range of interest.

| Lift-off Effect

"Lift-off" refers to the gap between the probe and the material surface (e.g., due to paint, dust, or air). While the Sigmatest 2.070 has lift-off compensation up to a certain distance (typically around 0.5 mm), it is best practice to ensure the probe is in direct, perpendicular contact with a clean surface. For painted level sensor housings, the instrument can often measure through the coating, provided the thickness is known and accounted for.

| Edge Effect

Measurements should not be taken too close to the edge of a part. The magnetic field extends beyond the physical diameter of the probe. If the probe is near an edge, the eddy current distribution is distorted, leading to false readings. A general rule is to stay at least three times the probe diameter away from any edge or geometric change.

| Limitations and Common Risks

While the Sigmatest 2.070 is a highly capable instrument, users should be aware of its factual boundaries and potential risks in a B2B environment.

1. **Ferrous Material Limitation:** The device is strictly for non-ferrous metals. Attempting to measure carbon steel or other ferromagnetic materials will result in massive errors because the magnetic permeability of the material overwhelms the conductivity signal.
2. **Geometry Sensitivity:** On very thin materials (e.g., less than 1 mm), the magnetic field may penetrate entirely through the part. This results in an underestimation of conductivity unless a high frequency is used to limit the penetration depth.
3. **Operator Dependency:** Despite the automated features, the angle and pressure applied to the probe can influence the results. Consistent training for quality control personnel is necessary to ensure repeatable data across different shifts.

4. Thermal Equilibrium: For the most accurate results, the calibration blocks, the instrument, and the workpiece should ideally be at the same temperature. Rapidly moving the device from a cold warehouse to a hot processing floor can cause temporary drift until the internal sensors stabilize.

| Frequently Asked Questions (FAQs)

Q: Can the Sigmatest 2.070 detect cracks in level sensor probes?

A: While it is primarily a conductivity meter, significant cracks or voids will disrupt eddy current flow and show up as a drop in conductivity. However, for dedicated crack detection, an eddy current flaw detector with specialized probes is more appropriate.

Q: How often should the calibration blocks be certified?

A: In most industrial quality management systems (ISO 9001), calibration standards should be recertified annually by an accredited laboratory to ensure traceability.

Q: Is it possible to measure the conductivity of liquids with this device?

A: No. The Sigmatest 2.070 is designed for solid non-ferrous metals. For measuring the conductivity of liquids in water treatment or chemical processing, a dedicated liquid conductivity transmitter is required.

Q: How does material hardness relate to the conductivity readings?

A: In many alloys, such as aluminum, there is a known correlation between hardness (achieved through heat treatment) and electrical conductivity. The Sigmatest 2.070 is often used to verify that a part has been properly aged or annealed by checking if its conductivity falls within the expected range for that specific temper.

| Conclusion

The Sigmatest 2.070 is an indispensable tool for ensuring the material quality of industrial components. By providing precise measurements of electrical conductivity, it allows engineers to verify alloy composition and structural integrity, which are foundational to the performance of level measurement instruments. Whether used in the production of radar sensor housings or the inspection of chemical storage tanks, this device ensures that the physical properties of the hardware match the engineering specifications.

For professional guidance on selecting the appropriate level measurement technology for your specific industrial application, including radar, ultrasonic, and hydrostatic solutions, visit the [Main Page](#) for detailed technical resources and product specifications.