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The Eletech Laboratory: accredited EMC testing for robust product development

In complex electronic systems, accredited EMC testing is not only a compliance step. It is a structured engineering tool that improves reliability, supports design decisions and helps transform validation into a concrete driver of product robustness.

What accreditation means beyond formal compliance

EMC, climatic, insulation, vibration and shock tests are accredited in accordance with the International Standard ISO/IEC 17025:2017. This ensures that **test reports are recognised internationally** under **mutual standard criteria** of **technical competence, impartiality** and **repeatability**. This fact has a direct operational consequence: **results are comparable over time and across laboratories**, reducing the need to **repeat tests in different countries**.

The standard does not focus only on procedures. It encompasses **qualification of personnel, structured skill matrices, calibration management, control and evaluation of measurement uncertainty, and participation in interlaboratory comparisons**. These elements ensure that data is not only generated, but **statistically reliable and technically defensible**.

At **Eletech**, **the lead company of the International Design Centres (IDCs), R&D division of Elemaster Group**, these requirements translate into **defined qualification paths for laboratory personnel, formalised competence matrices and controlled measurement processes** aligned with **ISO/IEC 17025 requirements**.

ELETECH LABORATORY
Elemaster Group

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Technical competence in an accredited laboratory

Within an accredited laboratory, **personnel qualification is not optional**. Technicians must be **authorised to perform all tests required by the relevant product standards**.

This requirement reinforces **operational integrity**. Every measurement follows **standard-defined procedures**, and each test plan is developed through:

- **theoretical analysis of documentation**
- **confirmation on the physical prototype**

Before performing any test, the **Eletech Laboratory collaborates closely with manufacturers** to analyse **product architecture**. Engineers examine aspects such as **system interfaces, cable routing and the real operating conditions** in which the product will be used. Preliminary evaluation of **interfaces, ports, cable lengths and operating conditions** determines which tests must be executed or can be excluded. The laboratory and the manufacturer jointly define the **test plan**, ensuring alignment between **normative theory and real product architecture**.

Competence is therefore embedded not only in **execution**, but in **interpretation**. In the case of the **Eletech Laboratory**, this structured approach ensures **consistency between engineering analysis and accredited testing activities**.

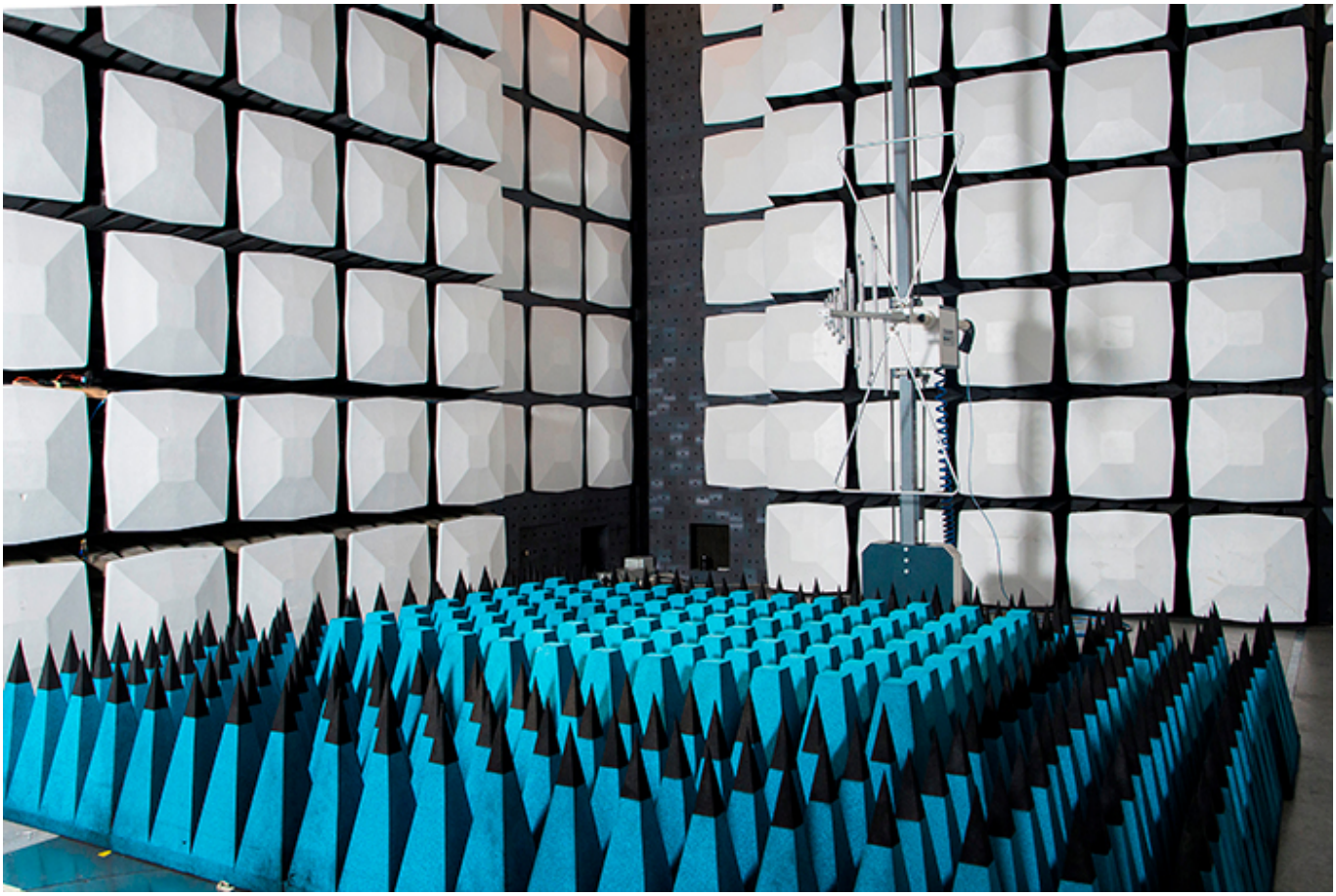
Repeatability, measurement uncertainty and decision reliability in EMC testing

Measurement uncertainty and calibration management are sometimes perceived as administrative burdens. In reality, they represent **protection against incorrect decisions**.

Poorly controlled uncertainty can generate **false positives**, where compliant products are unnecessarily modified, or **false negatives**, where non-compliant products reach certification stages.

ISO/IEC 17025 introduces **rigorous management** of these parameters. **Interlaboratory tests** verify **statistical coherence of results**, strengthening confidence in data and reducing the risk of **strategic misjudgements**.

In sectors such as **medical devices**, accredited reports are increasingly becoming **de facto mandatory**. The market expects documentation that demonstrates **traceability, repeatability and recognised competence**. For the **Eletech Laboratory**, operating under **accreditation** ensures that **EMC results are reproducible, technically defensible and internationally recognised**.



International recognition, certification efficiency and time-to-market

The **MRA (Mutual Recognition Agreements) framework** ensures that **accredited test results are accepted across borders**. This has a **direct impact on time-to-market**.

When reports are internationally recognised:

- **duplication of tests abroad is reduced**
- **additional audits can be avoided**
- **certification processes become smoother**

Accreditation therefore functions not only as a **quality guarantee**, but as a **business accelerator**. It reduces friction in **global supply chains** and simplifies access to **regulated markets**.

For projects developed within the **Elemaster and Eletech ecosystem**, the presence of an **internally accredited laboratory** further reduces **coordination complexity between design and validation phases**. Within the broader **ELEVO, the Group's Innovation Path**, which promotes integration between **R&D, validation and industrialisation**, **ISO/IEC 17025 accreditation** reinforces a development model where **testing competence is structurally embedded into the product lifecycle**.

How the Eletech Laboratory strengthens the EMC development ecosystem

In the specific context of **EMC validation**, the Eletech Laboratory operates **across activities** such as:

- **emission and immunity testing**
- **pre-compliance activities**
- **iterative troubleshooting processes**
- **software and hardware validation**

When the laboratory is integrated within the **broader engineering ecosystem**, as in the case of **Elemaster and Eletech**, accredited **testing reinforces the entire development chain**.

Access to an **accredited anechoic chamber** **during the design phase** enables not only **repeatable pre-compliance measurements**, **immediate validation of design modifications** and **reduction of rework before final certification**. It also creates the conditions for a **deeper understanding of the electromagnetic behaviour of the product itself**.

In increasingly complex electronic systems, where **hardware architecture, software, interfaces and shielding interact continuously**, the **anechoic chamber** is not merely a highly technological space. It is an **environment that makes visible what would otherwise remain difficult to interpret**. By simulating an **open field** and isolating the device from **external interference**, it allows engineers to observe **electromagnetic behaviour under controlled conditions**, transforming **invisible phenomena into measurable and explainable information**.

Within this framework, **unexpected couplings**, effects related to **cabling** and interactions between **PCB layout, enclosure and shielding** become easier to identify and analyse. The value of testing therefore does not lie only in **detecting that a limit has been exceeded**, but in **understanding why it happens** and **which design element is contributing to that behaviour**.

This is precisely where the **anechoic chamber becomes a true design lever**. **EMC testing evolves into an iterative development tool**: **measure, intervene, observe again**. Each modification produces an **immediate response**, allowing engineers to **refine the system progressively** rather than waiting for a **final verdict at the end of the process**.

This approach becomes particularly valuable during **pre-compliance activities**. Bringing the **anechoic chamber into the prototyping phase** means allowing the project to **learn while it is still flexible**. At this stage, interventions on **cabling, filters, shielding or layout** can be evaluated when **design changes are still feasible**, reducing uncertainty, limiting **costly redesigns** and making the **path towards certification more linear and efficient**.

The **Eletech Laboratory**, operating under **ISO/IEC 17025 accreditation**, allows **EMC validation** to be positioned not as a **downstream verification step**, but as a **structured component of product development**.

For customers whose products are developed internally within the **Elemaster/Eletech ecosystem**, this integration represents a **concrete competitive advantage** in terms of **reduced delays and faster time-to-market**. For external customers not involved in the design process, the service aligns with the **standards of traditional accredited laboratories**.

Immunity testing and real robustness beyond minimum requirements

Within the **Eletech Laboratory**, **immunity testing** is not treated merely as a **formal verification step**. Instead, it becomes a **structured process for evaluating how robust an electronic system truly is** when confronted with **real-world electromagnetic phenomena**.

Immunity testing evaluates the ability of a device to **maintain its intended performance** when exposed to **specific electromagnetic disturbances**. Rather than focusing on what a product emits, these tests analyse **how systems react when disturbances are intentionally introduced through electrical interfaces**. In laboratory conditions, disturbances are injected into **power lines or communication ports**, reproducing phenomena commonly encountered in **real operating environments**. From this perspective, the laboratory acts as a **controlled simulator of real-world conditions**, making these situations observable in a **repeatable and measurable environment**.

Within an **ISO/IEC 17025-accredited environment**, immunity tests such as:

- **EFT/Burst**
- **Surge**
- **ESD**

are executed according to **standardised procedures and defined performance criteria**.

These disturbances reflect different physical phenomena commonly found in operational environments.

EFT/Burst refers to **high-frequency disturbances with relatively low energy**, typically generated by switching events such as **relays, contactors or inductive loads**.

Surge events simulate **high-energy overvoltages** induced by **lightning strikes** or disturbances in **power distribution infrastructures**.

Electrostatic discharge (ESD) reproduces **sudden electrical discharges** that occur when a charged person or object transfers electrostatic energy to an electronic device.

By reproducing these disturbances in a **controlled environment**, engineers gain insight into **how systems respond to electromagnetic stress conditions** that are often difficult to analyse directly in the field. Increasingly, manufacturers choose to **extend test levels beyond normative minima** to assess **real robustness** under **operational transients, power fluctuations or unbalanced loads**.

The credibility of these extended evaluations depends on **measurement traceability and procedural rigour**. Accreditation ensures that even **robustness-driven tests** maintain **statistical reliability and comparability**, as applied within the **Eletech Laboratory framework**.

The Eletech Laboratory: a strategic asset, not a symbolic certificate

Within the Eletech Laboratory, **accreditation** should not be interpreted as a **symbolic badge**. It represents:

- **a guarantee of competence**
- **a safeguard against measurement error**
- **a tool for reducing regulatory risk**
- **a facilitator of international market access**
- **a structural contributor to time-to-market**

In complex electronic systems, where **EMC behaviour depends on hardware architecture, cabling, shielding and software robustness**, **reliable data** becomes the **foundation for every design decision**.

Without a **structured and accredited laboratory framework**, testing risks becoming a **fragmented activity**. Within the **Eletech Laboratory**, supported by **ISO/IEC 17025 accreditation for EMC, climatic, insulation, vibration and shock tests**, it becomes an **industrial process aligned with engineering, certification and business strategy**.

In this sense, accreditation is not an **administrative endpoint**. Within the **Eletech Laboratory**, it becomes part of a **technical infrastructure** that supports **innovation, protects decision-making and strengthens the credibility of the entire product development cycle**.