

KEMA Labs

CESI Group



SMART METERING

*Testing, Inspection and
Certification Services*



SMART METERING IN TODAY'S MARKETS

Smart metering equipment is essential for accurate and reliable billing and monitoring of electric energy in the power industry. Smart metering is not limited to the residential sector, but also applies to other segments of the energy industry, such as industrial and commercial customers, distributed generation and storage facilities, and electric vehicle charging stations.

Given the crucial role of smart metering in the energy transition, it is essential that the metering equipment meets the highest standards of quality, performance, and security. Smart meters must be able to operate reliably and accurately under various conditions and scenarios, and to resist potential attacks or tampering. Therefore, testing and certification of smart metering equipment is vital to ensure its compliance with the relevant international standards and regulations, as well as the specific requirements of different markets and regions.



About us

KEMA Labs is a global leader in testing, inspection, and certification of energy-related products and systems. We have more than 90 years of experience and expertise in the energy sector, and we are trusted by customers and regulators worldwide. We operate in more than 30 countries and have over 1,500 employees. We are part of the CESI Group, one of the world's largest providers of testing and certification services.

KEMA Labs has a strong reputation for quality, independence, and innovation. We are committed to delivering excellence and value to our customers, and to contributing to a safe, sustainable, and smart energy future. We are constantly investing in new technologies, facilities, and capabilities to meet the evolving needs of the energy industry. We are also actively involved in the development and improvement of international standards and regulations, and we participate in various industry associations and initiatives.

KEMA Labs offers world-renowned, impartial testing and certification of all kinds of energy meters according to all relevant international standards.

Overview of services for smart meters

KEMA Labs energy meter testing and certification services provide impartial evidence of accuracy, safety, reliability, and stability – giving your customers complete peace of mind that your energy metering solutions satisfy all their quality requirements. Our services cover the whole range of energy meters: from domestic meters to industrial/network units, electronic or digital, and billed or prepaid.

KEMA Labs is a worldwide recognized partner for testing and certification of energy meters. We test and certify energy meters against all relevant industry standards including the Measuring Instruments Directive 2014/32/EU (MID) – essential for energy meters intended for European markets. KEMA Labs can also offer technical support and guidance throughout the certification process, so manufacturers can optimize their product design, performance, and efficiency.

KEMA Labs can perform testing and certification of energy meters according to the following standards:

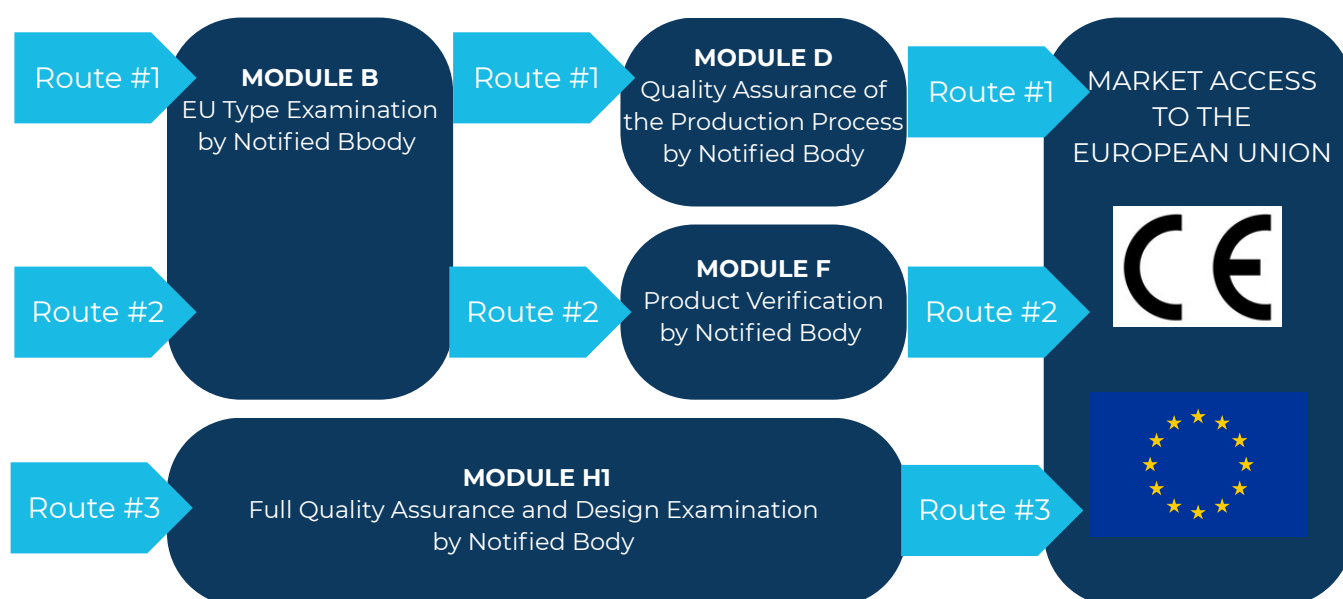
Standards	Characteristics
EN 62052-11 EN 50470-3	They can serve as a basis for compliance with European Measuring Instruments Directive 2014/32/EU (MID)
IEC 62052-11/31 IEC 62053-11/21/22/23/24	For active and reactive energy meters intended for the international market
OIML R46-1/-2	For the international market
ANSI C12	Series for the American market
Others:	
• IEC 62054-21	For time switches
• IEC 62055-31	For prepayment meters
• IEC 62059-32-1	For durability examination
• IEC 62059-41	For reliability prediction
• IEC 62059-31-1	For accelerated reliability testing

CERTIFICATION FOR MEASURING INSTRUMENTS DIRECTIVE (MID) 2014/32/EU

Understanding the MID certification process

The Measuring Instruments Directive 2014/32/EU (MID) is a European regulation that harmonizes the requirements and procedures for the conformity assessment of measuring instruments used for legal metrology purposes in the European Union. The MID covers 10 categories of measuring instruments, including active electrical energy meters. The MID aims to ensure the accuracy, reliability, and security of the measuring instruments, as well as the protection of the consumers and the environment.

To comply with the Measuring Instruments Directive (MID) 2014/32/EU, manufacturers of energy meters may select from several conformity assessment routes, including:



The Module B of the European Measuring Instruments Directive 2014/32/EU consists of an EU Type Examination of the energy meter, after which you will receive an "EU Type Examination Certificate". This Type Examination must be followed by either an assessment of the production site management system (Module D of the MID) or conformity of the type based on product verification (Module F of the MID) in order to affix the CE mark on the energy meter.

Your trusted partner for MID testing and certification

We are a Notified Body for the Measuring Instruments Directive 2014/32/EU (MID), also having EN ISO/IEC 17065 accreditation (product certification) and EN ISO/IEC 17025 accreditation (testing and calibration laboratories).

KEMA Labs can help you during the entire certification process of your energy meter.

We can issue:

- EU-Type Examination Certificates (Module B of the MID) on the basis of the ISO/IEC 17025 and ISO/IEC 17065 accreditation
- Certificates of Conformity based on Quality Assurance of the Production Process (Module D of the MID) on the basis of the ISO/IEC 17065 accreditation





CERTIFICATION FOR IEC STANDARDS

IEC standardization developments for AC energy meters

Standards create common rules for all the players in the power industry: manufacturers, utilities, and consumers. For that reason, they are of great benefit for the entire sector, as long as there are common ways to prove the compliance of the equipment to the standards themselves. Standards can apply nationally or internationally, depending on the specific needs, but in both cases, they ensure quicker introduction of innovative technologies, while increasing safety for society.

IEC Technical Committee TC13 deals with standardization in the field of electrical energy measurement and control, for smart metering equipment and systems forming part of smart grids. Those components, initially installed in few selected points, are nowadays pervading

the whole electrical grid, being used in power stations, along the feeders and at energy users and producers. Since one of the aims of TC13 is also to prepare international standards for meter test equipment and testing methods, KEMA Labs is heavily contributing to this TC13 technical committee, participating in several working groups. Due to the quick evolution, during the last decade several standards have been revised and new sections have been introduced to cover the increasing smart metering developments:

- In 2015, the IEC 62052-31 was introduced for product safety.
- In 2020, a major step was taken, new versions of the IEC product standards for energy meters were published: the IEC 62052-11, IEC 62053-21, -22, -23, and -24.

National legalization bodies, utilities and manufacturers are expected to adapt to these new product standards starting in 2022.

Your trusted partner for IEC testing and certification

KEMA Labs, a third-party accredited laboratory with experience and knowledge of the market, is well-positioned to help clients navigate the complex requirements of the latest versions of the relevant industry standards for energy meters:

- KEMA Labs adapted to the new 2020 standards (IEC 62052-11, IEC 62053-21, -22, -23, and -24) by implementing new test procedures or revising existing test procedures and methods.
- Next to this, KEMA Labs also implemented the product safety standard IEC 62052-31 with state-of-the-art facilities for switch endurance testing at different power factors and switch short circuit testing up to 10.000 A, single fault testing, and safety assessment.
- For the clock and timing accuracy tests our laboratory has access to a GPS time synchronization network with PPS, IRIG-B and PTP.

In summary our expertise can help manufacturers ensure the performance, accuracy, safety and reliability of their energy meters, giving consumers peace of mind that they are using safe and reliable products.

KEMA Labs can perform testing and certification of energy meters according to the following IEC standards:

- **IEC 62052-11** – General requirements, tests and test conditions –Part 11: Metering equipment
- **IEC 62052-31** – General requirements, tests and test conditions - Part 31: Product safety requirements and tests
- **IEC 62053-11/21/22/23/24** – Particular requirements
- **IEC 62052-21** – General requirements, tests and test conditions - Part 21: Tariff and load control equipment
- **IEC 62054-21** – Particular requirements for time switches
- **IEC 62055-31** – Payment systems - Particular requirements
- **IEC 62059-31-1** – Dependability - Accelerated reliability testing - Elevated temperature and humidity

KEMA Labs can also offer testing services for the following IEC standards:

- **IEC 62059-32-1** – Dependability - Testing of the stability of metrological characteristics by applying elevated temperature
- **IEC 62059-41** – Dependability - Reliability prediction



CERTIFICATION FOR OIML R46 STANDARD

OIML requirements and organization

The International Organisation for Legal Metrology (OIML) is an intergovernmental organization that develops international standards to ensure the accuracy and reliability of measuring instruments worldwide. Founded in 1955, OIML works to promote global harmonization of legal metrology procedures and practices. Its recommendation, OIML R46, focuses specifically on active electrical energy meters, setting out requirements that facilitate their acceptance and market access on a global scale. By adhering to these standards, manufacturers can ensure their products meet the necessary criteria for international distribution and compliance.

Market access requirement

OIML R46 certification is essential for obtaining official approval at the national level in several Asian and Pacific countries. Testing your electricity meter according to

OIML R46 requirements can save both time and costs. The OIML R46 document meets the requirements of various local markets, particularly outside Europe, such as in Asia-Pacific regions and Latin American countries. A KEMA Labs Type Evaluation Report and OIML Certificate according to OIML R46 will facilitate easier market access by combining all relevant OIML, IEC, and EN standards, creating an optimal acceptance package for your meter.

Your trusted partner for OIML testing and certification

As an **OIML Issuing Authority and approved Test Laboratory**, KEMA Labs is now fully authorized to help you during the entire certification process of your energy meter according to OIML R46 standard.

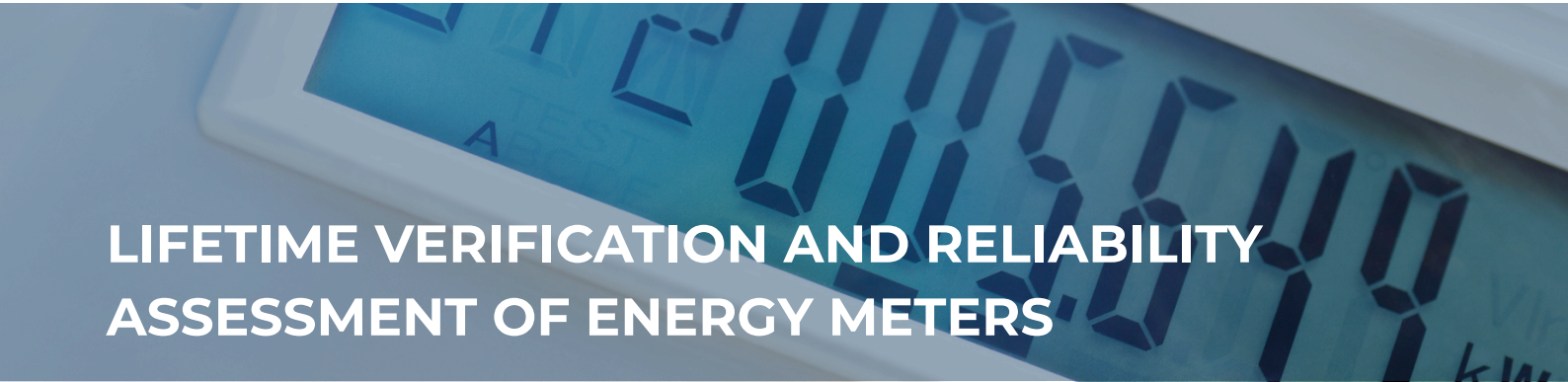
As a result, KEMA Labs can issue the following deliverables:

- OIML Certificates under ISO/IEC 17065 accreditation (product certification), and

- OIML Type Evaluation Reports under ISO/IEC 17025 accreditation (testing and calibration laboratories).

In summary, KEMA Labs testing and certification services help you save time and money by bridging requirements in

local markets, facilitating global market access. With our state-of-the-art facilities and experienced engineers, we ensure the shortest lead times, including a fast-track option for urgent needs and/or tight deadlines.



LIFETIME VERIFICATION AND RELIABILITY ASSESSMENT OF ENERGY METERS

Accelerated reliability testing based on IEC 62059-31-1

The IEC 62059-31-1 standard defines a test method for accelerated reliability testing to estimate the expected lifetime of an energy meter using Weibull statistical analysis. However, this method is highly time-consuming and therefore impractical for both manufacturers and third-party laboratories.

To address this, KEMA Labs has developed a practical and scientifically grounded test protocol based on IEC 62059-31-1:2008. This adapted method provides a reliable approach to evaluate whether, under the ageing conditions defined in the standard, an energy meter type achieves a specified

lifetime (Y years) with a failure rate ($F\%$) at a given confidence level ($CL\%$). In total, 150 samples are tested in five batches of 30 meters, each exposed to different temperature and humidity conditions.

•Example: the test can verify whether an energy meter meets a lifetime of 15 years with a 5% failure rate at a 50% confidence level, under defined ambient temperature conditions.

In summary, the KEMA Labs proprietary test protocol—derived from IEC 62059-31-1—does not aim to determine the actual lifetime of an energy meter. Instead, it aims to demonstrate compliance with a target lifetime (e.g., 15 years). The IEC 62059-31-1 method is applied only to calculate a shortened test duration, aligned with the manufacturer's declared lifetime, thereby reducing total test time from months to weeks.

This protocol can be offered in two ways:

- **Option 1 – Inspection Service:** The manufacturer prepares the test setup, while a KEMA Labs Inspector supervises the testing process, verifies the setup and results, and issues the final report.
- **Option 2 – Laboratory Testing Service:** KEMA Labs takes full responsibility for the test setup preparation, test execution, and final reporting, providing a complete end-to-end testing solution.

Stability of metrological characteristics at elevated temperature (1000 h) according to IEC 62059-32-1

KEMA Labs offers testing of energy meters according to IEC 62059-32-1. IEC 62059-32-1 provides a method to evaluate one important aspect of durability, the stability of metrology

characteristics, by operating a test specimen at the upper limit of the specified operating ranges of temperature, voltage and current for a period of 1000 hours.

Reliability prediction according to IEC 62059-41

KEMA Labs offers review services and certification services for energy meters in accordance with IEC 62059-41. The meter manufacturer is responsible for providing a reliability report that complies with the requirements of IEC 62059-41. KEMA Labs will review this report, specifically focusing on the elements outlined in Clause 6.6 of the standard.

- **Remark:** please note that KEMA Labs does not perform the reliability calculations ourselves; our role is to assess whether the manufacturer's report meets the standard's requirements. Based on this review, we can issue a KEMA Type Evaluation Report.

The manufacturer's report will be incorporated into the KEMA Type Evaluation Report, supplemented with photographs of the meter.

Technology, Expertise and long-standing legacy for the Energy Sector

KEMA Labs

CESI Group

CESI S.p.a.

Via Rubattino 54
20134
Milan, Italy

IPH Institut "Prüffeld für elektrische Hochleistungstechnik" GmbH

Landsberger Allee 378
12681 Berlin
Germany

KEMA B.V.

Klingelbeekseweg 195
6812 Arnhem
The Netherlands

KEMA Powertest LLC

County Line Road 4379
Chalfont, PA, 18914
United States

FGH Engineering and Test GmbH

Hallenweg 40
68219 Mannheim
Germany

Zkušebnictví, a. s.,

Podnikatelská 547
190 11
Prague 9 – Běchovice
Czech Republic