

# How accurate are energy meters?

The relevance of energy meter testing is taken too lightly in the energy management community. The complexities of modern meters, which include the simultaneous measurement and recording of power quality, communications, tariffs and billing, have increased the importance of meter testing to ensure that manufacturers, utilities and end users get top quality products.

"The activity of metering plays a significant role in consumer satisfaction, revenue protection, quality control, compliance with regulatory requirements and image building," says Sydney Mabalayo, Marketing Manager of SPM Metering Services, a company who specialises in electricity meter test equipment.

"Poor quality meters, which are widely available on the market, have increased the importance of the meter testing," says Mabalayo, before explaining that energy meters from all over the world are being tested at several places in the supply chain before they reach consumers. "Taking a look at when, why and how the meters are tested, is an important exercise in understanding meter testing in the energy management arena."

## The meter testing supply chain

Energy meters are being tested in laboratories by manufacturers before shipping to utilities, and by utilities before the meters get installed. Challenges of this step include the proper testing of a large number of meters in a short amount of time. "It can also be difficult to test new meter designs, which includes testing or verification of complex features. Maintaining the in-house legal metrology system, without removing the reference standard from the bench," says Mabalayo.



On-site meter testing is also becoming increasingly important for electric utilities around the world. The reasons are to assure revenue, comply with regulations and improve customer satisfaction – all of which are based primarily on the correct recording of energy consumption.

"The correctness of energy recording is in turn dependent on the meters' instrument transformers. On-site testing methods are mainly influenced by access to the meter site – in Asian countries, for example, access to the meter and removal of the meter connections are difficult and restricted to certain authorities to prevent energy theft. On-site testing isn't legally accepted in every country," says Mabalayo.

## Standards for meter testing

The tests, test conditions and acceptance criteria for meter testing in the laboratory according to meter type and accuracy class are defined by the IEC 62052-11, IEC 62053.11, 21, 22, 23 and EN50470 series. While many countries have adopted the IEC standards as is, some have modified them to suit local conditions. Examples are the Indian standards IS 13779 and 14697.

There is currently no international standard for such testing on-site testing. Generally, the same limit defined for laboratory testing is used. In Australia, for example, a class 0.5 meter should have a 0.7% limit for on-site testing. In Kenya a 3% error is allowed for class 2 electromechanical meters and a +2.5% to -3.5% error is allowed for class 2 meters in Hong Kong.

"Various initiatives are under way to define the tests and test conditions. Among these are the Italian Standard, which is in draft stage and which defines the testing of various metering standards, and the German Standard, which is also in draft stage, that is specially designated for on-site testing and testing equipment."

## New trends in meter testing

New test benches in laboratories are being designed to offer a high degree of process automation, such as automatic handling and connection of meters, pulse  $V_0$  testing ( $V_0$  is the initial storage network output voltage), adjustment, parameterisation and other functional testing.

On-site meter testing has also been expanded beyond simple accuracy testing to include analysis such as connection checking and harmonic analysis to investigate whether problems are being caused by the consumer or the network, amongst other innovative testing solutions.

Why manufacturers and utilities need meter testing  
Meter testing can provide a significant value addition for both manufacturers and utilities. "The major long-term beneficiary will be the electrical utilities, provided that they integrate this activity properly and systematically in their distribution management system," says Mabalayo.

## Meter testing at utilities offers the following advantages:

- Statistical evaluation of different types of meters, brands and performance.
- Qualitative feedback for future procurements.
- Detection of theft.
- Screening of a particular area or zone so that the surveillance frequency of the zone can be increased or decreased.
- Minimising customer complaints and legal challenges, and image building.

SPM Metering System, a subsidiary of Southern Power Maintenance, whose major clients include Eskom, City Power, Zest and Rotek Engineering, distributes ZERA GmbH products for accurate meter testing. ZERA has over 90 years of experience in the manufacturing of meter and instrument transformer testing equipment and the company specialises in equipment used for on-site and laboratory testing.

"By pursuing and maintaining a commitment to excellence in service, our major customers have shown continuous confidence in us through consistent renewal of long-term contracts and association," concludes Mabalayo.

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