![Eskom logo]

Metering Reliability Research in Eskom

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The common denominator is the *need to protect substantial investment* in solid-state electricity meters, particularly prepayment meters of which over 4 million units are currently installed.

Other drivers are:

- Eskom's revenue depends on the *long-term performance* of metering equipment, it is therefore necessary to understand their lifetime characteristics (e.g. life expectancy)

- Need for a means to monitor meter field performance to ensure purchase specification compliments field environment

A number of research initiatives have been undertaken in this area over the past 15 years, for the sake of relevance and time this presentation will discuss only the following:

- Development In-House **Accelerated Life Test Procedure** and Test Facility

- Development of a **Meter Obsolescence Planning Tool**

- Traditionally referred to as Eskom ALT however formal name is "Accelerated Environment Stress Test Procedure for Electricity Metering Equipment"

- Does <u>NOT</u> demonstrate life expectancy but identifies *meter design limitations, inadequate quality control* and *manufacturing process problems*

- Addresses need for continued evaluation of new products or existing products which have undergone significant *design and/or manufacturing process and/or component sourcing changes*

- It has since been listed in purchase specification by several African utilities and adopted by South African based meter manufacturers as part of their design verification test regime

Sampling: A batch of meters (typically 24) is sampled from the production line (Note: At times manufacturers submit prototypes for testing in which case sampling is disregarded)

Pre-Qualifying Test: The meter is visually inspected and fictionally tested (including accuracy tests)
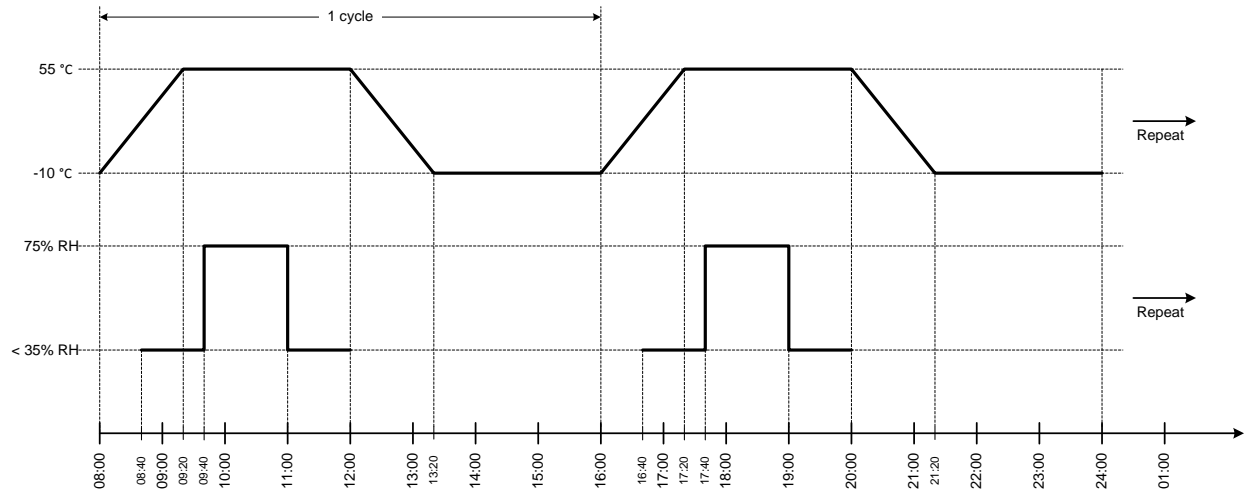
Vibration & Drop Test: The meters are subjected to random vibration and a number of drops (this is simulate transportation and handling condition in the field)

Post-Vibration & Drop Test: Same as Pre-Qualifying Test. Asses impact of Vibration & Drop Test on meter performance.
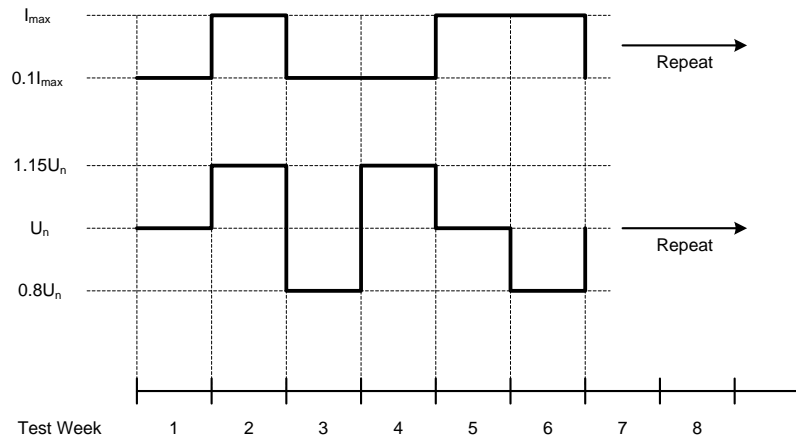
Stress Test: Meters are installed inside an environmental chamber and exposed to temperature/humidity cycling while energized with current and voltage. During the test the meters are removed from the chamber and exposed to EMC phenomena (e.g. lightning surge, switching transients, electrostatic discharge, etc.)

Post-Stress Test: Same as Pre-Qualifying Test. Asses impact of Stress Test on meter performance.

Daily Temperature & Humidity Profile

1 cycle

55 °C

-10 °C

75% RH

< 35% RH

Repeat

Repeat

08:00 08:40 09:00 09:20 09:40 10:00 11:00 12:00 13:00 13:20 14:00 15:00 16:00 16:40 17:00 17:20 17:40 18:00 19:00 20:00 21:00 21:20 22:00 23:00 24:00 01:00

Weekly Voltage & Current Profile

I_{max}

$0.1I_{max}$

Repeat

$1.15U_n$

U_n

$0.8U_n$

Repeat

Test Week   1   2   3   4   5   6   7   8

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Microsoft Excel tool developed to provide technical means to motivate for the replacement/rehabilitation of a meter population based on non-compliance to IEC/SABS/Eskom standards and specifications. The tool relies on field data generated through the application of:

- A statistical sampling procedure

- An in-situ meter test procedure

Thank you