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| blue%20tiff | **2 CD OIML R 46-4**  Date: **13 Nov 2024**  Reference number: **TC12\_p1\_N073**  Supersedes document: TC12\_p1\_N058 |
| OIML TC 12 Instruments for measuring electrical quantities  Secretariat/Convenor: Phillip Mitchell, Australia  Email: [Phillip.mitchell@measurement.gov.au](mailto:Phillip.mitchell@measurement.gov.au) | Circulated to P- and O-members and liaison bodies and external organisations for:   |  |  |  | | --- | --- | --- | | |  | | --- | | X | | Discussion at meeting in March 2025 | |  |  | | |  | | --- | |  | |  | |  |  | | |  | | --- | | X | | Vote (P-members only) and comments by 20 February 2025 | |
| TITLE OF THE CD (English):  OIML R 46-4  **Electricity Meters – Alternating Current (a.c.)**  Part 4: Evaluation report format | |

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Foreword

[To be added]

Explanatory Notes

Meaning of symbols used in this report

|  |  |  |
| --- | --- | --- |
| base m.p.e | = | base maximum permissible error |
| *f*nom | = | nominal frequency |
| *U*nom | = | nominal voltage |
| *I*max | = | maximum current |
| *I*tr | = | transitional current |
| *I*min | = | minimum current |
| *I*st | = | starting current |
| H1 | = | humidity class 1: enclosed locations where the instruments are not subjected to condensed water, precipitation, or ice formations |
| H2 | = | humidity class 2: enclosed locations where the instruments may be subjected to condensed water, to water from sources other than rain and to ice formations. |
| H3 | = | humidity class 3: open locations with average climatic conditions |

# Information

## Meter information

Manufacturer and type

|  |  |
| --- | --- |
| Meter manufacturer: |  |
| Meter type (model designation): |  |

## Meter specification

Accuracy and measured quantities

**Active electrical energy**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy class: |  |  | A / 2 |  | B / 1 |  | C / 0.5 |  | D / 0.2 |  | E / 0.1 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | Demand |  | Fundamental frequency only |

**Apparent electrical energy**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy class: |  |  | A / 2 |  | B / 1 |  | C / 0.5 |  | D / 0.2 |  | E / 0.1 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | Demand |  | Fundamental frequency only |

**Reactive**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Accuracy class: |  |  | A / 2 |  | B / 1 |  | C / 0.5 |  | D / 0.2 |  | E / 0.1 |

|  |  |  |
| --- | --- | --- |
|  |  | Demand |

Electrical parameters

|  |  |  |
| --- | --- | --- |
| Nominal frequency, *f*nom: |  | Hz |
| Nominal voltage, *U*nom: |  | V |
| Maximum current, *I*max: |  | A |
| Transitional current, *I*tr: |  | A |
| Minimum current, *I*min: |  | A |
| Starting current, *I*st: |  | A |

Environment

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Lower specified temperature: |  |  | −55 °C |  | −40 °C |  | −25 °C |  | −10 °C |  | +5 °C |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Upper specified temperature: |  |  | +30 °C |  | +40 °C |  | +55 °C |  | +70 °C |  | +85 °C |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Humidity class: |  |  | H1 |  | H2 |  | H3 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| For use: |  |  | Outdoor |  | Indoor use only |

Connection mode(s)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | Direct-connected |  | Current transformer |  | Current and voltage transformers |

|  |  |
| --- | --- |
| Phases, wires, elements: |  |

Direction of energy flow and load balance

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | Single-register, bi-directional |  | Single-register, positive direction only |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | Two-register, bi-directional |  | Single-register, uni-directional |

For bi-directional and poly-phase meters:

|  |  |  |
| --- | --- | --- |
|  |  | Concurrent flow of current in the positive and negative directions on different phases |

Testability

|  |  |  |
| --- | --- | --- |
| Meter constant, active energy: |  | *(include units of measurement)* |
| Meter constant, reactive energy: |  | *(include units of measurement)* |
| Meter constant, apparent energy: |  | *(include units of measurement)* |

Number of pulses to ensure a standard deviation of measurement less than 0.1 base m.p.e.:

|  |  |
| --- | --- |
| at maximum current, *I*max: |  |
| at transitional current, *I*tr: |  |
| at minimum current, *I*min: |  |

Interval meter

|  |  |
| --- | --- |
| Interval data storage capability: |  |

Internal clock

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Clock type(s): |  |  | Synchronous |  | Crystal-controlled |

Hardware and software

|  |  |  |
| --- | --- | --- |
| Hardware version(s): |  | |
| Software version(s): |  | |
| Sensitive frequencies[[1]](#footnote-1): |  | *(include units of measurement)* |

Auxiliary devices

Provide information about any auxiliary devices

|  |
| --- |
|  |

Remarks

|  |
| --- |
|  |

# Units and current

|  |  |  |  |
| --- | --- | --- | --- |
| Requirements | Passed | Failed | Remarks |
| Units of measurement (OIML R 46-1, 5.1) | | | |
| Valid units for active energy: Wh, kWh, MWh, GWh |  |  |  |
| Valid units for reactive energy: varh, kvarh, Mvarh, Gvarh |  |  |  |
| Valid units for apparent energy: VAh, kVAh, MVAh, GVAh |  |  |  |
| For demand meters, the units of measurement for demand |  |  |  |
| Minimum current ratios (OIML R 46-1, 6.1.4; Table 1; Table 2) | | | |
| Check *I*max/*I*tr ratio complies |  |  |  |
| Check *I*max/*I*min ratio complies |  |  |  |
| Check *I*max/*I*st ratio complies |  |  |  |

# Metrological requirements

## Accuracy requirements

The meter has been tested for accuracy requirements:

|  |  |  |  |
| --- | --- | --- | --- |
| Accuracy requirements (OIML R 46-1, 6.2) | Passed | Failed | Remarks |
| Base maximum permissible errors: for all applicable measurement quantities and directions |  |  |  |
| No load |  |  |  |
| Starting current |  |  |  |

## Influence factors

The meter has been tested for the allowed effects of influence factors:

|  |  |  |  |
| --- | --- | --- | --- |
| Influence factors (OIML R 46-1, 6.3) | Passed | Failed | Remarks |
| Temperature; temperature dependence |  |  |  |
| Self-heating |  |  |  |
| Load balance |  |  |  |
| Voltage variation |  |  |  |
| Frequency variation |  |  |  |
| Harmonics in voltage and current circuits |  |  |  |
| Integral cycle load control test |  |  |  |
| Odd harmonics in the current circuit |  |  |  |
| High-order harmonics |  |  |  |
| DC in the AC current circuit |  |  |  |
| Reversed phase sequence |  |  |  |
| Magnetic field (AC, power frequency) of external origin; 400 A/m |  |  |  |
| Radiated, RF, electromagnetic fields; with current |  |  |  |
| Conducted disturbances, induced by radio frequency fields |  |  |  |
| Fast load current variation |  |  |  |

## Disturbances

The meter has been tested for the allowed effects of disturbances:

|  |  |  |  |
| --- | --- | --- | --- |
| Disturbances (OIML R 46-1, 6.4) | Passed | Failed | Remarks |
| Magnetic field (AC, power frequency) of external origin |  |  |  |
| Electrostatic discharges |  |  |  |
| Fast transients |  |  |  |
| Severe voltage variations |  |  |  |
| One or two phases interrupted |  |  |  |
| Continuous (DC) magnetic induction of external origin |  |  |  |
| Voltage dips and short interruptions on AC power supply |  |  |  |
| Voltage dips and short interruptions on DC power supply |  |  |  |
| Radiated, RF, electromagnetic fields |  |  |  |
| Surges on AC mains power lines |  |  |  |
| Damped oscillatory waves immunity test |  |  |  |
| Short-time overcurrent |  |  |  |
| Impulse voltage |  |  |  |
| Earth fault |  |  |  |
| Operation of auxiliary devices |  |  |  |
| Vibration |  |  |  |
| Shock |  |  |  |
| Protection against solar radiation |  |  |  |
| Dry heat |  |  |  |
| Cold |  |  |  |
| Damp Heat |  |  |  |
| Durability |  |  |  |
| Ring wave |  |  |  |
| Differential mode current disturbances (2-150 kHz) |  |  |  |

# Technical requirements

## Meter markings

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Marking requirements (OIML R 46-1, 7.1.1) | | Passed | Failed | | Remarks |
| Markings are indelible, distinct and legible from outside the meter | |  |  | |  |
| Serial number is affixed in a position that is not readily disassociated from the meter | |  |  | |  |
| Meter markings | | | | | |
| All meters (OIML R 46-1, 7.1.2) | Marked on meter? | | | Remarks | |
| 1. Manufacturer |  | | |  | |
| 1. Manufacturer address |  | | |  | |
| 1. *U*nom |  | | |  | |
| 1. *I*max |  | | |  | |
| 1. *I*tr |  | | |  | |
| 1. *I*min |  | | |  | |
| 1. *I*st |  | | |  | |
| 1. Approval mark(s) |  | | |  | |
| 1. Serial number |  | | |  | |
| 1. Number of phases |  | | |  | |
| 1. Number of wires |  | | |  | |
| 1. Register multiplier (if other than unity) |  | | |  | |
| 1. Meter constant(s) |  | | |  | |
| 1. Year of manufacture |  | | |  | |
| 1. Accuracy class |  | | |  | |
| 1. Directionality of energy flow |  | | |  | |
| 1. Meter type (model designation) |  | | |  | |
| 1. Temperature range |  | | |  | |
| 1. Humidity and water protection information |  | | |  | |
| 1. Impulse voltage protection information |  | | |  | |
| 1. *f*nom |  | | |  | |
| 1. The connection mode(s) for which the meter is specified |  | | |  | |
| 1. Connection terminals uniquely identified to distinguish between terminals |  | | |  | |
| Demand meters (OIML R 46-1, 7.1.3) | Marked on meter? | | | Remarks | |
| 1. Response period or demand interval |  | | |  | |
| 1. Update interval (if applicable) |  | | |  | |
| 1. Maximum demand rating |  | | |  | |
| 1. All information essential for determination of the demand from the meter indication. |  | | |  | |
| 1. For primary rated meters: 2. Current transformer rating, e.g. CT 100-5 A 3. Voltage transformer rating, e.g. VT |  | | |  | |
| Multi-part meters | | | | | |
| Markings on measurement modules (OIML R 46-1, 7.1.4.1) | Marked on meter? | | | Remarks | |
| 1. Manufacturer |  | | |  | |
| 1. *U*nom |  | | |  | |
| 1. *I*max |  | | |  | |
| 1. *I*tr |  | | |  | |
| 1. Type approval mark(s) |  | | |  | |
| 1. Serial number |  | | |  | |
| 1. Number of phases |  | | |  | |
| 1. Number of wires |  | | |  | |
| 1. Register multiplier (if other than unity) |  | | |  | |
| 1. Meter constant(s) |  | | |  | |
| 1. Year of manufacturer |  | | |  | |
| 1. Accuracy class |  | | |  | |
| 1. Meter type (model designation) |  | | |  | |
| 1. *f*nom |  | | |  | |
| 1. The connection mode(s) for which the meter is specified |  | | |  | |
| 1. Connection terminals uniquely identified to distinguish between terminals |  | | |  | |
| Markings on external indicating devices (OIML R 46-1, 7.1.4.2) | Marked on meter? | | | Remarks | |
| 1. Manufacturer (name or brand) |  | | |  | |
| 1. Serial number |  | | |  | |
| 1. Year of manufacturer |  | | |  | |
| 1. Model designation |  | | |  | |
| 1. *f*nom |  | | |  | |
| 1. *U*nom |  | | |  | |
| 1. Type approval mark |  | | |  | |
| Markings on other metrologically relevant parts (OIML R 46-1, 7.1.4.3) | Marked on meter? | | | Remarks | |
| 1. Manufacturer |  | | |  | |
| 1. *U*nom |  | | |  | |
| 1. Approval mark(s) |  | | |  | |
| 1. Serial number |  | | |  | |
| 1. Year of manufacturer |  | | |  | |
| 1. Meter type (model designation) |  | | |  | |
| 1. *f*nom |  | | |  | |

## Metrological seals

|  |
| --- |
| Describe the physical metrological seals. Include how they seal the meter case, and connection terminals of the transformers including LPITs, both at the meter and at the LPIT end |
|  |

|  |  |  |  |
| --- | --- | --- | --- |
| Requirements for metrological seals (OIML R 46-1, 7.2) | Passed | Failed | Remarks |
| Meter case has means for applying a metrology seal(s) |  |  |  |
| The connection terminals of the transformers including LPITs, both at the meter and at the LPIT end, have means for being sealed with a metrology seal. |  |  |  |
| For multi-part meters, every part is sealed |  |  |  |
| For demand meters, the demand reset device is sealed |  |  |  |

## Evaluation of software-controlled meters

|  |
| --- |
| Describe the software and indicate the version of the software present at the time of testing, and how to identify the software version |
|  |

|  |  |  |  |
| --- | --- | --- | --- |
| Requirements for software-controlled meters (OIML R 46-1, Annex 7.3) | Validation Description | Passed | Failed |
| Software identification (7.3.2.1) |  |  |  |
| Correctness of metrological algorithms and functions (OIML R 46-1, 7.3.2.2) |  |  |  |
| Software securing and protection (OIML R 46-1, 7.3.2.3) |  |  |  |
| Audit trails (OIML R 46-1, 7.3.2.4) |  |  |  |
| Prevention of misuse (OIML R 46-1, 7.3.2.5) |  |  |  |
| Support of fault and defect detection (OIML R 46-1, 7.3.2.6) |  |  |  |
| Shared indications (OIML R 46-1, 7.3.3.1.4) |  |  |  |
| Protection of stored data (OIML R 46-1, 7.3.3.3.2) |  |  |  |
| Automatic storage (OIML R 46-1, 7.3.3.3.3) |  |  |  |
| Deletion of stored data (OIML R 46-1, 7.3.3.3.4) |  |  |  |
| Protection of transmitted data (OIML R 46-1, 7.3.3.4.2) |  |  |  |
| Transmission delay or interruption (OIML R 46-1, 7.3.3.4.3) |  |  |  |
| Indications from dynamic modules of legally relevant software (OIML R 46-1, 7.3.3.5) |  |  |  |

## Readability of result

|  |
| --- |
| Describe the indicating device(s) including the type (electronic or mechanical), all relevant measurement data displayed, display format, and instructions on how to use it. |
|  |

|  |  |  |  |
| --- | --- | --- | --- |
| Requirements for readability of result (OIML R 46-1, 7.4.1) | Passed | Failed | Remarks |
| The meter has one (or more) indicating device(s) |  |  |  |
| The indicating device is easy to read. |  |  |  |
| The characters of measurement results are at least 4 mm high. |  |  |  |
| Any decimal fractions are clearly indicated |  |  |  |
| For mechanical registers, any decimal fraction drum is marked differently. |  |  |  |
| The indicating device is able to display all data relevant for billing purposes. |  |  |  |
| It is possible to display the content of all relevant memories. |  |  |  |
| For automatic sequencing displays, each display of register for billing purposes is retained for a minimum of 5 s. |  |  |  |
| For multi-tariff meters, the register which reflects the active tariff is indicated |  |  |  |
| It is possible to read each tariff register locally and each register is clearly identified. |  |  |  |
| Electronic registers are non-volatile so that they retain stored values upon loss of power. Stored values shall not be overwritten and shall be capable of being retrieved upon restoration of power. |  |  |  |
| The register is capable of storing and displaying an amount of energy that corresponds to the meter running at *P* = *U*nom ×*I*max ×*n* for at least 4000 h, where *n* is the number of phases. This capability for storage and display applies to all registers relevant for billing including positive and negative flow registers for bi-directional meters and tariff registers for multi-tariff meters. |  |  |  |
| In the case of electronic registers, the minimum retention time for results is one year for a disconnected meter. |  |  |  |
| Electronic indicating devices have a display test that switches all the display segments on then off for the purpose of determining whether all display segments are working. |  |  |  |

## Test output

|  |
| --- |
| Describe the test output(s). |
|  |

|  |  |  |  |
| --- | --- | --- | --- |
| Requirements for test output (OIML R 46-1, 7.4.2.1) | Passed | Failed | Remarks |
| The meter is equipped with a test output for efficient testing |  |  |  |
| The wavelength of radiated signals is between 550 nm to 1000 nm. |  |  |  |
| The radiation strength *E*T complies with limits at on and off conditions (see OIML R 46-1, 7.4.2.1) |  |  |  |

Testing for meter constants:

|  |  |  |  |
| --- | --- | --- | --- |
| Meter constant(s) (OIML R 46-1, 7.4.2.1) | Passed | Failed | Remarks |
| The relation between the measured energy given by the test output and the measured energy given by the indicating device complies with the meter constant marking on the name-plate. |  |  |  |
| If the meter is capable of supporting multiple meters constants, or a range of meter constants, all shall correctly express the relation between the measured energy given by the test output and the measured energy given by the indicating device. |  |  |  |

## Test mode for demand meters

|  |
| --- |
| Describe the test mode(s). |
|  |

|  |  |  |  |
| --- | --- | --- | --- |
| Requirements for demand meters equipped with a test mode (OIML R 46-1, 7.4.2.2) | Passed | Failed | Remarks |
| 1. The meter is designed to ensure there are no internal or external factors which can cause a difference between the measured values obtained via the test mode and normal operating modes. |  |  |  |
| 1. The error differential between the test results in normal mode and those in test mode do not exceed 0.2 %. |  |  |  |

## Test provisions for multi-tariff meters and interval meters

|  |
| --- |
| Describe the test provisions for multi-tariff meters and interval meters, including:   1. Procedures to enable and disable the test function (if applicable). 2. Minimum period between synchronization pulses that can be programmed. 3. Typical rising/falling time of the edges of the synchronization pulses. 4. The time interval for compensation of the time indication (if any) by the meter’s time base. 5. Minimum time required for the meter to be connected to mains supply, for operation reserve to be fully available. |
|  |

|  |  |  |  |
| --- | --- | --- | --- |
| Requirements for Test provisions (OIML R 46-1, 7.4.2.3) | Passed | Failed | Remarks |
| The test provisions have the required functionality:   1. The meter continuously displays time indication on the indicating device (date and time with 1 s resolution) 2. The meter emits light pulses, in accordance with the time indication, with a programmable time interval. 3. After tests, the meter emits pulse and displays the time indication without loss of measurement time. |  |  |  |
| If the required functionality is achieved via a test function:   1. The test function does not interrupt energy measurement. If the test output is used to emit the time synchronization pulses, the metrological energy pulses does not interfere with the time pulses. 2. If a power supply interruption occurs, when power supply is restored the test function must be restored. It is admissible that the meter turns off and stops emitting synchronization pulses during the power supply interruption, however, the time indication and synchronization pulses must be restored when the power supply is restored. 3. The test function must be automatically disabled after a predefined time interval (48 h is recommended.) It must also be possible to manually disable the test function. |  |  |  |
| The optical time synchronization pulses meet the requirements of Annex A of IEC 62052-11 with the following additional specification: The ON period (tON) of the time synchronization pulse must be greater than 10 ms and less than 100 ms. |  |  |  |

## Direction of energy flow

|  |
| --- |
| Describe the category of meter specifying the kinds of registers and capability to measure energy in different directions. Also specify how the polarity of energy flow is defined by the manufacturer’s connection instructions. |
|  |

|  |  |  |  |
| --- | --- | --- | --- |
| Requirements for direction of energy flow (OIML R 46-1, 7.6) | Passed | Failed | Remarks |
| For bi-directional meters, energy registration occurs in the correct register when the direction of flow changes (OIML R 46-1, 7.6.1) |  |  |  |
| For apparent energy meters, apparent registration occurs correctly and in the correct register (OIML R 46-1, 7.6.2) |  |  |  |

## Demand meters

|  |
| --- |
| Describe any demand meter functionality and capabilities. |
|  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Requirements for demand meters (OIML R 46-1, clause 7.7) | | Passed | Failed | Remarks |
| Maximum demand register (7.7.1) | The meter has a maximum demand register that operates correctly and is able to be displayed. |  |  |  |
| The maximum demand register is able to be displayed on the meter. |  |  |  |
| Maximum demand reset device (7.7.2) | The meter has a maximum demand reset device that operates correctly. |  |  |  |
| The maximum demand reset device is protected from unauthorised modification or resetting |  |  |  |
| Demand interval (7.7.3) | Demand intervals do not deviate from the nominal demand interval by more than 0.2 % |  |  |  |
| Demand interval indication (7.7.4) | The meter has a demand interval indication that operates correctly. |  |  |  |
| Demand interval changes (7.7.5) | Demand meters comply with the demand interval changes requirements. |  |  |  |
| Calculation of demand (7.7.6) | Demand calculation comply with the requirements. |  |  |  |
| Allocation of demand (7.7.7) | Demand quantities are appropriately allocated to demand registers |  |  |  |
| Performance requirements (7.7.8) | All demand values comply with the performance requirements. |  |  |  |

## Additional requirements for multi-tariff meters and interval meters

|  |
| --- |
| Describe any interval data and multi-tariff functionality and capabilities. |
|  |

|  |  |  |  |
| --- | --- | --- | --- |
| General requirements for multi-tariff meters and interval meters (OIML R 46-1, 7.8.1) | Passed | Failed | Remarks |
| Capable of displaying local time with a resolution of 1 s |  |  |  |
| The meter’s time indication is adjustable allowing for leap years and seasonal daylight-saving schemes |  |  |  |
| The meter has a device that emits periodic optical pulses for comparison with an external time reference. |  |  |  |
| Multi-tariff register requirements (OIML R 46-1, 7.8.2) | Passed | Failed | Remarks |
| Energy associated with different tariffs is recorded in different individual registers. |  |  |  |
| The energy stored in each register for billing are indicated and identified on the meter’s indicating device. |  |  |  |
| For the same time interval, the sum of the values of the energy stored in each tariff register is equal to the value of energy stored in the total energy register. |  |  |  |
| The relative difference between the known energy applied to the meter and the corresponding energy presented in the indicating device and stored in the respective register shall not be greater than the base m.p.e. plus the equivalent energy of one pulse of the meter constant. |  |  |  |

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| --- | --- | --- | --- |
| Time indication requirements (OIML R 46-1, 7.8.3 and Table 8) | Passed | Failed | Remarks |
| The meter complies with the time indication requirements for the following characteristics for: | | | |
| Time indication accuracy at reference conditions (including mains supply) |  |  |  |
| Time indication accuracy with operation reserve enabled |  |  |  |
| Temperature influence on time indication accuracy |  |  |  |
| Electromagnetic disturbances influence on time indication accuracy |  |  |  |
| Battery change requirements (OIML R 46-1, 7.8.4) | Passed | Failed | Remarks |
| Meters that allow the exchange of the battery used by operation reserve must allow its change without breaking the metrological sealing marks |  |  |  |
| During battery replacement, the meter must keep the time indication without losing the registration of the time, for up to five minutes, even if a power outage occurs during this process. |  |  |  |

## Requirements for indicating devices

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| Describe the indicating device(s). |
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### General requirements

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| --- | --- | --- | --- |
| General requirements for indicating devices (OIML R 46-1, 7.9.1) | Passed | Failed | Remarks |
| There is one (or more) indicating device(s)  Street light meters do not need to have an indicating device, as long as the information regarding energy consumption can be accessed through a physical device or software. |  |  |  |
| 1. Must be capable of displaying the numerical value of each quantity for which the meter is approved, as well as, the firmware version (for software-controlled meters) |  |  |  |
| 1. Displayed units: 2. Energy: Wh, varh, VAh multiples and submultiples 3. Demand: W, var, VA multiples and submultiples 4. Time: hh:mm:ss format 5. Date: DD/MM/YY or MM/DD/YY according with national authority. |  |  |  |
| 1. Capable of recording the energy corresponding to the maximum current at the highest rated voltage and unity power factor for a minimum of 1150 h. |  |  |  |
| 1. Sufficient digits to meet item c) above |  |  |  |
| 1. In the case of multiple registered values displayed on a single display, the indicating device must show cyclically each register for at least 5 s, with an identification code. |  |  |  |
| 1. Identification code: To exhibit multiple quantities or registers an identification code must be presented to uniquely identify each one of them. 2. The size of quantities and their identifying codes must be defined by national authorities. |  |  |  |
| Transformer-operated meters may display on their respective indicating devices, the quantities on the primary or secondary side of instrument transformers |  |  |  |

### Additional requirements and tests for external indicating devices (IED)

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| --- | --- | --- | --- |
| Additional requirements for external indicating devices (EID) (OIML R 46-1, 7.9.2) | Passed | Failed | Remarks |
| 1. Must be updated at intervals of no more than 1 min, or a time equivalent to the number of screens multiplied by 5 s |  |  |  |
| 1. The information presented by the EID cannot be different from those stored in the meter respecting the update conditions set out in item a) above |  |  |  |
| 1. Must exhibit the following minimal information:    1. Identification of the meter or measurement module (in the case of multi-part meters) from where the information which is displayed comes.    2. Indication of the status update of the quantities exhibited (i.e. date and hour of the last update).    3. Measured quantities and registers as configured by the user. |  |  |  |
| 1. Must be provided with identification of the meter’s type approval. |  |  |  |
| Additional tests for external indicating devices (EID) (OIML R 46-1, 7.9.3) | Passed | Failed | Remarks |
| 1. Dielectric tests (only on the EID). |  |  |  |
| 1. Meter’s internal losses with EID connected (potential circuit and power supply, maximum total loss 6 W and 15 VA). |  |  |  |
| 1. Indicating Device test (within operating temperature limits) |  |  |  |
| 1. Electromagnetic compatibility tests on the display only |  |  |  |
| 1. Test of tariff registers (for multi-tariff meters) |  |  |  |

## Additional requirements for multi-part meters

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| Describe the multi-part meter. |
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| Additional requirements for multi-part meters (OIML R 46-1, 7.10) | Passed | Failed | Remarks |
| Multi-part meters comply with the requirement of (OIML R 46-1, 7.10) | | | |
| Parts of multi-part meters (OIML R 46-1, 7.10.1) |  |  |  |
| Additional requirements for measurement modules (OIML R 46-1, 7.10.2) |  |  |  |
| Additional requirements for management modules (OIML R 46-1, 7.10.3) |  |  |  |
| Indicating device of a multi-part meter (OIML R 46-1, 7.10.4) |  |  |  |
| Test output (OIML R 46-1, 7.10.5) |  |  |  |
| Additional requirements for test modes (OIML R 46-1, 7.10.6) |  |  |  |

# Requirements for kinds of meters

## Multi-branch meters

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| Describe the features and functions of the multi-branch meter. |
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| Requirements for multi-branch meters (OIML R 46-1, Annex A) | Passed | Failed | Remarks |
| For interval meters, the summation of interval data equates to the cumulative register value over the same period |  |  |  |
| For multi-tariff meters, only a single tariff register (in addition to the cumulative register) is active at any time. |  |  |  |
| For multi-tariff meters, the summation of values recorded in each multi-tariff register equates to the value recorded in the cumulative register |  |  |  |

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| Describe the testing of the multi-branch meter. |
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The multi-branch meter has been tested:

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| --- | --- | --- | --- |
| Multi-branch meters (OIML R 46-1, Annex A) | Passed | Failed | Remarks |
| Single-phase connections |  |  |  |
| Three-phase connections. |  |  |  |
| Cross-channel influences |  |  |  |
| Configurations |  |  |  |
| Family of LPITs   1. Determination of initial intrinsic error 2. Starting current 3. Test of no-load condition |  |  |  |

1. As required by OIML R 46-2, clause 2.3.9.1. An example could be clock output frequencies. [↑](#footnote-ref-1)