Australian Government
Department of Industry and Science

National Measurement Institute

Consultation Paper

Approval Standards for Electricity Meters Used for Trade

July 2015

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Introduction

This consultation paper seeks feedback and submissions on the pattern approval requirements for electricity meters. The paper proposes for consideration a draft NMI R 46 based on the International Organisation of Legal Metrology (OIML) recommendation OIML R 46 for electricity meters measuring active energy. The paper also raises issues for consideration. In particular, NMI seeks feedback on the scope of OIML R 46 and other international standards for various meter types and applications.

The Purpose of this Consultation

The purpose of this consultation is to inform the development of options for approval requirements. Following this consultation, NMI proposes to develop a Regulatory Impact Statement (RIS) to analyse the costs and benefits of each option.

This consultation is conducted under the broad proposal that NMI adopt the international recommendation OIML R 46. However, this consultation also raises a number of issues. The responses to these issues will inform the development of various options for the appropriate standard(s) for approval of electricity meters.

Submissions

Submissions should be received by close of business **Friday 7 August 2015** and can be lodged either by:

- emailing your submission with the subject heading “Electricity Meter Consultation” and your company or individual name to the following email address UtilityMetering@measurement.gov.au; or
- mailing your submission with the subject heading “Electricity Meter Consultation” and company or individual name to –

  Legal Metrology Branch
  National Measurement Institute
  PO Box 264
  Lindfield NSW 2070
  Attention: Utility Metering

Background

What is pattern approval?

Pattern approval is the process of assessing the pattern (or design) of an electricity meter to determine its capability to maintain accuracy in the environment in which it will be installed and used for trade. Installation environments typically include influences and disturbances such as temperature changes, electromagnetic fields, electrical disturbances and dust. Smart meters, and other meters where billing is dependent on time are also assessed for their ability to maintain accurate time.

Australian Regulation

On 1 January 2013, electricity meters were brought into the trade measurement system. All electricity meters installed from 1 January 2013 for use for trade, and measuring less than 750 MWh per year, must be pattern approved and verified. NMI introduced these requirements for electricity meters following consultation and regulatory impact analysis[1].

Currently, electricity meters are assessed for pattern approval against the requirements of NMI M 6-1. This is an Australian pattern approval standard developed in consultation with Australian industry. It has been in existence (formerly as NSC M 6) since April 2000.

Most recently, NMI conducted industry consultation on the pattern approval requirements in 2013[2]. The focus of the consultation was on electricity sub metering. Some stakeholders have stated that the pattern approval requirements are difficult to achieve for smaller-sized electricity meters commonly used in sub-metering applications and the installation environment of sub-meters justified different requirements. NMI received 15 submissions. The outcome of the consultation was that there was insufficient justification to have different requirements for sub-meters based on the installation environment.

International Regulation

There are a number of different international standards for electricity meters. The three standards identified as the most widely recognised and relevant for Australia and its major trading partners are discussed here. Recognised predominantly in Europe are a set of International Electrotechnical Commission (IEC) standards that contains approval specifications for

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[1] The Regulation Impact Statement is available here: https://ris.govspace.gov.au/files/2012/12/02-Electricity-Meters-RIS-20121218.pdf

[2] The consultation and submissions is available here: http://www.measurement.gov.au/Pages/Consultation-Paper-on-Amendments-to-the-Pattern-Approval-of-Electricity-Meters.aspx.

electricity meters[3]. In North America, American National Standards Institute (ANSI) C12 standards are widely used and recognised.

The third relevant international standard is OIML R 46. The International Organisation of Legal Metrology (OIML) is an inter-governmental treaty organisation which develops international standards for measuring instruments. Further, as a signatory to the OIML Treaty and under the *National Measurement Act 1960* (Cth), Australia is obliged to adopt OIML standards when setting pattern approval requirements. There are two exceptions. One is where the requirements are not practicable due to particular circumstances in Australia. The other is where it is not in the national interest.

OIML R 46 was finalised and published by OIML in 2012. At that time, NMI understood that all OIML member nations, including Europe and North America, would move to adopt OIML R 46 as the national standard for electricity meters. As of late 2014, NMI understands that Europe will not adopt OIML R 46 as the sole mandatory requirements. Instead, it is understood that Europe will adopt OIML R 46 but also retain the IEC standards. For approval in Europe, industry will have two pathways – either through compliance with the OIML standard or the IEC standards. It is understood that OIML R 46 may be adopted in due course in other countries, but the timeframe and extent of the adoption is unclear.

Proposal to Adopt OIML R 46

This paper proposes for consideration the adoption of OIML R 46 as NMI R 46 in Australia. Please refer to the associated draft document titled "NMI R 46 Active Electrical Energy Meters (DRAFT)". NMI is seeking feedback and submissions on this proposal.

NMI has also produced a document titled: "Information Guide - Details of how OIML R 46 differs from NMI M 6-1" to assist in understanding the requirements of OIML R 46.

There are a number of issues that NMI has identified below. These issues and associated questions consider other international standards. The feedback provided will assist NMI in developing options as part of a regulatory impact statement for approval standards for electricity meters.

Later consultations will consider implementation matters including appropriate timeframes. This consultation aims to seek feedback on the technical content and scope of a proposed NMI R 46 as a pattern approval standard for electricity meters, and, other international standards.

[3] The standards are IEC 62052.11, IEC 62053.21 and IEC 62052.22.

Issues

NMI has identified a number of specific issues for consideration in this consultation. These issues are listed below along with questions.

Note that all verification requirements have been deleted from the draft NMI R 46. Verification requirements are contained in NITP 14. Future revision to the verification requirements will involve a separate consultation process.

Scope

The scope of NMI R 46 applies to electricity meters measuring active energy (kilowatt hours), with a nominal frequency of 50 Hz, and system voltages up to 690 V. The standard is applicable to typical “utility” meters, such as those found in a meter box on the side of a house and includes traditional accumulation meters and advanced meters or smart meters.

The scope also covers a number of other different types of electricity meters and different applications. Some of these are listed below:

- Sub-metering. This metering application may typically be found in shopping centres, office buildings, or multi-tenanted residential buildings. Electricity is supplied to the building or site by a ‘utility meter’, and then the electricity usage of each shop, office, or tenant is measured using a sub-meter.
- DIN-rail mounted metering. A small meter designed be mounted onto a DIN rail and typically used in sub-metering applications.
- Multi-circuit metering. This type of meter has multiple (for example 72) separate current inputs or sensors for measuring energy usage for multiple users. This type of meter is typically used in sub-metering applications.
- Metering for a solar power purchase agreement (SPPA) where a company provides a customer with a solar panel and the electricity generated by the panel.
- Electric vehicle charging stations.
- Individual device metering (e.g.: street lighting and appliance metering).

NMI seeks feedback on the scope and applicability of NMI R 46 to different meter types and applications.

Impulse Voltage Test

A particular issue related to the scope is that of the impulse voltage test.

As noted in the background, it has been stated by some manufacturers that pattern approval is difficult for “small” meters. This is due to the requirements of the impulse voltage test because it is more difficult to provide protection against a voltage impulse in a physically small meter. An example of a small meter is a DIN-rail mounted meter typically used for sub-metering applications.

The IEC standards specify a lower impulse voltage level than in OIML R 46 and the current Australian requirements (NMI M 6-1).

Some manufacturers have obtained approval against the current Australian requirements and NMI understands other manufacturers are investing in order to meet the requirements.

Questions on the scope and impulse voltage test
(1) What is the appropriate scope or applicability of NMI R 46 (and NMI M 6-1) for different metering types or applications in Australia? Please specify and explain why. *(2) Are there other metering types and applications that are not listed under 'Scope' above? If so, please specify.* *(3) Are there any other trusted Australian or international standards that would be appropriate as a pattern approval standard for different metering types or applications in Australia? If so, please specify.* *(4) What are the appropriate impulse voltage requirements for different metering types or applications in Australia? Please specify and explain why.* *(5) As a manufacturer/importer of electricity meters:* *(a) How many electricity meter models do you have approved internationally against a different international standard?* *(b) What additional costs would there be to comply with NMI R 46?*

Temperature

NMI R 46 (Table 1, page 15) provides a range of minimum and maximum temperature values that the manufacturer can select for their meter. Due to the climate in Australia, it is proposed that Australia retains similar temperature requirement to those currently in place under NMI M 6-1. Specifically, it is proposed that the minimum temperature range should be -10 °C to 55 °C. An extract from the proposed NMI R 46 is shown below.

Temperature	From lower temperature limit to upper temperature limit as specified by manufacturer. The manufacturer shall specify the lower temperature limit from the values: –55 ºC, –40 ºC, –25 ºC, –10 ºC~~, +5 ºC~~. The manufacturer shall specify the upper temperature limit from the values: ~~+30 ºC, +40 ºC,~~ +55 ºC, +70 ºC.

Further, NMI is seeking feedback on allowing lower temperature ranges for certain meters or applications such as the following:

- Meters located indoors.
- Higher accuracy class meters.

Questions on temperature
(6) Do you support the proposed minimum temperature range of -10 °C to +55 °C? *(7) Do you support a reduced minimum upper temperature of +40 °C for indoor meters?* *(8) Do you support a reduced minimum upper temperature of +40 °C for meters of accuracy class C and D (corresponding to class 0.5 and class 0.2)?*

Interval Meters and Minimum Storage Requirements

NMI R 46 includes requirements that interval meters store data relevant for billing. Minimum storage periods for this data are left to national authorities to determine.

This storage requirement is for data to be stored on the meter itself. Due to the range of possible uses of the meters (for example, remotely-read or manually-read), NMI proposes that minimum storage periods shall not be specified. Instead, manufacturers shall specify the storage period capabilities of their meters (e.g.: 200 days for 30-minute interval data). These specified storage capabilities shall be listed on the certificates of approval.

NMI is seeking feedback on this proposal.

Question on storage requirements for interval meters
(9) Do you support the proposal of manufacturer-specified storage period capabilities for interval meters in Australia?

Meter Markings

Under the proposed NMI R 46 (clause 3.5), there are some changes to the markings required for pattern approval in Australia. NMI is seeking feedback on the proposed required markings listed below.

- Manufacturer
- U_{nom}
- I_{max}
- I_{tr}
- I_{min}
- Approval mark(s)
- Serial number
- Number of phases
- Number of wires
- Register multiplier (if other than unity)
- Meter constant(s)
- Year of manufacture
- Accuracy class

- Directionality of energy flow if the meter is bidirectional or unidirectional. No marking is required if the meter is capable only of positive direction energy flow.
- Meter type (model designation)
- Temperature range
- Humidity and water protection information
- Impulse voltage protection information
- f_{nom}
- The connection mode(s) for which the meter is specified
- Connection terminals uniquely identified to distinguish between terminals.

Question on storage requirements for interval meters
(10) Do you support all of the proposed mandatory markings? If not, please specify and explain why?

Authorised Access

An issue under the current metrological control system is that of access to metrological parts/parameters of the meter. In particular, at present if a battery is located under the metrological seal, then the meter must be subsequently verified after battery replacement.

Under the proposed NMI R 46 (clause 3.6.1), there is the opportunity for defining and permitting authorised access. For instance, an appropriately authorised person may be permitted to replace batteries without the need for subsequent verification.

Rather than establishing an authorisation system, NMI would like to make use of existing authorised persons if any appropriate systems currently exist.

Questions on authorised access
(11) Are there existing authorisation systems that NMI could utilise to implement authorised access? Please specify. *(12) What other access, besides for battery replacement, should NMI also consider allowing for authorised persons? Please specify.*

Other Issues

There are a number of other differences between NMI M 6-1 and OIML R 46-1. NMI welcomes any other comments on the regulatory impact of these changes, or the practicality and applicability of these requirements in Australia.

Questions on authorised access
(13) Do you have any other comments on the proposed requirements of NMI R 46? Please specify.