NMO Report to Ofgem – Phase 1 (P01467)

NMO's view on the evidence required to demonstrate eligibility of heat meters for the Non Domestic Renewable Heat Incentive (RHI)

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1. Scope of Report

1.1. Taking account of the RHI Regulations (as amended), which make explicit reference to Annexes of the Measuring Instruments Directive (MID) relevant to heat metering (e.g. Class 2 heat meter), this Report seeks to addresses the following questions:

- What evidence would be acceptable to demonstrate the eligibility of a heat meter for the Non Domestic RHI?
- For each type of evidence, which bodies would be appropriate bodies to provide this evidence?
- Specifically for the case of heat meters with externally mounted temperature sensors, which standards could be used to demonstrate the eligibility of the matched pair of temperature sensors component of a heat meter?

1.2. In addition to addressing the questions raised above, this Report also seeks to answer the following specific questions:

- In NMO's expert view as a Notified Body for heat metering, could a heat meter with externally mounted temperature sensors be demonstrated to meet the RHI requirements by reference to testing under standards EN 1434 or OIML R75?
- What possible routes could be used to demonstrate that a heat meter with an externally mounted temperature sensor meets the RHI requirements?
- What would be the particular challenges that NMO thinks a heat meter with external mounted sensors would be facing to demonstrate the RHI requirements (MID Class 2 requirements) for any of the possible routes.
- In NMO's expert view as a Notified Body for heat metering, what is the likelihood for a heat meter with external mounted temperature sensors to demonstrate MID class 2 requirements.

Note: "Class 2 heat meter" means a heat meter which –

- complies with the relevant requirement s set out at Annex 1 to the Measuring Instrument Directive,
- complies with the specific requirements listed in Annex MI-004 to that Directive, and
  falls within accuracy class 2 as defined in Annex MI-004 to that Directive.

2. Report Details

2.1 What evidence would be acceptable to demonstrate the eligibility of a heat meter for the Non Domestic RHI?

For a heat meter to be considered eligible for the Non-Domestic RHI scheme NMO would expect Ofgem to be provided with information in accordance with, at least, one of the following.

a. MID approved meter – a valid EC Type Examination (or Design Examination) Certificate issued by a Notified Body, evidence (e.g. photograph) that the meter has undergone the full conformity assessment process (CE-mark, supplementary metrology mark, Notified Body number are present) with a copy of the manufacturer DofC (issued in accordance with Modules D, F or H1), evidence that the meter has been properly secured, is of the correct specification for the application and installed in accordance with manufacturer requirements. Correct calibration of the meter is, in this instance, covered by the conformity assessment (verification) procedure.

b. EEC approved meter – effectively as per MID, but with a valid EEC certificate and appropriate conformity assessment (verification) markings, evidence of correct securing, specification and installation. Please note, however, that self-verification (equivalent of Module D) is not permitted under EEC approvals so evidence of conformity assessment (verification) by a competent third-party would be required. Correct calibration of the meter is, in this instance, covered by the verification procedure. You may wish to allow some form of 'self-verification' under the RHI, but you would need to define the requirements and specify who can conduct the assessment and certification of the manufacturer. As an alternative to verification, a valid calibration certificate and evidence of sealing may be deemed sufficient with the calibration certificate issued by an accredited (ISO 17025) laboratory.

c. OIML R75 approved meter – at present, NMO is the only OIML Issuing Authority for OIML R75 so any OIML R75 certificate will need to have been issued by ourselves (other Issuing Authorities may become available in the future). A copy of this certificate would need to be supplied. As the OIML Recommendation and Certificate of Conformity have no legal standing the acceptable conformity assessment (verification) procedures would need to be specified by yourselves, e.g. third-party verification and/or self-verification. As an alternative to verification, a valid calibration certificate and evidence of sealing may be deemed sufficient with the calibration certificate issued by an accredited (ISO 17025) laboratory. Regardless of which approach is taken, evidence that the meter is of the correct specification and has been correctly installed should also be provided.

d. 'Certificate' [or test report] from a test house – The test house should have accreditation to ISO 17025 by UKAS (or an equivalent Accreditation Body that has signed the ILAC MRA), with the scope of the accreditation covering the testing of heat meters in accordance with the applicable standard (EN1434). A full test report

demonstrating conformity with the type approval tests specified in Part 4 of EN1434 would be required. I would also anticipate seeing the completed checklist in EN 1434 to demonstrate conformity. The test report (for type approval tests) would cover the model of meter, but a calibration or verification report/certificate would be required for the particular meter that is being installed – part 5 of EN 1434 details the verification tests. As per the other alternatives, evidence of correct securing, specification and installation would be required.

In the information provided above, any reference to a UKAS accredited testing or calibration laboratory can be read as an independent third-party laboratory or a manufacturer's UKAS accredited testing or calibration laboratory. You may wish to 'relax' the requirements to specify that 'equivalence' to ISO 17025 can be demonstrated by the manufacturer (for either a third party or manufacturer laboratory), rather than requiring accreditation, but you would then need to conduct an assessment to determine if the procedures that have been adopted are 'equivalent' to the requirements of ISO 17025 – this may take some form of desk assessment of submitted documentation and/or a factory visit.

2.2 For each type of evidence, which bodies would be appropriate bodies to provide this evidence?

In order to determine that the meters would meet the tests of a "class 2 heat meter" as defined in reg. 2 of the RHI Scheme Regulations 2011 as amended, and the Measuring Instruments Directive, NMO would expect the following information to be provided:

- A copy of a valid MID EC Type (or Design) Examination Certificate for the meter (or all of the sub-assemblies) issued by a Notified Body, or
- A copy of a valid EEC Type Examination certificate for the meter (or all of the sub-assemblies), or
- A copy of a valid OIML R75 Certificate of Conformity issued by NMO, or
- A copy of a test report and checklist, issued by a UKAS (or equivalent) accredited test laboratory, in accordance with the applicable parts of EN 1434.

The information listed above will only demonstrate that the model of meter complies with the requirements. Evidence of correct calibration, installation, securing, etc. will be required for each individual installation.

2.3 Specifically for the case of heat meters with externally mounted temperature sensors, which standards could be used to demonstrate the eligibility of the matched pair of temperature sensors component of a heat meter?

To demonstrate compliance with MI-004 of the MID a manufacturer (either within the UK or the rest of the EU) would need to undertake the appropriate conformity assessment procedure(s). These are B + D, B + F or H1, where B is EC Type Examination, D is Declaration of Conformity to Type based on Quality Assurance of

the Production Process (colloquially known as ‘self-verification’), F is Declaration of Conformity based on Product Verification and H1 is Declaration of Conformity based on Full Quality Assurance plus Design Examination. These conformity assessment activities need to be conducted by, or under the supervision of, a Notified Body such as NMO (or an equivalent in Europe).

Type examination conformity can be shown by testing and evaluating the Temperature Pairs to the normative document EN 1434, or OIML R75. EN 1434 clearly states in the Scope, that surface mounted temperature sensors are not covered. Although R75 has no such statement it is safe to assume that when reference is made in R75 to “with or without pockets” that this is referring to either “in the direct flow” (without pocket) or “mounted in a pocket”. Therefore none of the recognised standards or recommendations allow the use of, let alone specify how strap- on probes could be tested.

Note: A temperature pair does not have an accuracy class, (neither does the calculator), it is only the flow sensor which has the associated accuracy, the allowable MPEs for a temperature pair are the same no matter what the accuracy class of the complete assembly is.

In MI-004 section 7.2 of the MID states a MPE for the temperature pair of $E_t = (0{,}5 + 3\,\Delta\theta_{min}/\Delta\theta)$, where the error Et relates the indicated value to the true value of the relationship between temperature sensor pair output and temperature difference, which is in-line with the EN1434 and OIML R75. Note there is no mention in the MID, of the extra allowance for mounting in a pocket as stated in the EN 1434 and OIML R75, which in the specified tests for temperature pairs, stipulates, when a probe is used in a pocket is that any differences caused by mounting in a pocket shall be within 1/3 of the MPE.

NOTE: The Draft version of EN 1434-4 Type approval tests states the difference should be within ½ of the MPE.

Therefore to meet the essential requirements of the MID, extra considerations concerning strap-on temperatures sensors need to be considered. First, the accuracy of the measurement, this is dependent on several factors that do not influence temperatures as specified in the EN 1434 and R75:

- Probe installation: The bonding/contact of probe to the pipe, what if any insulation of the probe is required, how do you insure consistency in the installation of the probe. Also variations in pipe materials and wall thickness what affect will this have. Where in the flow and return should they be placed? How to insure consistency?

- Outside influences – What affect will outside temperature sources have on the sensors, positing near heaters of or boilers may affect the readings.

- Risk of fraud – With exposed probes these could easily be influenced by outside temperature sources.

- Sealing of Temperatures sensors – These would be required to be sealed in position.

Therefore a test plan to investigate that strap-on sensors meet the required MPE is required, including tests of the accuracy of the sensors and how this is influenced by outside temperature sources, positioning/installation of the sensors and the insulation used. The MPE, I would suggest that using the criteria for when a probe is used in a pocket is that any differences caused by mounting in a pocket shall be within 1/3 of the MPE. Therefore comparisons to measurements made in the flow itself would be required.

Further examination to ensure sealing and installation instructions are robust so the initial verification on installation is consistent, and once put into use there is confidence in the security of the installation.

Talking to Hest Meter experts who are members of CEN/TC 176 (Heat Meters), and the experts drafting EN 1434, they confirm NMO's opinion that for a strap-on probes to meets this MPE requirement would be very difficult. Additionally the installation of strap-on sensors has many difficulties in the insurance of consistent measurement and security. Therefore, why EN 1434 states in the scope "Surface mounted temperature sensors are not covered by this European Standard".

3 Summary

Although EN 1434 and OIML R75 do not cover the use of strap-on temperature sensors, conformity to the essential requirements of the MID can be demonstrated by other means. It is therefore possible to interpret the essential requirements in a manner which does not preclude the use of externally mounted temperature sensors. Although it is considered that a heat meter using externally mounted temperature sensors would not satisfy the requirements in EN 1434 and OIML R75, the only way to ascertain with any certainty whether the heat meter could satisfy the essential requirements would be through the conduct of practical tests and the assessment of the test results.