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for energy consumers

Non-domestic RHI applicants and participants, renewable heat installers, meter manufacturers and suppliers, renewable heat trade bodies, meter testing laboratories

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Dear Stakeholder,

Open letter on the eligibility of ISO 4064:2014 and MID MI-001 water meters in the Great Britain and Northern Ireland Renewable Heat Incentive schemes.

Heat meters are a critical part of both the Great Britain and Northern Ireland Renewable Heat Incentive ("RHI") schemes. They are required for a number of reasons, primarily in order to accurately determine periodic support payments.

The RHI Scheme Regulations 2018 ("the GB Regulations") and the RHI Scheme Regulations (Northern Ireland) 2012 ("the NI Regulations"), therefore, provide a range of eligibility criteria in respect of heat meters with which applicants and participants must ensure compliance.

A heat meter is made of three main components – a flow sensor, which measures the volume of liquid passing through a pipe; temperature sensors, which measure the temperature of that liquid; and a calculator (sometimes referred to as an integrator), which uses the measurements provided by the other components and performs the necessary calculations to determine and display an energy value, typically in kilowatt hours (kWh) or megawatt hours (MWh).

Through our administration we see various types of flow sensor that use different methods to determine flow rate. Typically, the flow meter is designed specifically to act as a component (or 'sub-assembly') of a heat meter. Others may be designed as a 'water meter' but may be used in conjunction with other components to form a heat meter.

There are a number of industry standards that are relevant to the design, manufacture, testing and marking of these water meters.

As part of our ongoing administration, we are reviewing these standards, and seeking views on the requirements of BS EN ISO 4064-2014 ("ISO 4064-2014") and the Measuring Instruments Directive ("MID") Annex MI-001, and whether heat meters that use flow meters that meet the requirements of these standards also meet the

requirements stipulated in regulation 2 of both the GB Regulations and NI Regulations[1] for a "class 2 heat meter". In particular, this letter is concerned with the accuracy requirements as specified in the relevant standards.

The below sets out what the Regulations require, with the relevant sections of the various standards set out in Annex 1. We then provide our own interpretation in the 'Analysis' section which has been aided with input from independent technical consultants, followed by proposed next steps and specific areas in which we are seeking feedback.

What the Regulations require

The eligibility requirements in relation to metering are set out in Chapter 3 of the GB Regulations and NI Regulations. These chapters stipulate throughout that where a heat meter is required, that meter must be a "class 2 heat meter".

Regulation 2 of the GB Regulations and NI Regulations define a class 2 heat meter as a heat meter that:

a) Complies with the relevant requirements set out in Annex I to the Measuring Instruments Directive;
b) Complies with the specific requirements listed in Annex VI (Thermal energy meters (MI-004)) to that directive; and
c) Falls within accuracy class 2 as defined in Annex VI (Thermal energy meters (MI-004)) to that directive.

Analysis

Historically, we have accepted heat meters that use water meters tested to ISO 4064-2014 as meeting the definition of 'class 2 heat meter' where applicants declare that "meters have been sized appropriately so that they are generally operating above the transition flow value, and are appropriate for the temperature of the liquid for which they are metering".

We now understand that there are certain circumstances that may mean certain meters would not comply with the definition of class 2 heat meter. We have conducted a comparison between the accuracy classes defined in ISO 4064-2014 (relating to water flow meters) and the corresponding accuracy requirements in MI-001 (relating to water flow meters) and MI-004 of the MID (relating to heat meters in sub-assembly). The comparison was focused around operation in the upper flow rate zone around q_p or Q_3 (see Annex 1 for relevant definitions), as this would be standard practice in operation.

The assessment concluded that water flow meters tested to ISO 4064-2014 and designated as Class 1 meters under that standard will meet the requirements of MID Class 2 (MI-004) when operating with hot water (>30ºC) in the upper flow zone.

Figure 1 shows a comparison of the relevant accuracy requirements for a hypothetical meter.

As can be seen from Figure 1, a water meter that only meets the requirements of ISO 4064-2014 Class 2 will not necessarily meet the requirements of MID Class 2 (MI-004) when operating in hot water, irrespective of flow zone.

Similarly, a water meter fulfilling the minimum accuracy of MID MI-001 when operating with hot water will not necessarily satisfy the RHI requirements of MID Class 2 (MI-004).

[1] http://www.legislation.gov.uk/uksi/2018/611/pdfs/uksi_20180611_en.pdf; http://www.legislation.gov.uk/nisr/2012/396/pdfs/nisr_20120396_en.pdf

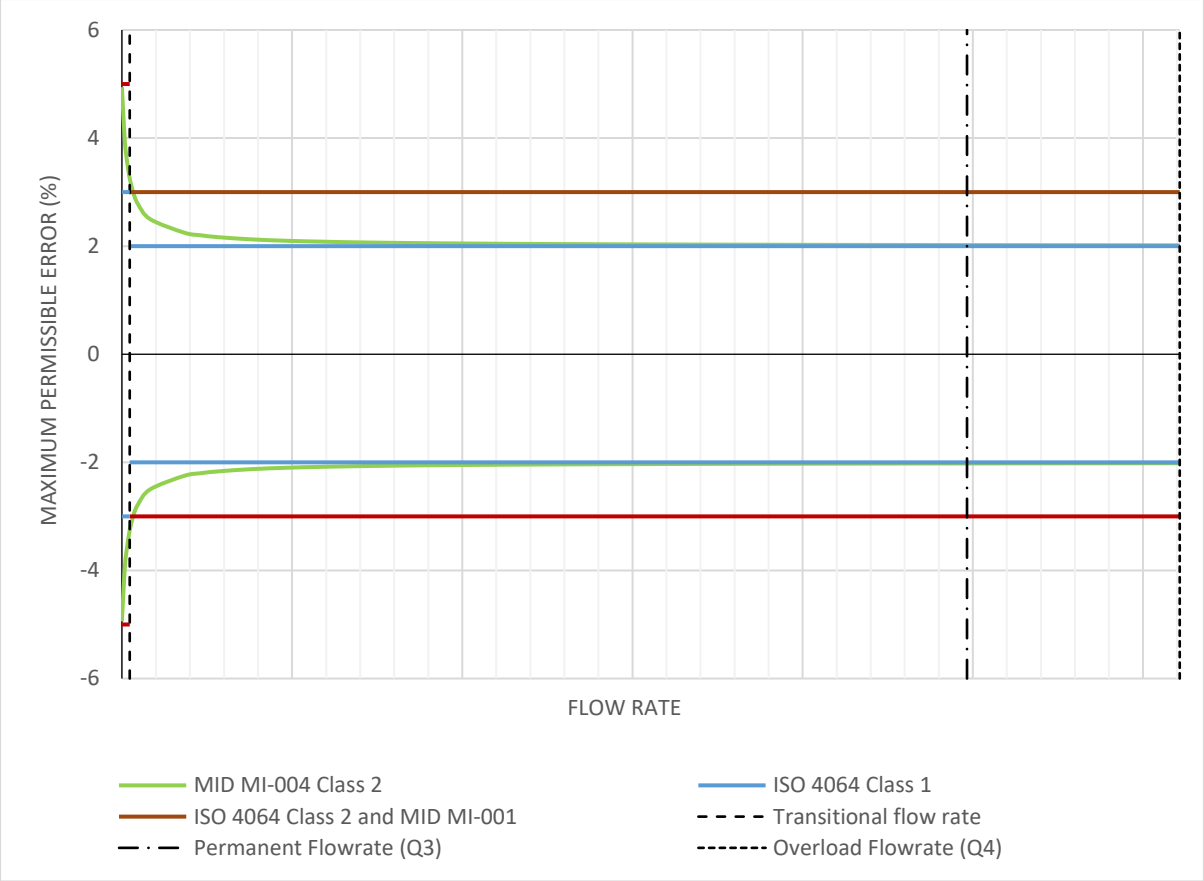

Figure 1: Comparison of maximum permissible errors for hot water meters.

We believe that the accuracy of some meters have not been shown to align with the regulatory requirements. As such, it is possible that when a system is operating in conditions close to Q_3, which is good practice, the accuracy of some meters may not be within the accuracy requirements for MID class 2 heat meters.

In light of the above analysis, it is our view that the following are not compliant with the Regulations:

- Meters that have only been shown to meet Class 2 accuracy requirements of ISO 4064-2014, and the heat conveying liquid being measured is typically greater than 30ºC.

- Meters that have only been shown to meet the accuracy requirements set out in Annex MI-001 of the MID, and the heat conveying liquid being measured is typically greater than 30ºC.

Next steps

We are mindful of the change that may therefore need to be made by applicants and scheme participants to ensure their metering is compliant with the GB Regulations or NI Regulations (as applicable), but we must balance this against the need to ensure that public funds are awarded appropriately under the scheme.

This being the case, we are proposing to put in place a six month 'grace period', during which applicants and participants can take remedial action. At the end of that grace period, should sufficient remedial action not have been taken, we would commence compliance action in accordance with the GB Regulations or NI Regulations (as applicable).

We would expect suitable remedial action to be either:

- The replacement of such a water meter with a meter which is compliant with the GB Regulations or NI Regulations (as applicable), and evidence of that replacement. Further guidance on these requirements can be found in paragraphs 13.6 to 13.24 of RHI Guidance Volume 1[2].

- The provision of evidence showing that the meter, considering the conditions in which it is operating, meet the definition of a class 2 heat meter as described above. Such evidence might include:

    - Documentation from the manufacturer stating that the meter has been manufactured in accordance with ISO 4064-2014 or 2017 and is Class 1 accurate under such standards;
    - Photographic evidence which explicitly states the accuracy of the meter alongside the operational temperature limit;
    - Photos or documentation which states the Q_3 value of the meter; and
    - The standard operational flow rate and temperature of the heat conveying liquid that the meter is measuring.

Industry engagement

Should you have any information or evidence that you believe would inform our position on whether these meters are compliant with the GB Regulations' and NI Regulations' definition of class 2 heat meter, we would welcome any feedback by 1 July 2019.

We would also welcome any comments you may have on our proposals set out in the 'Next Steps' section above.

Any submission should be a clear, evidence-based analysis that we will review before publishing a final position on this matter.

Following consideration of any representation from industry or interested parties, should our final position remain in line with that set out in this letter, the grace period for remedial action will commence on the date of publication of our final position.

We may publish any non-confidential responses we receive alongside a decision on next steps on our website at Ofgem.gov.uk/consultations. If you want your response – in whole or in part – to be considered confidential, please tell us in your response and explain why. Please clearly mark the parts of your response that you consider to be confidential.

Yours sincerely

RHI Operations Team

[2] https://www.ofgem.gov.uk/system/files/docs/2019/01/guidance_volume_1_oct_2018.pdf

Annex 1

What the standards say

Measuring Instruments Directive Annex VI - MI-004 Thermal Energy Meters (heat meters)

Maximum Permissible Errors (MPE) are defined for three classes of meter, and are given by the following formulae that relates the MPE to the flow rate being measured.

- Class 1: MPE = $(1 + 0.01 \times q_p/q)$ not more than 5%
- Class 2: MPE = $(2 + 0.02 \times q_p/q)$ not more than 5%
- Class 3: MPE = $(3 + 0.05 \times q_p/q)$ not more than 5%

Where:

q = the flow rate of the heat conveying liquid

q_p = the highest value of q that is permitted permanently for the heat meter to function correctly.

The highest MPE is when the flow meter is operating at the lowest flow rate at which the meter can correctly function, q_i. The MPE at this flow rate will depend on the specific meter but is limited to 5% in MI-004.

The lowest MPE is when the flow meter is operating at high flow rates, at or above q_p and tending to q_s, the highest value of q that is permitted for short periods for the thermal energy meter to function correctly.

MID Annex III - MI-001 Water Meters

MPE are defined for a single class of meter:

- The upper flow zone ($Q_2 \leq Q \leq Q_4$):
  - Cold Water (defined as 0.1 to 30ºC): 2%
  - Hot water (defined as 30ºC to at least 90ºC): 3%
- The lower flow zone ($Q_1 \leq Q < Q_2$) is 5% for water having any temperature.

Where:

Minimum Flowrate (Q_1)= The lowest flowrate at which the water meter provides indications that satisfy the requirements concerning the maximum permissible errors (MPEs).

Transitional Flowrate (Q_2) = The transitional flowrate is the flowrate value occurring between the permanent and minimum flowrates, at which the flowrate range is divided into two zones, the 'upper zone' and the 'lower zone'. Each zone has a characteristic MPE.

Permanent Flowrate (Q_3) = The highest flowrate at which the water meter operates in a satisfactory manner under normal conditions of use, i.e. under steady or intermittent flow conditions.

Overload Flowrate (Q_4) = The overload flowrate is the highest flowrate at which the meter operates in a satisfactory manner for a short period of time without deteriorating.

BS EN ISO 4064-1:2014 Water meters for cold potable water and hot water

Part one of this standard concerns the metrological and technical requirements for water meters for cold portable water and hot water.

MPE are defined for two classes of meter:

- The upper flow zone ($Q_2 \leq Q \leq Q_4$):
    - Cold water (defined as 0.1 to 30ºC): Class 1 ±1% and Class 2 ±2%
    - Hot water (defined as 30ºC+): Class 1 ±2% and Class 2 ±3%
- The Lower flow zone (($Q_1 \leq Q < Q_2$): Class 1 ±3% and Class 2 ±5% at all temperatures.

Where the terms are defined as with MID Annex III - MI-001 Water Meters above.

A summary of the MPE for each meter can be seen on the Table 1 for hot water meters operating in the upper flow zone.

Standard	**MPE**
Measuring Instruments Directive Annex VI - MI-004 Thermal Energy Meters: Class 2	(2 + 0.02 x q_p/q) not more than 5% tending towards 2%
Measuring Instruments Directive Annex III - MI-001 Water Meters	±3%
BS EN ISO 4064-1:2014 Water meters for cold potable water and hot water: Class 1	±2%
BS EN ISO 4064-1:2014 Water meters for cold potable water and hot water: Class 2	±3%

Table 1: MPE comparison for flow components in upper flow zone at temperatures >30˚