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WELMEC Guide 13.3

Guide for sealing of Water and Thermal energy meters

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For information:
This Guide is available for the Working Group Measurement Instruments
For future reference on the Europa Website.

WELMEC

WELMEC is a co-operation between the legal metrology authorities of the Member States of the European Union and EFTA.

This document is one of a number of Guides published by WELMEC to provide guidance to manufacturers of measuring instruments and to Notified Bodies responsible for conformity assessment of their products.

The Guides are purely advisory and do not themselves impose any restrictions or additional technical requirements beyond those contained in relevant EU Directives.

Alternative approaches may be acceptable, but the guidance provided in this document represents the considered view of WELMEC as to the best practice to be followed.

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Contents

1 Definitions and abbreviations

In this document the following abbreviations and definitions apply:

MID
Measuring Instrument Directive, directive 2014/32/EU of the European parliament and of the council of 26 February 2014 on measuring instruments amended by the COMMISSION DELEGATED DIRECTIVE (EU) 2015/13 of 31 October 2014 amending Annex III to Directive 2014/32/EU of the European Parliament and of the Council, as regards the flowrate range of water meters

TEC
A TEC is an EU-type examination certificate under annex II Conformity Assessment Procedures module B or an EU design examination certificate under annex II Conformity Assessment Procedures module H1 of the MID.

Utility meter
According to this guide a utility meter is either an Water Meter according to Annex III (MI-001) or a Thermal Energy Meter according to Annex VI (MI-004) of the MID.

(Metrology) Seal
A (metrology) seal is a specific securing measure which can be applied on a utility meter to ensure the metrological integrity of the instrument.
The TEC specifies the place(s) where the (metrology) seals have to be applied. The use of these seals is mandatory under the MID when these seals are specified in the TEC as means of securing the measuring instrument.

Note: The manufacturer is responsible that all securing measures are applied to the utility meter prior to placing on the market and/or before putting the utility meter in to use including the seals as specified by the TEC.

Installation seal
An installation seal is a seal applied by an installer to indicate the integrity of the installation. The installation seal may need to satisfy national requirements, but the installation seals are not within the scope of the MID.
Guidance in this document concerning the use and location of installation seals is to be considered as advice.
The installer should always take into account the national requirements concerning the installation of utility meters with regard to the correct use and application of the installation seals.

Installer
The person legally designated for installing the meter (for example the utility, manufacturer, or owner), as meant in the ‘putting into use’ sections of Annex III and Annex VI of MID.
Note: the installer can be a sub-contracted party.

2 Scope

For the benefit of manufacturers, and all other interested parties, e.g. notified bodies under annex II Conformity Assessment Procedures, modules B, D, F and H1 of the MID, notifying authorities and market surveillance authorities, this document describes a best practise approach to securing measuring instrument covered under Annex III (MI-001) and Annex VI (MI-004) of the MID.

It should be noted that it is the responsibility of the manufacturer of the utility meter to be able to demonstrate the conformity to all applicable requirements of the MID including conformity to the securing provisions of his measuring instruments or sub-assemblies to the requirements of MID.

If specific annexes exist in the MID, which lay down the essential requirements for sub-assemblies, the provisions of this guide shall apply mutatis mutandis to such sub-assemblies as it does for the complete measuring instruments under the MID.

This document is limited to the placing on the market or putting into use of utility meters by the manufacturer or his authorized representative.
If the utility meter is placed on the market by the manufacturer and the utility meter is installed by an installer, national legislations of the Member States apply.
Depending on those national requirements specific action[1] needs to be taken if it is made evident through the securing provisions that changes in the legally relevant parts, parameters or settings of the utility meter has been made.

This guide does not cover those national legislations *(see also chapter 3 of this guide*), although certain points of attention regarding putting into use are presented.

[1] *Such an action could for example be to apply for a reverification.*

3 Putting into use of a utility meter

Utility meters placed on the market and/or put into use by the manufacturer need to satisfy the requirements of the MID. Therefore a conformity assessment procedure according to annex II, module B, type-examination or H1, design evaluation, has to be carried out on the utility meter. The manufacturer of the utility meters shall declare the utility meter in conformity with the MID. The manufacturer can only declare conformity to the MID if the meters are fitted with all securing provisions as specified in the TEC by the manufacturer.

After a TEC has been issued for the utility meter an applicable conformity assessment procedure according to annex II, module D, F or H1 of the MID can be carried out.
During a conformity assessment procedure according to annex II, module D, F or H1 the utility meters shall be fitted with all securing provisions as specified by the TEC by the manufacturer.

Knowing that conformity assessment can take place in multiple steps, the following applies.

With respect to the putting into use of the utility meter, four possibilities exist, depending on national legislation:

The instruments can be put into use in one of the following ways:

1. The manufacturer or his representative sets-up the metrologically relevant parameters during putting into use, after that the manufacturer applies the necessary securing measures and carries out the annex II, module D or H1 procedure2 of the MID; or
2. The installer performs part of the activities described in the procedures under module D or H1 of the manufacturer2, sets-up the metrologically relevant parameters during putting into use and carries out the annex II, module D or H1 procedure of the MID on behalf of and under the responsibility of the manufacturer. If the installer needs to change the metrologically relevant parameters, settings or parts this is made evident by the securing measures installed in or on the instrument (also see Chapter 4). With respect to changing legally relevant parts, parameters or settings of the utility meter during installation, the national requirements apply. Depending on those national requirements specific action needs to be taken in case the securing measures show that changes has been made. An example of such action to be taken could be to apply for a reverification; or
3. The installer sets-up the metrologically relevant parameters and applies the securing measures on behalf of and under the responsibility of the manufacturer, when putting into use. The manufacturer then applies to a notified body to carry out the annex II, module F procedure of the MID; or
4. The installer puts the instrument into use, without the need for making modifications to it.

Additionally, the installer putting the instruments into use shall ensure that the meter is appropriate for the accurate measurement of consumption that is foreseen or foreseeable, by determining:

- The flowrate range of the water.
- The temperature range of the water.

[2] *A manufacturer can only carry out an Annex D or H1 procedure if his quality system has been assessed and approved by a notified body under the MID.*

- The relative pressure range of the water, the range being 0,3 bar to at least 10 bar at Q 3 .

Note:

- Effectively this means the utility and/or installer must check they put a meter into use which suits the application ranges given above.

4 General securing principle

Utility meters placed on the market and/or put into use by the manufacturer need to satisfy the requirements of the MID. The utility meters shall therefore be fitted with all securing provisions by the manufacturer.

The manufacturer shall demonstrate to the notified body that these securing measures, including the sealing provisions, are adequate. The notified body under annex II, module B or H1 shall specify in the TEC the securing measures required to ensure the integrity of the utility meters (e.g. sealing, identification of the software, etc.).

The securing measures shall also be documented by the manufacturer in the technical documentation file (see article 18 of the MID, paragraph 2 and 4).

4.1 Securing requirements

Securing is needed for the following reasons, see “Annex A: MID requirements concerning securing”:

- To prevent access without evidence to parts being critical for the metrological characteristics of the utility meter;
- To prevent changes without evidence in software that is critical for the metrological characteristics of the utility meter.
- To prevent access without evidence to parameters or settings that can influence the metrological performance of the utility meter, for example but not limited to calibration factors, compensation parameters, changes of parameters for adoption of the meter to a specific installation;
- To prevent access without evidence to the display of the total quantity supplied or the displays from which the total quantity supplied can be derived, whole or partial reference to which is the basis for payment, shall be reset during use;
- To prevent access without evidence to interfaces of the utility meters when influence on the metrological characteristics of the utility meter can occur through the interface.

  However interfaces need not be secured if the utility meter cannot be influenced in any inadmissible way by the connection to it of another device, by any feature of the connected device itself or by any remote device that communicates with the utility meter. If this is the case those protective interfaces shall be described in the TEC.

- To prevent disconnection of parts without evidence, including ancillary devices[3] or utility mains supply equipment, when this can influence the metrological performance of the instrument.

In chapter 5 some specific securing provisions are given. However, the lists of provisions in chapter 5 are not exhaustive. Manufacturers should therefore always show, document and clarify the securing measures so the notified body can evaluate that the securing measures, including the sealing provisions, comply with the requirements of MID.

[3] See also WELMEC guide 11.5 Utility Meters and Ancillary Devices

5 Instrument specific securing provisions

5.1 Securing utility meters

5.1.1 Metrologically important parameters

Access to means for modification of software, settings and/or parameters that influence the determination of the results of measurements shall be secured. In case this is done by software securing, the manufacturer should take notice of WELMEC guide 7.2.

5.1.2 Disconnection of parts

Disconnections of metrologically relevant parts shall not occur without evidence by sealing the connection or shall be prevented by means of a device that prevents any measurement after disconnecting and reconnecting.

5.1.3 Straightener and straight pipe lines (if applicable)

In case the use of a straightener is necessary to guarantee the correct functioning of the utility meter the straightener is considered to be part of the utility meter and should therefore be described in the TEC.

It is the responsibility of the manufacturer to ensure that the correct straightener is installed with the utility meter and therefore the manufacturer should deliver the meter with the appropriate straightener. It is advisable for the manufacturer to secure the straightener.

In the case of straight pipe lines, either the straight pipe lines are defined in the TEC under “Conditions of use”[4] or they are specified as part of the meter[5]. In the latter case the manufacturer should deliver the meter with all relevant parts, including the straight pipe lines.

- If the straight pipe lines are defined in the TEC under “Conditions of use”, information in respect of these conditions of use should be on the descriptive plate *(See article 9.1, Annex I of MID)*. It is advisable for the installer to apply his installation seal[6] to these parts;

- If the straight pipe lines are part of the instrument it is advisable for the manufacturer to secure these parts.

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[4] *A straight pipe line can be defined under “Conditions of use” if <u>any</u> pipe line can be used provided that it meets some generic requirements, for example a particular length or diameter. Compliance with the conditions of use is the responsibility of the end-user. He should therefore be able to check the conditions of use without the need of the TEC and/or the technical documentation. Hence, the information in respect to the conditions of use should be on the descriptive plate where it is readily available to the end-user, see also article 9.1, Annex I of MID.*

[5] *A straight pipe line is considered to be a part of the utility meter if a specific type of pipe line needs to be used or when the straight pipe line is part of the Equipment under Test. The pipe line is documented and conformity to type needs to be established during placing on the market and/or putting into use. Conformity to type is the responsibility of the manufacturer and therefore this part cannot be specified under conditions of use.*

[6] *The installer should always take into account the national requirements concerning the installation of utility meters with regard to the correct use and application of the installation seals.*

5.2 Securing provisions specific for Water Meters

Component / Description	Securing necessary	Remark
Housing against opening	Yes	• Unless the metrologically relevant parts are secured inside the housing. • Unless the housing cannot be opened without damaging the housing to such an extent that the housing cannot be reused.
Adjustment device	Yes	
Inscriptions	Yes	Unless the inscriptions are permanently placed onto the meter.
Interfaces (in- and outputs) for legal purposes	Yes	
Interfaces (in- and outputs) for other purposes	Yes	Unless the utility meter cannot be influenced through the interface
Connection between different parts of the meter not integrated in one housing	Yes	
Connection to meter sensor and legally relevant indicating device	Yes	
Connection between meter sensor and communication module	Yes	If it is used for legal purposes
Connection between communication module and legally relevant indicating device	Yes	
Legal part of software	Yes	
Software / Parameter settings	Yes	
For example but not limited to:		
configuration of registers		
setting of correction devices (curve fitting, ….)		
Meter against removing	No*	
Connection between cartridge meters and the piping	No*	
Removable batteries	No*	
External power supply	No*	
* However it is advisable that an installation seal[7] is applied		

[7] *The installer should always take into account the national requirements concerning the installation of utility meters with regard to the correct use and application of the installation seals.*

5.3 Securing provisions specific for thermal energy meters

5.3.1 Thermal energy meters not consisting of sub-assemblies

Component / Description	Securing necessary	Remark
Housing against opening	Yes	Unless the metrologically relevant parts are secured inside the housing. Unless the housing cannot be opened without damaging the housing to such an extent that the housing cannot be reused.
Adjustment device	Yes	
Inscriptions	Yes	Unless the inscriptions are permanently placed onto the meter.
Interfaces (in- and outputs) for legal purposes	Yes	
Interfaces (in- and outputs) for other purposes	Yes	Unless the utility meter cannot be influenced through the interface
Connection between different parts of the meter not integrated in one housing	Yes	
Connection of temperature sensors to the calculator	Yes	
Connection of temperature sensors to the installation	Yes	
Connection between meter sensor with pulsar	Yes	
Connection between pulser with legally relevant indicating device	Yes	
Legal part of software	Yes	
Software / Parameter settings	Yes	
Meter against removing	No*	
In- and outlets	No*	
* However it is advisable that an installation seal[8] is applied		

[8] *The installer should always take into account the national requirements concerning the installation of utility meters with regard to the correct use and application of the installation seals.*

5.3.2 Thermal energy meters built from sub-assemblies

Component / Description	Securing necessary	Remark
Housing of the sub-assemblies against opening	Yes	Unless the metrologically relevant parts are secured inside the housing. Unless the housing cannot be opened without damaging the housing to such an extent that the housing cannot be reused.
Adjustment device of the sub-assemblies	Yes	
Inscriptions of the sub-assemblies	Yes	Unless the inscriptions are permanently placed onto the meter.
Interfaces (in- and outputs) for legal purposes	Yes	
Interfaces (in- and outputs) for other purposes	Yes	Unless the utility meter cannot be influenced through the interface
Connection between different parts of the sub-assemblies not integrated in one housing	Yes	
Connection of temperature sensors to the calculator	No*	
Connection of flow sensor to the calculator	No*	
Connection of temperature sensors to the installation	Yes	
Connection between meter sensor with pulsar	Yes	
Connection between pulser with legally relevant indicating device	Yes	
Legal part of software	Yes	
Software / Parameter settings	Yes	
Sub-assemblies against removing	No*	
In- and outlets	No*	
* However it is advisable that an installation seal[9] is applied		

[9] *The installer should always take into account the national requirements concerning the installation of utility meters with regard to the correct use and application of the installation seals.*

6 Securing measures

The details of the securing measures shall be provided by the manufacturer and a notified body should evaluate their suitability.

6.1 Hardware sealing

Various types of seals are available, varying in terms of robustness. Inscriptions, unique to the manufacturer, should be embossed into the seal to allow traceability. Manufacturers should consider and apply robust methods to ensure that seals cannot be easily copied for fraudulent purposes.

6.2 Software securing

Various types of software securing are available, ranging from software identification to audit trails. Guidance on the subject of compliance with the software related requirements contained in the MID is given in WELMEC guide 7.2.

Annex A: MID requirements concerning securing

The MID specifies a number of requirements concerning the securing of a utility meter, as lay down in the following articles:

MID, article 18, paragraph 2 and 4:

- The technical documentation shall be sufficiently detailed to ensure the integrity of the instrument;
- The manufacturer shall specify where seals and markings have been applied.

MID, Annex I Essential Requirements, article 8 “Protection against corruption”:

8.1 The metrological characteristics of a measuring instrument shall not be influenced in any inadmissible way by the connection to it of another device, by any feature of the connected device itself or by any remote device that communicates with the measuring instrument.

8.2 A hardware component that is critical for metrological characteristics shall be designed so that it can be secured. Security measures foreseen shall provide for evidence of an intervention.

8.3 Software that is critical for metrological characteristics shall be identified as such and shall be secured. Software identification shall be easily provided by the measuring instrument. Evidence of an intervention shall be available for a reasonable period of time.

8.4 Measurement data, software that is critical for measurement characteristics and metrologically important parameters stored or transmitted shall be adequately protected against accidental or intentional corruption.

8.5 For utility measuring instruments the display of the total quantity supplied or the displays from which the total quantity supplied can be derived, whole or partial reference to which is the basis for payment, shall not be able to be reset during use.

Annex II, module B: article 6 and Annex II, module H1 article 4.3 specify that the certificate and its annexes shall contain all relevant information for conformity evaluation and in-service control.

In particular, to allow the conformity of manufactured instruments with the examined type to be evaluated regarding the reproducibility of their metrological performances, being properly adjusted using appropriate means, these certificates shall contain:

- measures required for ensuring the integrity of the instruments (sealing, identification of software, etc.);

- information on other elements necessary for the identification of the instruments and to check their visual external conformity to type;

- if appropriate, any specific information necessary to verify the characteristics of manufactured instruments;

- in the case of a sub-assembly, all necessary information to ensure the compatibility with other sub-assemblies or measuring instruments.