

Background document 2

List of changes to MID suggested by WELMEC (Member States and some stakeholders)

| N° | Authoring WELMEC-wg ¹ | Place in MID | Subject | Details of Proposal in Background Document 2 | Decisions notified under MRR ² (= trade barriers) |
|----|----------------------------------|---------------------------|---|--|--|
| 1 | WG-11 | Art. 1 | Define « functions » in specific annexes | 2 | 0 |
| 2 | WG-8 | Art. 5 | Modification of the subassemblies and the complete measuring instrument | 3 | 0 |
| 3 | WG-10 | Art. 23 | Mix-and-match of new SSD's with old dispensers | 4-8 | 0 |
| 4 | WG-8 | Annex I | Metrological Data Processing Unit (MDPU) | 9-10 | 0 |
| 5 | WG-11 | Annex I | Real time clock | 11-12 | 0 |
| 6 | WG-8 | Annex I 1.1 | No exploiting the MPE | 13 | 0 |
| 7 | WG-2 | Annex I 1.3.1 | Temperature limits | 14-15 | 0 |
| 8 | WG-8 | Annex I 8 | Sealing | 16 | 0 |
| 9 | WG-2 | Annex I 10.1&3 | Meaning of hard copy | 17-18 | 0 |
| 10 | WG-11 | Annex I 10.5 | Display of legally important results | 19-20 | 0 |
| 11 | WG-11 | MI-001 | Changes to MI-001 (water meters) | 21-24 | 0 |
| 12 | WG-11 | MI-002 | Changes to MI-002 (gas meters) | 25-32 | 0 |
| 13 | WG-11 | MI-002 | MPE of gas meters | 33-37 | 0 |
| 14 | WG-11 | MI-002 | Gas energy measurement | 38-43 | 0 |
| 15 | WG-11 | MI-003 | Instrument transformers | 44-47 | 0 |
| 16 | WG-11 | MI-003 | Changes to MI-003 (electricity meters) | 48-56 | 0 |
| 17 | WG-11 | MI-004 | Changes to MI-004 (heat meters) | 57-66 | 0 |
| 18 | WG-10 | MI-005 | Fuel Dispenser Totalisers for Tax purposes | 67 | 0 |
| 19 | WG-10 | MI-005 5.3 | Solve unclarity regarding gas elimination devices | 68 | 0 |
| 20 | WG-10 | MI-005 5.6 | Self Service Devices as sub-assemblies | 69 | 0 |
| 21 | WG-2 | MI-006 CH I | Subassemblies | 70-72 | 0 |
| 22 | WG-2 | MI-006 CH II Tab.4 1.2 | Verification scale intervals for single or multi-interval instruments | 73-74 | 0 |
| 23 | WG-2 | MI-006- CH II 2.1 | Category X instruments | 75-76 | 0 |
| 24 | WG-2 | MI-006 CH II 5 | High precision weighing instruments | 77-78 | 0 |
| 25 | WG-2 | MI-006 CH II 6.2 | Dynamic setting | 79-80 | 0 |
| 26 | WG-8 | MI-007 | Improvement of annex MI-007 (taximeters) | 81 | 0 |

¹ WELMEC, is the organisation of national authorities in legal metrology at which meetings some stakeholders participate. Suggestions for the text changes are from the following WELMEC working groups:
 WG-2 : weighing instruments (MID, Annex MI-006)
 WG-8 : horizontal MID issues and Annex MI-007, Annex MI-008, Annex MI-009 and Annex MI-010
 WG-10 : measuring systems fro continuous and dynamic measurement of other liquids than water (MID, Annex MI-005)
 WG-11 : utility meters (MID, Annex MI-001, Annex MI-002, Annex MI-003 and Annex MI-004)

² Regulation (EC) No 764/2008; OJ L 218 of 13.8.2008, pp. 21-29 – **See Annex 2 above for details**

Proposal

11.1 Include definition for “functions beside the functions defined in the specific annexes” and /or “measuring system”

Aim

Clarification of the scope of MID.

The application of MID on measuring systems shall be limited on systems which are defined in the specific annexes.

This will avoid different interpretations by the manufacturer and notified bodies in respect to the devices permanently or temporary connected to a meter, which may or which need to be considered during a conformity assessment.

Example: A caloric value determination device (CVDD) may be part of measuring station for gaseous fuels on site. This device provides results used by a connected conversion device (instead of fixed values, which is usual today).

If a manufacturer ask for the assessment of the gas meter plus the CVDD as a system it is not clear how this shall be handled, because there are no specific requirements in MID for a CVDD.

WG 11 see no further need for a definition of “functions beside the functions defined in the specific annexes” if an amendment of Annex MI002 ... MI004 with requirements on legally important additional functionality (see 11.3-6) will happen.

Reasons:

- A definition of a measuring system is only given in MI-005.
- Legal certainty about the scope is needed for notified bodies.
- Taking into account the introduction of new functionality connected with smart meters and smart grids a definition of measuring system in respect to utility meters is difficult.
- The definition of measuring system depends on the kind of instrument and the application range (domestic, commercial, light industry, industry), hence a definition should be part of the instrument specific annexes.
- The specific definitions of the devices and functions, which have to be considered during a conformity assessment, can be given in the instrument specific annexes only.

Draft text proposal for the changed Article 1

Article 1

Scope

This Directive applies to the devices and systems ~~with a measuring function~~ defined in the instrument-specific annexes with a measuring function concerning water meters (MI-001), gas meters and volume conversion devices (MI-002), active electrical energy meters (MI-003), heat meters (MI-004), measuring systems for continuous and dynamic measurement of quantities of liquids other than water (MI-005), automatic weighing instruments (MI-006), taximeters (MI-007), material measures (MI-008), dimensional measuring instruments (MI-009) and exhaust gas analysers (MI-010).

Proposal :

Adapt the sub-assembly definition in order to introduce the possibility to certify the subassemblies in more categories of measuring and keep the necessity to certify nevertheless the complete measuring instrument.

Aim :

Extend to possibility to certify some sub assemblies (or partly completed instruments like in the machinery directive n° 2006/42/EC) in more fields than in the current version of MID even if a certification of the complete instrument is still needed before putting it into use.

Reasons for the development

The sub assembly approach is for the time being very limited in MID (limited to the field of heat meters and gas meters and to a few sub assemblies).

It is not foreseen in some field like measuring system of liquids other than water and automatic weighing instruments although these instruments are modular in most cases. By construction they are composed of parts manufactured separately by different providers and assembled by the manufacturer of the complete instrument.

The same part could be used in several instruments by several manufacturers and it would be appropriate to open the possibility to have it certified according to MID and accompanied with a declaration of conformity.

However as it cannot in most cases be ensured just by the certification of the parts that a complete instruments is in conformity with MID the proposal is to keep also a certification of the complete instrument with a manufacturer (assembler) will be responsible of the full conformity. The responsible person for the complete instrument will then be well identified.

If such a modification is accepted it would facilitate the approval for manufacturers; It would also mean fewer problems in the MID application for manufacturers of measuring system of liquids other than water especially, it would facilitate the revamping of some measuring instruments and it would remove unclear situation concerning the responsibility of the conformity of the complete instrument

Proposal

Include in article 4 a definition of “partly completed instruments” similar to the corresponding one in Machinery directive

Include in article 5 of MID

Unless otherwise specified in the specific annex, even if sub assemblies have been evaluated independently and separately, the complete instrument shall be evaluated in view of establishing its conformity to the requirements of the Directive.

Include in article 8 the following text :

Member States shall take all appropriate measures to ensure that partly completed instruments and sub assembly of instruments can be placed on the market only if it satisfies the relevant provisions of this Directive.

10.5 Mix and Match of pre-MID Fuel Dispensers with MID Self Service Devices (and vice versa).

See attachments:

- 1) MID CECOD letter, presenting the explanation provided by CECOD.
- 2) POS Questionnaire presenting the outcome of a questionnaire held by CECOD.

C.E.C.O.D.

COMITE DE FABRICANTS EUROPEENS D'INSTALLATION ET DE DISTRIBUTION DE PETROLE
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Courbevoie, le 23 novembre 2007

Dear Sir,

Following our letter of July 2006 and our subsequent meetings, we are writing to raise again the significant difficulties our industry is facing with implementing aspects of the Measuring Instruments Directive (MID).

In many cases MID is currently delaying investment in technology, increasing approval costs, and preventing fuel retailers from having a free and open choice about the equipment they buy. Clearly these implications are the opposite of MID's intent. We believe that a simple, but important, clarification of MID could address the issue while still delivering the full benefits of this valuable EU Directive.

At present, MID requires full system certification covering dispensers and metrologically significant parts of POS equipment⁽¹⁾. The key issue is that there is little or no relationship between dispenser and POS procurement cycles. This means that when fuel retailers want to upgrade either their POS or dispensers then a full new system approval is required -- even when only some of the equipment has been replaced.

Often fuel retailers have to invest in specific MID systems approvals to install the equipment of their choice - despite the fact that their new equipment is MID-certified and their existing equipment has valid OIML recommendation based National Approvals. The current MID interpretation is driving up approvals activities and costs across the industry -- including extending National Approvals. The MID system approval required for each dispenser/POS combination can also delaying investment in technology and limit free supplier choice.

During the past 12 months there have been a number of useful meetings with WELMEC and many proposals to resolve the escalating problems. However, due to interpretation of the Essential Requirements and Annex MI005, only a clarification of the Directive (or perhaps an implementation guidance note from the Commission) may resolve the situation to the satisfaction of all Member States W&M authorities.

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Our proposal is to permit Nationally Approved equipment to be mixed with MID approved equipment. CECOD believe that, as the technical requirements for MID are a super-set of those previously in place, the resulting site systems will benefit from the upgrade. Specifically, CECOD request the following two clarifications to MID:

1. Notified Bodies can issue separate MID compliance certificates for dispensers and/or the metrologically significant part of POS systems.
2. During the transition period, Nationally Approved equipment can be mixed with MID Approved equipment without gaining new system approvals.

It is our members' view that the above proposal will speed up MID implementation by enabling retailers to purchase major new components, thus phasing in the upgrade to MID.

We recognise that there may be a short window of opportunity to clarify the Directive. CECOD ask that our proposal be considered soonest. We would also welcome the opportunity to meet you and discuss the increasingly difficult MID issues being faced by our industry.

Thank you in advance for your consideration of our proposals.

Yours sincerely,



Patrick BERTHON
CECOD Chairman

- (1) Metrological Part of a Point-Of-Sale System (POS) is a Self Service Device (SSD) or Sub-Assembly as described in the Directive 2004/22/EC.

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| | POS in any type of configuration | | POS for unmanned sales or in self-service with stacking of customers | |
|----------------------|---|--|--|---|
| | NATIONAL POS certificate required BEFORE MID? | NATIONAL POS certificate required AFTER MID? | National certified POS connected to MID dispensers? | MID certified POS connected to National dispensers? |
| Directive MID | N.A. | N.A. | No | No |
| Austria | Yes | Yes | Yes | Yes |
| Belgium | No | No | N.A. | No |
| Bulgaria | Yes | Yes | Yes | No |
| Cyprus | No | No | N.A. | Yes |
| Czech Republic | No | No | N.A. | No |
| Denmark | No | No | No | Yes |
| Denmark | No | No | Yes | Yes |
| Estonia | No | No | N.A. | Yes |
| Finland | Yes | No | Yes | Yes |
| France | Yes | Yes | Yes | Yes |
| Germany | Yes | Yes | Yes | No |
| Greece | No | No | N.A. | N.A. |
| Hungary | Yes (fiscal) | Yes (Fiscal) | Yes | No |
| Ireland | Yes | No | Yes | Yes |
| Italy | Yes | Yes | Yes | Yes |
| Latvia | No | No | N.A. | Yes |
| Lithuania | No | No | N.A. | Yes |
| Luxembourg | No | No | N.A. | No |
| Malta | No | No | Yes | Yes |
| Netherlands | Yes | No | No* | No** |
| Poland | No | No | Yes | Yes |
| Portugal | No | No | N.A. | Yes |
| Romania | Yes | Yes | Yes | No |
| Slovakia | No | No | N.A. | Yes |
| Slovenia | No | No | N.A. | Yes |
| Spain | No | No | Yes | Yes |
| Sweden | Yes | No | Yes | Yes |
| Switzerland | Yes/No | Yes/No | Yes | Yes |
| United Kingdom | Yes | No | No* | No** |

Definitions:

Before MID = Before 30-10-2006

After MID = After 30-10-2006

N.A. = not applicable

National POS or Dispenser= National certified POS or Dispenser

POS (Point of Sale) = SSD (Self Service Device)

MID dispensers = MID certified dispensers

No* = Mix MID certified dispensers with National certified dispensers is allowed IF minimum 1 National certified dispenser is part of the system.

No** = Mix National certified dispensers with MID certified dispensers is allowed IF minimum 1 MID certified dispenser is part of the system.

Remarks:

1. National certified POS after MID in NL: On basis of an Evaluation Certificate the extension of national SSD certificates are possible, even in case of more functions (to avoid Mix & Match problems).
2. There are POS in UK getting National certificate after MID date
3. The number of installed MID certified systems in UK and NL are rather limited, likely due to Mix & Match problem (who is able to state an station with MID dispenser and MID SSD of different manufacturers)
4. Some times there are curious installations in NL. MID-dispensers and one national certified dispenser are connected to a national certified SSD, to avoid legal difficulties with Mix & Match.
5. More over the constructions of the MID and the national certified dispenser under point 4 are same. Only a few dispenser manufacturers have this possibility, so the overall MID certificate is in this case a real trade barrier.

Conclusion:

- **These examples demonstrate that the concept of an overall certificate (dispenser and POS in one certificate) does not work in the field.**
- **None of the EU member states are presently following the directive's requirement. Even the 2 countries closest, The Netherlands and UK, have made exemptions in order to have a workable situation.**

MID amendment necessary even for after the transition period:

1. **Self-Service devices should become Sub Assemblies.**
2. **Directive must indicate that a MID certified Self-Service device is required for Sale stacking and Unmanned sales.**

Proposal : Add requirements on measurement data processing unit applicable to all measuring instrument when they include or are connected to such a unit

Aim : Fix appropriate harmonized essential requirements for the data processing unit which are frequently used together with the measuring instrument.

Reason of the amendment

There is obviously a strong interest on further processing of measuring data, received from a MID measuring instrument (e. g. for billing on special tariffs in combination with temperature or time or combinations of data like volume and weight for transport of packages). The derived “measuring”-values from such data processing instruments are used for billing in a comparable way as the direct measured values from the MID measuring instruments. Therefore it seems appropriate to provide the same degree of protection for the derived values as for the directly measured values as both are used for the purposes described in Article 2 of the MID.

Up to now there is only a limited requirement for further processing of data in Annex 1 , 11. The development of national requirements is not possible. Standardisation bodies are discussing the issue in the field of utility meters but there is a need for more developed essential requirements to base any standard on.

Harmonisation of the functionality “further data processing” could be realised by adding special technical features to any existing instrument specific annex of the MID. The necessary procedure for such additions is very time consuming. An alternative solution for this problem could be to wait for the possible extension of the sub assembly approach to a sub-assembly “Metrological Data Processing Unit” (MDPU) with a specific annex dedicated to MDPU but this approach is not likely to be developed soon.

So the proposed solution is to extend the essential requirements in annex 1.

As most new measuring instruments are already equipped with software controlled micro processors, every notified body with the competence for electronic software controlled instruments should be able to assess the conformity of the MDPU part to the essential requirement of MID in connection with the specific measuring instrument with which the MDPU is compatible.

Every processing of measuring values has influence on the correct result, especially when other measurement values not regulated by the MID (e.g. temperature or time) are used. It is therefore necessary to fix a maximum permissible error (MPE) for the complete data processing by the MDPU. As the original primary measuring quantity and the final quantity after data processing normally have different dimensions, it is necessary to apply the MPE in percent of the correct value. Based on the known practical cases the additional percent error of additional data processing is about 1/3 of the percent MPE of the primary measurement.

Draft for the amendment

Add to Annex 1 the following definition and requirements (in paragraphs of annex 1 as numbered below) . Other specific essential requirements could be included in specific annexes (like requirements on time clock for utility meters)

Metrological Data Processing Unit

A metrological data processing unit (MDPU) is a software controlled device, used in order to calculate and/or indicate new measuring quantities, derived from the measuring result of the connected primary measuring instrument by combining or converting them with the time of measurement or other measuring quantities as e. g. temperature or pressure of the measurand.

Note: A MDPU may be connected to or integrated into one or more primary instruments by protected data channels.

Requirements for metrological data processing units:

The specific requirements for the measuring instrument shall be valid for the MDPU as far as applicable.

Maximum permissible errors

1.5 An MDPU is always assigned to at least one primary instrument according to the specific Annexes MI. The MDPU is a downstream unit i.e. it is processing the output of one or more instruments. The maximum permissible error (MPE) of the quantity calculated and / or indicated by an MDPU is the sum of the MPE of the primary instrument(s) plus an additional amount for errors caused by the MDPU which is defined as follows:

- (a) The additional MPE for a downstream MDPU is $1/3$ of the MPE of the primary measuring instrument connected to the MDPU.
- (b) If the MDPU is processing the output of more than one primary measuring instrument defined in Annexes MI, the additional MPE of the MDPU is $1/3$ of the arithmetic mean of the MPEs of all involved primary instruments.

10. 6. A MDPU shall be equipped with its own device or use the indication of the measuring instrument.

Proposal

- 8.16 Include requirement for real time clock whenever used in a measuring instrument
- 11.3 Include requirements on time /clock

Aim

Setting of general requirements for making a traceable time available in a meter by a clock, if used for legally important purposes. The time shall be available also, if a communication with other devices is not possible or disturbed. In order to improve the quality of the time a synchronization with a (central) high quality clock via communication shall be possible. A setting of time which does not lead to invalid results shall be considered as synchronization. A setting of time which is larger than the allowed synchronization span shall be possible, but only under an appropriate audit trail to avoid fraud.

By this measure, there is no need to consider the communication system (for instance of an utility company) in respect to legal aspects.

A clock shall be a part of a meter (internal or permanently connected by the manufacturer) only if legally function need the time and or the date.

The MPE on time (or clock) shall be part of the instrument specific Annexes, hence amendments of the concerned specific annexes MI00x are needed in this respect.

Reasons

For some measuring instrument categories the real time clock is a critical aspect of consumer protection. Further, time depending functionality will become much more important in future (see **Energy End-Use Efficiency and Energy Services Directive, 2006/32/EC**, smart grids etc.).

Providing the time by a clock as part of the meter will guarantee correct measurement results by a conformity assessment of the clock and improve the reliability of meters, especially if complicated rate structures will be used (utility meters).

WELMEC WG 11 consider the time as covered by Annex 1, clause 10 suitability.

The amendment of requirements in respect to the time will improve legal certainty and avoid national legislation.

Draft text proposal for the amendment of Annex 1 by requirements on the clock.

ANNEX I

ESSENTIAL REQUIREMENTS

DEFINITIONS

Clock

Device which provides the time and date for activating functions or stamping data

12. Clock

If the time or the date is used for functions under legal control or for stamping data in respect to purposes listed in article 4 (c), then the time and date shall be provided by a clock which is part of the instrument.*

The clock shall include a calendar covering a sufficient period of time if measurements are date dependent or if the time and date is part of the measuring result.

The time shall have a clear relation to the legal time at the place of use in order to allow a check by the concerned parties.**

The clock shall be settable to keep the relation to the legal time under appropriate protection on site as well as remotely (via an communication interface) if applicable.***

~~12~~ **13** Conformity evaluation

Explanations

* The clock need not to be inside the same housing but shall be delivered under the responsibility of the manufacturer (see article 10)

** In order to avoid problems with the summer time it should be possible to use UTC for instance

*** This includes a setting (a relative large change) or a synchronization which do not influence the validity of the measured results.

The appropriate protection includes a password protection, the allowed number of changes in a certain time period and an audit trail like the memorization of data about settings over a sufficient time in a lock book, which it allow to handle a consumer appeal.

Proposal :

Include the principle of not exploiting the MPE in annex 1

Aim :

Apply to all instruments the principle of not exploiting the MPE which existed first only for gas meter (same sign rule) and has been extended already to Annex Mi 001 to MI005

Reasons for the development

During the previous discussion on modification of MID concerning the replacement of the same sign rule principle in annex Mi 002, the majority of member states were in favour of having a general essential requirement in Annex 1 on this issue. For reason of difficulty in revising Annex 1 it was not the solution adopted at that time and the amendment was only included in some of the specific annexes.

The text included by directive 2009/137/EC of 10 November 2009 is the following : The meter shall not exploit the MPE or systematically favour any party.

As this could not be adapted to all categories an alternative text is proposed

Draft for the amendment

Add an essential requirement in 7 (Suitability) of Annex 1

Either

“The measuring instrument shall not exploit the MPE or systematically favour any party.”

Or

“A measuring instrument shall be designed so as to prevent the exploitation of MPEs in view of favouring one party.”

Item 2.4 (WG2) and 8.19 (WG8)

Version 4.0

Amendment

WG2: Temperature limits

WG8: Change in annex 1 or 6 because of special environment requirements

Chapter of MID

Annex I no. 1.3.1 Climatic environment

Text of the amendments

See page 2

Reason of the amendment

WG 2:

Different opinions regarding Article 8.3, Annex I 1.3.1 (Table 1) and Annex MI 006 Chapter I no 1.3 point out that there is a problem in practice. (eg 0 °C is missing in Table 1.

Present differences of opinion between Notified Bodies, and between member states, on MID temperature requirements for MI 006 instruments

WG 8:

Possible conflicts between the possibility for a member state to have special environment requirements based on the table 1 in annex 1 and the fact that MI 006 allows reduced range of temperature not including the limits indicated in table 1 of annex 1

Total amount of pages, including this cover

2 pages

Amendment to MID Annex MI-006 CHAPTER I

- 1.3 For the mechanical and climatic influence quantities:
The upper temperature limit and lower temperature limit can be otherwise specified as in Table 1 of Annex I with a minimum range of 30 °C unless otherwise specified in the following chapters of this Annex.

The mechanical environment classes according to Annex I, paragraph 1.3.2 are not applicable. For instruments which are used under special mechanical strain, e.g. instruments incorporated into vehicles, the manufacturer shall define the mechanical conditions of use.

Proposal : Add requirements on the sealing

Aim : Improve the sealing method (non transferability) and provide a mean to trace any access to the sealed parts after the instrument has been put on the market or into use.

Reasons for the development

There is an essential requirement applicable to all instruments that it shall be protected against corruption and especially in some cases that security means shall provide an evidence of an intervention.

The integrity of this sealing is of particular importance in case of a need of adjustment in situ before putting into use and later when the instrument is in use.

The experience is that this existing requirement is not sufficient to prevent fraud on the sealing (removal and reaffixing) and to provide a traceability as long as no identification is required.

The proposal is to add a requirement similar to what applies for the CE marking concerning the non transferability and to add a possibility of identification.

Draft for the amendment

Modify Annex 1 §8 as follows

“8.2

...evidence of an intervention. *In the case of physical seal it shall be self destructive upon removal and bear a marking to identify who has affixed it.*”

Item 2.5

Version 4.0

Amendment

Hard copy

Chapter of MID

Annex I no. 10.1 and 10.3

Text of the amendments

See page 2

Reason of the amendment

The meaning of “Hard Copy” Annex I 10.1 and 10.3 leads in different translations to misunderstandings, and needs to be clarified. (The question has been raised as some instruments deliver thousands of measuring results per day.)

Some WG2 members believe that “hard copy” can only mean a printout and some believe that to avoid an apparent conflict in the English version of the MID it must be understood to mean either a printout or data storage. Some are not in favour of to be interpreting hardcopy as data storage entry because this is not in alignment of No. 10.2 of annex I “Easy reading of the presented results under normal conditions of use”.

Total amount of pages, including this cover

2 pages

Amendment to MID Annex I

10 *Indication of result*

- 10.1 Indication of the result shall be by means of a display or hard copy in the form of a printout or storage.
- 10.2 The indication of any result shall be clear and unambiguous and accompanied by such marks and inscriptions necessary to inform the user of the significance of the result. Easy reading of the presented result shall be permitted under normal conditions of use. Additional indications may be shown provided they cannot be confused with the metrologically controlled indications.
- 10.3 In the case of hard copy, if it is a print out it shall be easily legible, in case of a storage it shall be made easily available and both shall be non-erasable.
- 10.6 In case of storage, indication of the values via a display (or by means of a software on a screen) under legal control must be possible

Proposal A

WG 8.14 display

Aim:

Setting up of requirements for the application of displays based on information technology (IT) for the access to metrological controlled values (which are the base for billing) instead of a conventional displays on site.

The installation of a meter using an IT based display shall be permitted only if the consumer accept this kind of solution. A discrimination of users which prefer a conventional solution shall be forbidden. This shall include financial disadvantages or other kind of pressure.

Reasons:

The use of Internet based solutions allow it to provide the results in comfortable way by a high level of data protection as well as concerning the authenticity and integrity of data (see also MID Annex1 clause 8.4) as an example.

The realization of an display on site is connected with considerable efforts which are not needed if a back up solution known as “hard copy” (AWI) is available on site. This approach provide legal certainty for the case of an appeal or for other needs like testing (see also Annex 1, 7.6).

- the amendment shall be a basis for a harmonised standard to have a common application of IT solutions in all member states.
- an appropriate level of consumer protection is given also for IT based solutions

Proposal B

WG 11.6 add requirement for display of legally important results

Aim:

It shall be emphasized that all legally relevant measurement results (registers and time interval values) need to be retrievable on a legally controlled display on the meter

WG 11 consider these function as covered by Annex 1, clause 10 suitability. The amendment shall implement specific requirements in respect to this functionality.

Reasons:

- a lack of consumer protection shall be avoided for complicated rate structures
- different interpretations of MID shall be avoided
- the amendment will support the standardisation (mandate M441),
- an improvement of legal certainty for manufacturer and utilities will be reached,

Draft of the amendment of MID Annex 1 by changing the requirements for the display

Amendments are underlined in respect to proposal A, point 8.4

Amendments are double underlined in respect to proposal B, point 11.6

10 Indication of result

10.5. ~~Whether or not a~~ A measuring instrument intended for utility measurement purposes ~~can be remotely read~~ it shall ~~in any case~~ be fitted with a metrological controlled display accessible ~~without tools~~ to the consumer.

Whether or not the transmission of data involve services of third parties* the meter shall allow retrieval of data on site over an appropriate period of time.**

The reading of this metrological controlled display shall provide all legally relevant*** ~~is the~~ measurement results that serves as the basis for the price to pay.

PUTTING INTO USE (to be added in the instrument specific annexes)

As regards the display the Member States shall ensure that the kind of display determined by the distributor or the person legally designated for installing the meter is such that the display is available for the end user without discrimination for the measurement task that is foreseen or foreseeable. 4*

Explanations

* Services of third parties mean for instance an internet provider and data bank services of an utility company.

** By these additional provisions the check of the data shall be possible also if the services of third parties are not available. An example may be a terminal program, which reads the complete data sets in an ASCII format over an optical interface.

The MID allows only solutions where a manufacturer provide complete measuring instruments. By allowing the use of standardised interfaces and commonly available hardware and software an acceptable replacement of a physical available display on site is given in the case of a need (appeal, testing).

*** This requirement clarifies the need to measure all data used for purposes mentioned in article 4(c) by a measuring instrument (if in the scope of MID).

4* The consumer shall have a choice to avoid solutions which he does not want.

Proposal A

11.7 change of MI001 concerning the minimum ratio of Q3/Q1

Aim:

Improvement of water measurements by an increased ratio of Q3/Q1. A ratio below 40 does not cover the consumer behavior proper (small flows or dripping taps are not or not correctly measured).

After a change of Annex MI001 there shall be no extension of the validity of existing MID certificates with ratio $Q3/Q1 < 40$.

Reasons:

- A minimum of Q3/Q1 of ≥ 40 meters are seen as state of the art,
- the harmonised standard (EN 14154-2010 1,2,3:2007/A2:2010) is changed in this way.

Proposal B

11.8 Include combination meters for water

Aim:

Avoidance of different interpretations of Annex MI001 in respect to the possibility to assess water meters, which include more than one measurement transducer to reach large ratios of Q3/Q1.

The aim shall be reached by a changed definition of a water meter.

Reasons:

- no specific requirements for combination meters are needed
- introduction of special requirements may lead to impediment of technical progress
- clarification is reached by change of definition

Draft text proposal for the changed of MI001

[Amendments are marked by a underline for the proposal A, point 11.7](#)

[Amendments are marked by a double underline for the proposal B, point 11.8](#)

ANNEX MI-001

WATER METERS

The relevant requirements of Annex I, the specific requirements of this Annex and the conformity assessment procedures listed in this Annex, apply to water meters intended for the measurement of volumes of clean, cold or heated water in residential, commercial and light industrial use.

DEFINITIONS

Water Meter

An instrument designed to measure, memorise and display the volume at metering conditions of water passing through the measuring instrument measurement transducer.

Minimum Flowrate (Q1)

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

Transitional Flowrate (Q2)

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 (Q3)

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 (Q4)

The overload flowrate is the highest flowrate at which the meter operates in a satisfactory manner for a short period of time without deteriorating.

SPECIFIC REQUIREMENTS

Rated Operating Conditions

The manufacturer shall specify the rated operating conditions for the instrument, in particular;

1. The flowrate range of the water

The values for the flowrate range shall fulfil the following conditions:

$$Q3/Q1 \geq 40 \text{ } 40$$

$$Q2/Q1 = 1,6$$

$$Q4/Q3 = 1,25$$

~~For 5 years from the date of entry into force of this Directive the ratio Q2/Q1 may be: 1,5, 2,5, 4 or 6,3.*~~

2. The temperature range of the water.

The values for the temperature range shall fulfil the following conditions:

0,1 °C to at least 30 °C, or

30 °C to at least 90 °C.

The meter may be designed to operate over both ranges.

3. The relative pressure range of the water, the range being 0,3 bar to at least 10 bar at Q3.

4. For the power supply: the nominal value of the AC voltage supply and/or the limits of DC supply.

MPE

5. The MPE, positive or negative, on volumes delivered at flowrates between the transitional flowrate (Q2) (included) and the overload flowrate (Q4) is:

- 2 % for water having a temperature ≤ 30 °C,
- 3 % for water having a temperature > 30 °C.

6. The MPE, positive or negative, on volumes delivered at flowrates between the minimum flowrate (Q1) and the transitional flowrate (Q2) (excluded) is 5 % for water having any temperature.

▼M3

6a. The meter shall not exploit the MPE or systematically favour any party.

Permissible Effect of Disturbances

7.1. Electromagnetic immunity

7.1.1. The effect of an electromagnetic disturbance on a water meter shall be such that:

— the change in the measurement result is no greater than the critical change value as defined in 8.1.4, or

— the indication of the measurement result is such that it cannot be interpreted as a valid result, such as a momentary variation that cannot be interpreted, memorised or transmitted as a measuring result.

7.1.2. After undergoing an electromagnetic disturbance the water meter shall:

- recover to operate within MPE, and
- have all measurement functions safeguarded, and
- allow recovery of all measurement data present just before the disturbance.

7.1.3. The critical change value is the smaller of the two following values:

- the volume corresponding to half of the magnitude of the MPE in the upper zone on the measured volume;
- the volume corresponding to the MPE on the volume corresponding to one minute at flowrate Q3.

7.2. Durability

After an appropriate test, taking into account the period of time estimated by the manufacturer, has been performed, the following criteria shall be satisfied:

7.2.1. The variation of the measurement result after the durability test, when compared with the initial measurement result, shall not exceed:

- 3 % of the metered volume between Q1 included and Q2 excluded;
- 1,5 % of the metered volume between Q2 included and Q4 included.

7.2.2. The error of indication for the volume metered after the durability test shall not exceed:

- ± 6 % of the metered volume between Q1 included and Q2 excluded;
- $\pm 2,5$ % of the metered volume between Q2 included and Q4 included for water meters intended to meter water with a temperature between $0,1$ °C and 30 °C,
- $\pm 3,5$ % of the metered volume between Q2 included and Q4 included for water meters intended to meter water with a temperature between 30 °C and 90 °C.

Suitability

8.1. The meter shall be able to be installed to operate in any position unless clearly marked otherwise.

8.2. The manufacturer shall specify whether the meter is designed to measure reverse flow. In such a case, the reverse flow volume shall either be subtracted from the cumulated volume or shall be separately recorded. The same MPE shall apply to both forward and reverse flow. Water meters not designed to measure reverse flow shall either prevent reverse flow or shall withstand an accidental reverse flow without any deterioration or change in metrological properties.

Units of Measurement

9. Metered volume shall be displayed in cubic metres.

Putting into Use

10. The Member State shall ensure that the requirements under 1, 2 and 3 are determined by the distributor or the person legally designated for installing the meter, so that the meter is appropriate for the accurate measurement of consumption that is foreseen or foreseeable.

CONFORMITY ASSESSMENT

The conformity assessment procedures referred to in Article 9 that the manufacturer can choose between are:
B + F or B + D or H1.

Explanation:

*This provision can be deleted because the 5 years period is in the past.

Proposal

11.3 include requirements on time /clock

11.4 include requirements on multiple register

11.5 include requirements on interval meter

11.6 add requirement for display of all legally important results

in respect to gas meters

Aim:

Setting of requirements for advanced billing features in a meter by introducing a registration device as a subassembly.

The subassembly is an optional part of a meter.

It is up to the manufacturer to realize one, only a sub set of the features or to design a meter, which is able to cover different features.

Examples for realized features:

- only 2 registers for high and low rate (tariff) switched by an external signal,
- only 2 registers for high and low rate (tariff) switched by a time frame (in this case the meter shall have a clock which may be synchronized),
- only 2 registers for high and low rate (tariff) switched by an internal threshold,
- instead of 2 registers for low and high rate a interval registration of hourly consumption (in this case the meter shall have a clock which may be synchronized).

Note: If a result of an additional function will be determined by a part of the meter which was not conformity assessed (hard- or software) it shall be clearly distinctable from those results which were subject to the conformity assessment.

The distributor (or the responsible stakeholder) shall bill a consumer only on the basis of measuring values which are measured by a conformity assessed meter.

Example:

- *If a meter has only 2 registers for high and low rate (tariff), switched by an external signal, the utility shall offer the consumer a contract in which the minimum amount of time during a day is specified in which the low tariff is offered.*

Reasons for the development of requirements for a registration device

Time depending functionality (time of use/interval metering) will become much more important in future in order to support the saving and control of energy consumption (**Energy End-Use Efficiency and Energy Services Directive, 2006/32/EC**, smart grids etc.). The registration of energy in registers or intervals is a known solution for the consumer protection especially if complicated rate structures shall be applied.

WG 11 considers these function as covered by Annex 1, clause 10 suitability but the amendment shall implement specific requirements in respect to this functionality.

The proposal improves the legal certainty for manufacturers, notified bodies and utilities by amendment to annexes.

Draft text proposal for the amendment of MI002 by requirements on a registration device

(Annex MI-002, 003 and MI004 are handled in principle in the same way, but specialities of gas meters are taken into account)

Amendments in respect to point 11.3-6 are underlined.

11.3 are marked bold

11.4 only underlined
11.5 italic and bold
11.6 are marked italic

ANNEX MI-002

GAS METERS AND VOLUME CONVERSION DEVICES

The relevant requirements of Annex I, the specific requirements of this Annex and the conformity assessment procedures listed in this Annex, apply to gas meters and volume conversion devices defined below, intended for residential, commercial and light industrial use.

Definitions

Gas meter

An instrument designed to measure, memorise and display the quantity of fuel gas (volume or mass) that has passed it.

Conversion device

A device fitted to a gas meter that automatically converts the quantity measured at metering conditions into a quantity at base conditions.

Minimum flowrate (Q_{\min})

The lowest flowrate at which the gas meter provides indications that satisfy the requirements regarding maximum permissible error (MPE.)

Maximum flowrate (Q_{\max})

The highest flowrate at which the gas meter provides indications that satisfy the requirements regarding MPE.

Transitional flowrate (Q_t)

The transitional flowrate is the flowrate occurring between the maximum 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.

Overload Flowrate (Q_r)

The overload flowrate is the highest flowrate at which the meter operates for a short period of time without deteriorating.

Base conditions

The specified conditions to which the measured quantity of fluid is converted.

Registration device

A registration device is a device fitted to a gas meter or to a conversion device (as an integral part or separate device) in order to register the amount of gas measured by the gas meter or converted by a conversion device in registers during periods depending on conditions.

Register

A register is a component of a registration device which counts the amount of gas if activated and memorises the result.

Interval register

An interval register belongs to a set of registers used for the registration of the amount of gas during consecutive time intervals.

Note: To each measuring interval belongs a single interval value.

Demand

The demand represents the quotient of the amount of gas divided by the time in which the amount of gas was determined.

PART I – SPECIFIC REQUIREMENTS – GAS METERS

1. Rated operating conditions

The manufacturer shall specify the rated operating conditions of the gas meter, taking into account:

1.1. The flowrate range of the gas shall fulfil at least the following conditions:

| Class | Q_{max}/Q_{min} | Q_{max}/Q_t | Q_r/Q_{max} |
|-------|-------------------|---------------|---------------|
| 1.5 | ≥ 150 | ≥ 10 | 1.2 |
| 1.0 | ≥ 20 | ≥ 5 | 1.2 |

1.2. The temperature range of the gas, with a minimum range of 40°C.

1.3. The fuel/gas related conditions.

The gas meter shall be designed for the range of gases and supply pressures of the country of destination. In particular the manufacturer shall indicate:

- the gas family or group;
- the maximum operating pressure.

1.4. A minimum temperature range of 50°C for the climatic environment.

1.5. The nominal value of the AC voltage supply and/or the limits of DC supply

2. Maximum permissible error (MPEs)

2.1. Gas meter indicating the volume at metering conditions or mass

Table 1

| Class | 1,5 | 1.0 |
|---------------------------|------|-----|
| $Q_{min} \leq Q < Q_t$ | 3% | 2% |
| $Q_t \leq Q \leq Q_{max}$ | 1,5% | 1% |

▼M3

The gas meter shall not exploit the MPEs or systematically favour any party.

2.2. For a gas meter with temperature conversion, which only indicates the converted volume, the MPE of the meter is increased by 0,5 % -in a range of 30 °C extending symmetrically around the temperature specified by the manufacturer that lies between 15 °C and 25 °C. Outside this range, an additional increase of 0,5 % is permitted in each interval of 10 °C .

3. Permissible effect of disturbances

3.1. Electromagnetic immunity

- 3.1.1. The effect of an electromagnetic disturbance on a gas meter or volume conversion device shall be such that:
- the change in the measurement result is no greater than the critical change value as defined in 3.1.3, or
 - the indication of the measurement result is such that it cannot be interpreted as a valid result, such as a momentary variation that cannot be interpreted, memorised or transmitted as a measuring result.
- 3.1.2. After undergoing a disturbance, the gas meter shall:
- recover to operate within MPE, and
 - have all measurement functions safeguarded, and
 - allow recovery of all measurement data present just before the disturbance.
- 3.1.3. The critical change value is the smaller of the two following values:
- the quantity corresponding to half of the magnitude of the MPE in the upper zone on the measured volume;
 - the quantity corresponding to the MPE on the quantity corresponding to one minute at maximum flowrate.
- 3.2. Effect of upstream-downstream flow disturbances
Under installation conditions specified by the manufacturer, the effect of the flow disturbances shall not exceed one third of the MPE.
4. Durability
After an appropriate test, taking into account the period of time estimated by the manufacturer, has been performed, the following criteria shall be satisfied:
- 4.1. Class 1.5. meters
- 4.1.1. The variation of the measurement result after the durability test when compared with the initial measurement result for the flow rates in the range Q_t to Q_{max} shall not exceed the measurement result by more than 2%
- 4.1.2. The error of indication after the durability test shall not exceed twice the MPE in paragraph 2.
- 4.2. Class 1.0 meters
- 4.2.1. The variation of the measurement result after the durability test when compared with the initial measurement result shall not exceed one-third of the MPE in paragraph 2.
- 4.2.2. The error of indication after the durability test shall not exceed the MPE in paragraph 2.
5. Suitability
- 5.1. A gas meter powered from the mains (AC or DC) shall be provided with an emergency power supply device or other means to ensure, during a failure of the principal power source, that all measuring functions are safeguarded.
- 5.2. A dedicated power source shall have a lifetime of at least five years. After 90% of its lifetime an appropriate warning shall be shown.

- 5.3. An indicating device shall have a sufficient number of digits to ensure that the quantity passed during 8000 hours at Q_{\max} does not return the digits to their initial values.
- 5.4. The gas meter shall be able to be installed to operate in any position declared by the manufacturer in its installation instruction.
- 5.5. The gas meter shall have a test element, which shall enable tests to be carried out in a reasonable time.
- 5.6. The gas meter shall respect the MPE in any flow direction or only in one flow direction clearly marked.

5.7. If a meter is designed to determine the amount of gas for both directions (import/export), the meter shall be fitted with

- two registers or displays respectively (one for each direction).
- a display of the total amount of gas adding the volume or mass of both directions under consideration of the sign. (*)
- a display of the total amount of gas adding the volume or mass of both directions as absolute sum (*)

The name plate shall include information about the applied solution

The meter shall fulfill the requirements of this annex for both flow directions.

6. Units

Metered quantity shall be displayed in cubic metre, or in kilogram.

PART II – SPECIFIC REQUIREMENTS – VOLUME CONVERSION DEVICES

A volume conversion device constitutes a sub-assembly according to Article 4, definition (b), second indent.

For a volume conversion device, the essential requirements for the gas meter shall apply, if applicable. In addition, the following requirements shall apply:

7. Base conditions for converted quantities

The manufacturer shall specify the base conditions for converted quantities.

8. MPE

- 0,5% at ambient temperature $20^{\circ}\text{C} \pm 3^{\circ}\text{C}$, ambient humidity 60% \pm 15%, nominal values for power supply;
- 0,7% for temperature conversion devices at rated operating conditions;
- 1% for other conversion devices at rated operating conditions.

Note: The error of the gas meter is not taken into account.

9. Suitability

- 9.1. An electronic conversion device shall be capable of detecting when it is operating outside the operating range(s) stated by the manufacturer for parameters that are relevant for measurement accuracy. In such a case, the conversion device must stop integrating the converted quantity, and may totalise separately the converted quantity for the time it is operating outside the operating range(s).

9.2. An electronic conversion device shall be capable to display all relevant data for the measurement without additional equipment.

PART III — SPECIFIC REQUIREMENTS — REGISTRATION DEVICES

A registration device constitutes a sub-assembly according to Article 4, definition (b), second indent.

For a registration device, the essential requirements for the meter according to Part I and the conversion device according to Part II shall apply, if applicable. In addition, the following requirements shall apply

10. Rated operated conditions:

Taking into account the internal resolution of the meter and the properties of the used interface, the manufacturer shall specify the rated operating conditions, *in particular the minimum length of intervals, in order to avoid inadmissible errors for the intended measurement task.*

11. MPE

11.1 Clock

1 s/day

11.2 Demand

The sum of the MPE for the gas meter and the conversion device, if applicable.

For influences raised by the interface between the gas meter or the conversion device respectively and the registration device an additional increase of one third of the MPE is permitted.

11.3 MPE of quantities used for threshold activation (see 12.2)

MPE for demands shall apply identically to 11.2 if used for threshold activation.

12. Suitability

12.1 The accumulation in the active register shall have the same progress as the volume or mass measured by the meter.

12.2 The registration device shall register the amount of gas in different registers activated by

- signals of an internal time switch.
- signals of an internal quantity dependent threshold indication and/or
- remote control signals at peripheral interface terminals.

12.3 A registration device shall be designed to provide

- one or several non-resettable registers counting the volume or mass after activation, starting with the value registered at the last deactivation and/ or
- a set of interval registers. (*3)

12.4 A registration device shall be able to provide the time and date at which an interval value has been registered and the related error status.

12.5 An interval value shall be marked as invalid if the clock was set by more than 30s.

12.6. The number of interval registers shall be sufficient to cover a sufficient time>(*4), if a new interval value is memorized the oldest value shall be deleted.

12.7 Demands shall be determined on the basis of discrete interval values. Maximum demands shall be determined for separate periods as a day; a week; a month or a year and stored in particular registers if applicable.

12.8 In addition to the interval values a registration device can determine and register average values of quantities, if measured by the gas meter or conversion device.

13. Indication

The registration device shall provide on a legally controlled display

- the information which register is currently activated (*5),
 - values of registers and/ or interval registers,
 - the unit of values,
 - identifiers which are assigned to the displayed values,
- and if applicable
- information identifying the direction of flow belonging to import/ export value,
 - the time,
 - the time of use program(schedule) for registers,
 - the threshold values of the quantities used for activating registers,
 - parameters and information, important for the correct working of the registration device and the inability of changing legally parameters in use.

The description of identifiers shall be on the nameplate or in the documentation accompanying the instrument

14 The registration device itself or an appropriate associated software for use by the consumer shall allow to verify the correct assignment of single interval values or sums of interval values to rates (like the maximum consumption or the sum of consumption during daily periods), if such processed values serves as basis for the price to pay. (6*)

**PART IV – PUTTING INTO USE AND CONFORMITY ASSESSMENT
PUTTING INTO USE**

4015. (a) Where a Member State imposes measurement of residential use, it shall allow such measurement to be performed by means of any Class 1.5 meter, and by Class 1.0 meters which have a Q_{\max}/Q_{\min} ratio equal or greater than 150.
- (b) Where a Member State imposes measurement of commercial and/or light industrial use, it shall allow such measurement to be performed by any Class 1.5 meter.
- (c) As regards the requirements under paragraphs 1.2~~and~~ ,1.3 and 5.7 , Member States shall ensure that the properties be determined by the distributor or the person legally designated for installing the meter, so that the meter is appropriate for the accurate measurement of consumption that is foreseen or foreseeable.

Conformity assessment

The conformity assessment procedures referred to in Article 9 that the manufacturer can choose between are

B+F or B+D or H1.

Explanations

* In principle the gas meter or conversion device can have two indications (one for import and one for export) or it can add the measurands of both directions taking into account the sign. In this case the main counter is the difference of the absolute values registered for export and import.

An instrument shall consider always only one gas line, otherwise a different instrument shall be used.

*2 If the meter is designed to measure these values and to provide the results via an interface to the registration device.

*3 An interval value may contain the progress of the main counter during the time of an interval or it may contain the value of the main counter at the end of an interval. In the latter case the progress during an interval is the difference between an interval value and the previous value.

*4 The number of intervals shall cover for instance 12 weeks in the case of a monthly billing in order to allow a consumer appeal.

*5 In the case of an interval register this is determined by the actual time.

*6 In the case of complicated rate structures an additional software provided by the manufacturer shall allow to check bills. For instance allocating of intervals for time frames (night, day, weekend etc.) shall be possible by this software. This allows to reduce the functionality on the meter at the ability to indicate the values only. The software may be easily updated if new structures become important.

Proposal A

11.9 Include MPE of gas meters which indicate only the amount of gas at base conditions

Aim:

Setting of requirement for gas meters which indicate the volume at base conditions but which do not determine the volume at actual conditions. This kind of meters are on the market, that is why legal certainty is needed for the manufacturer and notified bodies.

The amendment of the preamble of MI002 in respect to gaseous fuel measuring systems for vehicles shall clarify, that a conformity assessment of such systems only at the basis of Annex MI002 is not appropriate.

Reasons:

- Improvement of legal certainty for gas meters which are only able to indicate the volume at base conditions is urgent needed,
- Harmonisation of the requirements for different technologies, e. g. meters with and without temperature conversion is needed, taking into account new developments like electronic indications with temperature compensation for diaphragm gas meters

Proposal B

11.10 add MPE of gas meters in respect to different temperature ranges

Aim:

The rated operating conditions of gas meters shall be increased in respect to the temperature range by increased MPE for the higher and lower part of temperature range. During the application the gas meters work only over a small periods (hot summer days, cold winter nights) in high and low part of the ambient temperature range.

The change of the MPE of gas meter shall lead to a reduction of unreasonable costs and a harmonization of the MPE approach in the Annexes MI001, 002 and 003.

Reasons

- Reduced meter costs for applications in large temperature range
- Improvement of the possibility to develop new technologies for appropriate large temperature ranges
- Achievement of consistency of the approach in MI-003 (item 3, table 2) and MI-001 (item 5) is needed, taking into account the value of the commodities.

Draft for the amendment of MI002 by requirements on meters which indicate only the amount of gas at base conditions (A)

Amendments in respect to 11.9 are underlined (proposal A)

Draft for the amendment of MI002 by changed MPE for different temperature ranges

Amendments in respect to point 11.10 are underlined double (proposal B)

The relevant requirements of Annex I, the specific requirements of this Annex and the conformity assessment procedures listed in this Annex, apply to gas meters and volume conversion devices defined below, intended for residential, commercial and light industrial use. [This annex does not apply to compressed gaseous fuel measuring systems for vehicles.](#)

Definitions

Gas meter

An instrument designed to measure, memorise and display the quantity of fuel gas (volume or mass) that has passed it.

Conversion device

A device fitted to a gas meter that automatically converts the quantity measured at metering conditions into a quantity at base conditions.

Minimum flowrate (Q_{min})

The lowest flowrate at which the gas meter provides indications that satisfy the requirements regarding maximum permissible error (MPE.)

Maximum flowrate (Q_{max})

The highest flowrate at which the gas meter provides indications that satisfy the requirements regarding MPE.

Transitional flowrate (Q_t)

The transitional flowrate is the flowrate occurring between the maximum 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.

Overload Flowrate (Q_r)

The overload flowrate is the highest flowrate at which the meter operates for a short period of time without deteriorating.

Base conditions

The specified conditions to which the measured quantity of fluid is converted.

PART I – SPECIFIC REQUIREMENTS – GAS METERS

1. Rated operating conditions

The manufacturer shall specify the rated operating conditions of the gas meter, taking into account:

1.1. The flowrate range of the gas shall fulfil at least the following conditions:

| Class | Q_{max}/Q_{min} | Q_{max}/Q_t | Q_r/Q_{max} |
|-------|-------------------|---------------|---------------|
| 1.5 | ≥ 150 | ≥ 10 | 1.2 |
| 1.0 | ≥ 20 | ≥ 5 | 1.2 |

1.2. The temperature range of the gas, with a minimum range of 40°C.

1.3. The fuel/gas related conditions.

The gas meter shall be designed for the range of gases and supply pressures of the country of destination. In particular the manufacturer shall indicate:

- the gas family or group;
- the maximum operating pressure.

- 1.4. A minimum temperature range of 50°C for the climatic environment.
- 1.5. The nominal value of the AC voltage supply and/or the limits of DC supply
- 1.6. The base conditions for gas meters indicating the volume at base conditions

2. Maximum permissible error (MPEs)

- 2.1. Gas meter indicating the volume at metering conditions or mass

| | | |
|----------------------------|------|-----|
| Class | 1,5 | 1.0 |
| $Q_{\min} \leq Q < Q_t$ | 3% | 2% |
| $Q_t \leq Q \leq Q_{\max}$ | 1,5% | 1% |

Table 1

The MPEs of Table 1 shall be fulfilled in a range of 30 °C for class 1,5 and 40 °C for class 1 extending symmetrically around the temperature specified by the manufacturer that lies between 15 °C and 25 °C. Outside this range, an additional increase of one third of the MPE is permitted in each interval of 10 °C.

▼M3

The gas meter shall not exploit the MPEs or systematically favour any party.

- 2.2. For a gas meter with temperature conversion, which only indicates the converted volume, and a gas meter which only indicates the volume at base conditions the MPE of the meter is increased by 0,5 % additionally to the MPE given in 2.1. ~~in a range of 30 °C extending symmetrically around the temperature specified by the manufacturer that lies between 15 °C and 25 °C. Outside this range, an additional increase of 0,5 % is permitted in each interval of 10 °C.~~

3. Permissible effect of disturbances

3.1. Electromagnetic immunity

- 3.1.1. The effect of an electromagnetic disturbance on a gas meter or volume conversion device shall be such that:

- the change in the measurement result is no greater than the critical change value as defined in 3.1.3, or
- the indication of the measurement result is such that it cannot be interpreted as a valid result, such as a momentary variation that cannot be interpreted, memorised or transmitted as a measuring result.

- 3.1.2. After undergoing a disturbance, the gas meter shall:

- recover to operate within MPE, and
- have all measurement functions safeguarded, and
- allow recovery of all measurement data present just before the disturbance.

- 3.1.3. The critical change value is the smaller of the two following values:

- the quantity corresponding to half of the magnitude of the MPE in the upper zone on the measured volume;

- the quantity corresponding to the MPE on the quantity corresponding to one minute at maximum flowrate.
- 3.2. Effect of upstream-downstream flow disturbances
Under installation conditions specified by the manufacturer, the effect of the flow disturbances shall not exceed one third of the MPE.
- 4. Durability
After an appropriate test, taking into account the period of time estimated by the manufacturer, has been performed, the following criteria shall be satisfied:
 - 4.1. Class 1.5. meters
 - 4.1.1. The variation of the measurement result after the durability test when compared with the initial measurement result for the flow rates in the range Q_t to Q_{max} shall not exceed the measurement result by more than 2% in paragraph 2.1. and 3% in paragraph 2.2.
 - 4.1.2. The error of indication after the durability test shall not exceed twice the MPE in paragraph 2.
 - 4.2. Class 1.0 meters
 - 4.2.1. The variation of the measurement result after the durability test when compared with the initial measurement result shall not exceed one-third of the MPE in paragraph 2.1 and two-third of the MPE in paragraph 2.2.
 - 4.2.2. The error of indication after the durability test shall not exceed the MPE in paragraph 2.
- 5. Suitability
 - 5.1. A gas meter powered from the mains (AC or DC) shall be provided with an emergency power supply device or other means to ensure, during a failure of the principal power source, that all measuring functions are safeguarded.
 - 5.2. A dedicated power source shall have a lifetime of at least five years. After 90% of its lifetime an appropriate warning shall be shown.
 - 5.3. An indicating device shall have a sufficient number of digits to ensure that the quantity passed during 8000 hours at Q_{max} does not return the digits to their initial values.
 - 5.4. The gas meter shall be able to be installed to operate in any position declared by the manufacturer in its installation instruction.
 - 5.5. The gas meter shall have a test element, which shall enable tests to be carried out in a reasonable time.
 - 5.6. The gas meter shall respect the MPE in any flow direction or only in one flow direction clearly marked.
- 6. Units
Metered quantity shall be displayed in cubic metre, or in kilogram.

PART II – SPECIFIC REQUIREMENTS – VOLUME CONVERSION DEVICES

A volume conversion device constitutes a sub-assembly according to Article 4, definition (b), second indent.

For a volume conversion device, the essential requirements for the gas meter shall apply, if applicable. In addition, the following requirements shall apply:

7. Base conditions for converted quantities
The manufacturer shall specify the base conditions for converted quantities.
8. MPE
 - 0,5% at ambient temperature 20°C +/- 3°C, ambient humidity 60% +/- 15%, nominal values for power supply;
 - 0,7% for temperature conversion devices at rated operating conditions;
 - 1% for other conversion devices at rated operating conditions.Note: The error of the gas meter is not taken into account.
9. Suitability
 - 9.1. An electronic conversion device shall be capable of detecting when it is operating outside the operating range(s) stated by the manufacturer for parameters that are relevant for measurement accuracy. In such a case, the conversion device must stop integrating the converted quantity, and may totalise separately the converted quantity for the time it is operating outside the operating range(s).
 - 9.2. An electronic conversion device shall be capable to display all relevant data for the measurement without additional equipment.

PART III – PUTTING INTO USE AND CONFORMITY ASSESSMENT**PUTTING INTO USE**

10. (a) Where a Member State imposes measurement of residential use, it shall allow such measurement to be performed by means of any Class 1.5 meter, and by Class 1.0 meters which have a Q_{max}/Q_{min} ratio equal or greater than 150.
- (b) Where a Member State imposes measurement of commercial and/or light industrial use, it shall allow such measurement to be performed by any Class 1.5 meter.
- (c) As regards the requirements under paragraphs 1.2 and 1.3 Member States shall ensure that the properties be determined by the distributor or the person legally designated for installing the meter, so that the meter is appropriate for the accurate measurement of consumption that is foreseen or foreseeable.

Conformity assessment

The conformity assessment procedures referred to in Article 9 that the manufacturer can choose between are

B+F or B+D or H1.

Proposal

11.12 Include measuring instruments for gas energy

Aim:

Setting of requirement for meters which measure the energy gaseous fuels on site in order to improve the handling of different gas qualities (compositions).
New technologies especially the application of micro system solutions allow the determination of gas qualities (gross caloric values) by reasonable costs.
The amendment shall encourage manufacturers to develop energy meters taking into account the possibility to put the instruments on the whole European market.

Reasons:

- In order to develop of energy meters the manufacturers need reasonable requirements.
- The increasing diversity of gas imports, the generation of bio gas and the liberalization of the gas market will lead to more frequent changes of the gas quality on site.
- The metering of energy on site will increase the quality of billing.

First draft for the amendment of MI002 by requirements on energy meters as a proposal for further discussion.

Main points for discussion:

- implementation of a subassembly “caloric value determination device”
- choice of MPE’s and classes
- distinction criteria for classes of energy meters

Amendments of MI002 in respect to point 11.12 are underlined

ANNEX MI-002

GAS METERS, ~~AND~~ VOLUME CONVERSION DEVICES AND ENERGY METERS

The relevant requirements of Annex I, the specific requirements of this Annex and the conformity assessment procedures listed in this Annex, apply to gas meters, ~~and~~ volume conversion devices and energy meters defined below, intended for residential, commercial and light industrial use.

Definitions

Gas meter

An instrument designed to measure, memorise and display the quantity of fuel gas (volume or mass) that has passed it.

Conversion device

A device fitted to a gas meter that automatically converts the quantity measured at metering conditions into a quantity at base conditions.

Energy meter

An instrument which measures, memorises and displays the energy of fuel gas that has passed it, based on the gross caloric value

Minimum flowrate (Q_{\min})

The lowest flowrate at which the gas meter provides indications that satisfy the requirements regarding maximum permissible error (MPE.)

Maximum flowrate (Q_{max})

The highest flowrate at which the gas meter provides indications that satisfy the requirements regarding MPE.

Transitional flowrate (Q_t)

The transitional flowrate is the flowrate occurring between the maximum 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.

Overload Flowrate (Q_r)

The overload flowrate is the highest flowrate at which the meter operates for a short period of time without deteriorating.

Maximum gross caloric value ($H_{s,max}$)

The highest gross caloric value at which the energy meter provides indications that satisfy the requirements regarding maximum permissible error (MPE.)

Minimum gross caloric value ($H_{s,min}$)

The lowest gross caloric value at which the energy meter provides indications that satisfy the requirements regarding maximum permissible error (MPE.)

Base conditions

The specified conditions to which the measured quantity of fluid is converted.

PART I – SPECIFIC REQUIREMENTS – GAS METERS

1. Rated operating conditions

The manufacturer shall specify the rated operating conditions of the gas meter, taking into account:

1.1. The flowrate range of the gas shall fulfil at least the following conditions:

| Class | Q_{max}/Q_{min} | Q_{max}/Q_t | Q_r/Q_{max} |
|-------|-------------------|---------------|---------------|
| 1.5 | ≥ 150 | ≥ 10 | 1.2 |
| 1.0 | ≥ 20 | ≥ 5 | 1.2 |

1.2. The temperature range of the gas, with a minimum range of 40°C.

1.3. The fuel/gas related conditions.

The gas meter shall be designed for the range of gases and supply pressures of the country of destination. In particular the manufacturer shall indicate:

- the gas family or group;
- the maximum operating pressure.

1.4. A minimum temperature range of 50°C for the climatic environment.

1.5. The nominal value of the AC voltage supply and/or the limits of DC supply

2. Maximum permissible error (MPEs)
- 2.1. Gas meter indicating the volume at metering conditions or mass

Table 1

| | | |
|----------------------------|------|-----|
| Class | 1,5 | 1.0 |
| $Q_{\min} \leq Q < Q_t$ | 3% | 2% |
| $Q_t \leq Q \leq Q_{\max}$ | 1,5% | 1% |

▼M3

The gas meter shall not exploit the MPEs or systematically favour any party.

- 2.2. For a gas meter with temperature conversion, which only indicates the converted volume, the MPE of the meter is increased by 0,5 % -in a range of 30 °C extending symmetrically around the temperature specified by the manufacturer that lies between 15 °C and 25 °C. Outside this range, an additional increase of 0,5 % is permitted in each interval of 10 °C .

3. Permissible effect of disturbances

3.1. Electromagnetic immunity

- 3.1.1. The effect of an electromagnetic disturbance on a gas meter or volume conversion device shall be such that:

- the change in the measurement result is no greater than the critical change value as defined in 3.1.3, or
- the indication of the measurement result is such that it cannot be interpreted as a valid result, such as a momentary variation that cannot be interpreted, memorised or transmitted as a measuring result.

- 3.1.2. After undergoing a disturbance, the gas meter shall:

- recover to operate within MPE, and
- have all measurement functions safeguarded, and
- allow recovery of all measurement data present just before the disturbance.

- 3.1.3. The critical change value is the smaller of the two following values:

- the quantity corresponding to half of the magnitude of the MPE in the upper zone on the measured volume;
- the quantity corresponding to the MPE on the quantity corresponding to one minute at maximum flowrate.

3.2. Effect of upstream-downstream flow disturbances

Under installation conditions specified by the manufacturer, the effect of the flow disturbances shall not exceed one third of the MPE.

4. Durability

After an appropriate test, taking into account the period of time estimated by the manufacturer, has been performed, the following criteria shall be satisfied:

4.1. Class 1.5. meters

- 4.1.1. The variation of the measurement result after the durability test when compared with the initial measurement result for the flow rates in the range Q_t to Q_{\max} shall not exceed the measurement result by more than 2%

4.1.2. The error of indication after the durability test shall not exceed twice the MPE in paragraph 2.

4.2. Class 1.0 meters

4.2.1. The variation of the measurement result after the durability test when compared with the initial measurement result shall not exceed one-third of the MPE in paragraph 2.

4.2.2. The error of indication after the durability test shall not exceed the MPE in paragraph 2.

5. Suitability

5.1. A gas meter powered from the mains (AC or DC) shall be provided with an emergency power supply device or other means to ensure, during a failure of the principal power source, that all measuring functions are safeguarded.

5.2. A dedicated power source shall have a lifetime of at least five years. After 90% of its lifetime an appropriate warning shall be shown.

5.3. An indicating device shall have a sufficient number of digits to ensure that the quantity passed during 8000 hours at Q_{max} does not return the digits to their initial values.

5.4. The gas meter shall be able to be installed to operate in any position declared by the manufacturer in its installation instruction.

5.5. The gas meter shall have a test element, which shall enable tests to be carried out in a reasonable time.

5.6. The gas meter shall respect the MPE in any flow direction or only in one flow direction clearly marked.

6. Units

Metered quantity shall be displayed in cubic metre, or in kilogram.

PART II – SPECIFIC REQUIREMENTS – VOLUME CONVERSION DEVICES

A volume conversion device constitutes a sub-assembly according to Article 4, definition (b), second indent.

For a volume conversion device, the essential requirements for the gas meter shall apply, if applicable. In addition, the following requirements shall apply:

7. Base conditions for converted quantities

The manufacturer shall specify the base conditions for converted quantities.

8. MPE

- 0,5% at ambient temperature $20^{\circ}\text{C} \pm 3^{\circ}\text{C}$, ambient humidity 60% \pm 15%, nominal values for power supply;
- 0,7% for temperature conversion devices at rated operating conditions;
- 1% for other conversion devices at rated operating conditions.

Note: The error of the gas meter is not taken into account.

9. Suitability

9.1. An electronic conversion device shall be capable of detecting when it is operating outside the operating range(s) stated by the manufacturer for parameters that are relevant for measurement accuracy. In such a case, the conversion device must stop integrating the converted quantity, and may totalise separately the converted quantity for the time it is operating outside the operating range(s).

9.2. An electronic conversion device shall be capable to display all relevant data for the measurement without additional equipment.

PART III – SPECIFIC REQUIREMENTS – ENERGY METERS

For a energy meter, the essential requirements for the gas meter and conversion devices shall apply, if applicable. In addition, the following requirements shall apply:

10 Rated operating conditions

The manufacturer shall specify the rated operating conditions of the energy meter, taking into account:

10.1. The flowrate range of the gas shall fulfil at least the following conditions:

| <u>Class</u> | <u>Q_{max}/Q_{min}</u> | <u>Q_{max}/Q_t</u> | <u>Q_r/Q_{max}</u> |
|--------------|--|--------------------------------------|--------------------------------------|
| <u>E 2.5</u> | <u>≥150</u> | <u>≥10</u> | <u>1.2</u> |
| <u>E 2.0</u> | <u>≥20</u> | <u>≥5</u> | <u>1.2</u> |

10.2 In addition to requirements of 1.2 to 1.5

- Concerning the gas family or group indicated by the manufacturer the minimum and maximum concentration of all gas components which may influence the result and if applicable the permitted ranges of ratios between components.
- The minimum and maximum gross caloric value with a range of at least 1,5 kWh /m³ (at base condition) or 1,2 kWh/kg
- if an energy meter incorporates a gas meter in accordance to Part I then the climatic environment may be specified different to the gas meter with a minimum temperature range of 25 °C

11. Maximum permissible error (MPEs) of an energy meter for gaseous fuels

Table 2

| <u>Class</u> | <u>E 2,5</u> | <u>E 2.0</u> |
|--|--------------|--------------|
| <u>Q_{min} < Q < Q_t</u> | <u>4%</u> | <u>3%</u> |
| <u>Q_t ≤ Q ≤ Q_{max}</u> | <u>2,5%</u> | <u>2%</u> |

If an energy meter incorporates a gas meter in accordance to Part I indicating the mass or gas meter fitted with a conversion device in accordance to PART II then the determination of the gross caloric value shall respect the MPE laid down in Table 3

Table 3

| | | |
|----------------------|--------------|--------------|
| <u>Class</u> | <u>E 2,5</u> | <u>E 2.0</u> |
| <u>H_s</u> | <u>1,5 %</u> | <u>1 %</u> |

The energy meter or the determination of the gross caloric value respectively shall not exploit the MPEs or systematically favor any party.

12. Suitability

An energy meter of class E 2.0 shall memorise the hourly mean of the gross caloric value over a sufficient time in order to allow a check of the correct work.

13 Units

The metered quantity of energy shall be displayed in kWh or MWh.

PART ~~III~~ **IV** – PUTTING INTO USE AND CONFORMITY ASSESSMENT
PUTTING INTO USE

- ~~10.~~ 14(a) Where a Member State imposes measurement of residential use, it shall allow such measurement to be performed by means of any Class 1.5 meter, and by Class 1.0 meters which have a Q_{\max}/Q_{\min} ratio equal or greater than 150.
- (b) Where a Member State imposes measurement of commercial and/or light industrial use, it shall allow such measurement to be performed by any Class 1.5 meter.
- (c) As regards the requirements under paragraphs 1.2 and 1.3 Member States shall ensure that the properties be determined by the distributor or the person legally designated for installing the meter, so that the meter is appropriate for the accurate measurement of consumption that is foreseen or foreseeable.

Conformity assessment

The conformity assessment procedures referred to in Article 9 that the manufacturer can choose between are

B+F or B+D or H1.

Proposal

11.13 include instrument transformers

in respect to electricity meters

Aim

Adding instrument transformers for electricity measurements in the scope of MI003.
Reduction of barriers on trade for a considerable number of instruments (~2% of electricity meters are used in connection with transformers which cover up to 60 % of electricity consumption in the application range of domestic, commercial and light industry consumers)
Avoidance of national regulations and national approvals
Harmonization of assessment procedures for transformers

Reasons

Experience in the last years have shown that the instrument transformer industry could get significant advantages by finding harmonized requirements for instrument transformers in all European countries.

- improved billing and consumer protection for commercial and light industry applications,
- avoidance of national regulation/ approvals,
- improvement of legal certainty for manufacturers and utilities,
- reduction of barriers on trade and
- the development of harmonized standards based on the amendments.

Draft for the ammendment of MI003

Amendments are underlined for proposals 11.13

ANNEX MI-003

~~Active energy meters~~ MEASURING EQUIPMENT FOR ELECTRICITY

PART IV – INSTRUMENT TRANSFORMERS

Indication of result

1. Annex I clause 10 does not apply. {indication of result}

Quality of the electricity

2. An instrument transformer shall satisfy the accuracy requirements laid down in this Annex in the case of electricity with a quality as specified hereafter.

No legal requirements in respect of metrological performance apply when the electricity has a quality, even momentarily, which is worse than the quality specified hereafter.

The voltage and frequency values lie within the following limits:

$$0,8 \cdot U_n < U < 1,2 \cdot U_n;$$

$$0,98 \cdot f_n < f < 1,02 \cdot f_n.$$

Rated operating conditions

3. The manufacturer shall specify the climate and mechanical environment class B or class C for which the instrument transformer has been designed in accordance with Table 1 of Annex I.

A Current transformers

Rated secondary current

4. The standard values of rated secondary currents are 1 A, 2A and 5 A.

Rated output

5. The standard values of rated output up to 30 VA are:

1 – 1,5 – 2 – 2,5 – 5,0 – 10 – 15 and 30 VA.

Accuracy classes

6. The following accuracy classes are defined for current transformers:

0,1 – 0,2 – 0,2 S – 0,5 – 0,5 S - 1 - 3 - 5

Limits of current error and phase displacement

7. Table 4 shows the limits of current error and phase displacement, which shall be respected by the current transformer under rated operating conditions for electricity with a quality as specified in requirement 2 in part 2 of this Annex.

| Accuracy class | ± Percentage current (ratio) error at percentage of rated current shown below | | | | | ± Phase displacement at percentage of rated current shown below | | | | | | | | | |
|----------------|---|------|------|-----|------|---|----|----|-----|-----|--------------|------|------|------|------|
| | | | | | | Minutes | | | | | Centiradians | | | | |
| | 1 | 5 | 20 | 100 | 120* | 1 | 5 | 20 | 100 | 120 | 1 | 5 | 20 | 100 | 120 |
| 0,1 | - | 0,4 | 0,2 | 0,1 | 0,1 | - | 15 | 8 | 5 | 5 | - | 0,45 | 0,24 | 0,15 | 0,15 |
| 0,2 | - | 0,75 | 0,35 | 0,2 | 0,2 | - | 30 | 15 | 10 | 10 | - | 0,9 | 0,45 | 0,3 | 0,3 |
| 0,2 S | 0,75 | 0,35 | 0,2 | 0,2 | 0,2 | 30 | 15 | 10 | 10 | 10 | 0,9 | 0,45 | 0,3 | 0,3 | 0,3 |
| 0,5 | - | 1,5 | 0,75 | 0,5 | 0,5 | - | 90 | 45 | 30 | 30 | - | 2,7 | 1,35 | 0,9 | 0,9 |
| 0,5 S | 1,5 | 0,75 | 0,5 | 0,5 | 0,5 | 90 | 45 | 30 | 30 | 30 | 2,7 | 1,35 | 0,9 | 0,9 | 0,9 |

* additional test point at 150 % of rated current for class “ext. 150 %“

additional test point at 200 % of rated current for class “ext. 200 %“

Table 4 – Limits of current error and phase displacement for current transformers

8. For all classes the current error and phase displacement shall not exceed the values given in table 4 when the secondary burden is any value from 25 % to 100 % of the rated burden.

9. For current transformers of accuracy class 0,1 - 0,2 - 0,2 S and having rated burden not exceeding 15 VA an extended range of burden can be specified. The current error and phase displacement shall not exceed the values given in table 4, when the secondary burden is any value from 1 VA to 100 % of rated burden.
10. The secondary burden used for test purposes shall have a power-factor of 0,8 lagging except that when the burden is less than 5 VA, a power-factor of 1,0 shall be used. In no case shall the test burden be less than 1 VA.

B Voltage transformers

Rated secondary voltage

11. The standard values of rated secondary voltages are
100/√3 V - 110/√3 V - 100 V - 110 V - 200/√3 V - 200 V.

Rated output

12. The standard values of rated output are:
5 - 10 - 15 - 20 - 25 - 30 - 45 - 50 - 60 - 75 -
90 - 100 - 120 - 150 - 200 - 300 - 400 - 500 VA.

Accuracy classes

13. The following accuracy classes are defined for voltage transformers:
0,1 - 0,2 - 0,5 - 1 - 3

Limits of voltage error and phase displacement

14. Table 5 shows the limits of voltage error and phase displacement, that must be respected by the voltage transformer under rated operating conditions for electricity with a quality as specified in requirement 2 in part 2 of this Annex.

| <u>Class</u> | <u>Percentage voltage (ratio) error</u> <u>±</u> | <u>Phase displacement ±</u> | |
|--------------|---|-----------------------------|---------------------|
| | | <u>Minutes</u> | <u>Centiradians</u> |
| <u>0,1</u> | <u>0,1</u> | <u>5</u> | <u>0,15</u> |
| <u>0,2</u> | <u>0,2</u> | <u>10</u> | <u>0,3</u> |
| <u>0,5</u> | <u>0,5</u> | <u>20</u> | <u>0,6</u> |

Table 5 – Limits of voltage error and phase displacement for voltage transformers

15. The voltage error and phase displacement at rated frequency shall not exceed the values given in table 5 at any voltage between 80 % and 120 % of rated voltage and with burdens of between 25 % and 100 % of rated burden at a power-factor of 0,8 lagging.

16. For voltage transformers of accuracy class 0,1 and 0,2 , having rated burden not exceeding 25 VA an extended range of burden can be specified. The voltage error and phase displacement shall not exceed the values given in table 5, when the secondary burden is any value from 1 VA to 100 % of the rated burden.

Proposal A

11.3 include requirements on time /clock

11.4 include requirements on multiple register

11.5 include requirements on interval meter

11.6 add requirement for display of all legally important results

11.15 Include additional functions in respect to “power” (partly)

in respect to electricity meters

Reasons:

Aim:

Setting of requirements for advanced billing features in a meter by introducing a registration device as a subassembly.

The subassembly is an optional part of a meter.

It is up to the manufacturer to realize one, only a sub set of the features or to design a meter, which is able to cover different features.

Examples for realized features:

- *only 2 registers for high and low rate (tariff) switched by an external signal,*
- *only 2 registers for high and low rate (tariff) switched by a time frame (in this case the meter shall have a clock which may be synchronized),*
- *only 2 registers for high and low rate (tariff) switched by an internal threshold,*
- *instead of 2 registers for low and high rate a interval registration of hourly consumption (in this case the meter shall have a clock which may be synchronized).*

Note: If a result of an additional function will be determined by a part of the meter which was not conformity assessed (hard- or software) it shall be clearly distinctable from those results which were subject to the conformity assessment.

The distributor (or the responsible stakeholder) shall bill a consumer only on the basis of measuring values which are measured by a conformity assessed meter.

Example:

- *If a meter has only 2 registers for high and low rate (tariff), switched by an external signal, the utility shall offer the consumer a contract in which the minimum amount of time during a day is specified in which the low tariff is offered.*

Reasons for the development of requirements for a registration device

Time depending functionality (time of use/interval metering) will become much more important in future in order to support the saving and control of energy consumption (**Energy End-Use Efficiency and Energy Services Directive, 2006/32/EC** , smart grids etc.). The registration of energy in registers or intervals is a known solution for the consumer protection especially if complicated rate structures shall be applied.

WG 11 considers these function as covered by Annex 1, clause 10 suitability but the amendment shall implement specific requirements in respect to this functionality.

The proposal improves the legal certainty for manufacturers, notified bodies and utilities by amendment to annexes.

Proposal B

8.25 delete class A

Aim:

Especially in countries where most of the energy is consumed as electricity, the bills could be quite large for a household. In this case the increased cost for a better meter class is negligible compared to the invoice totals based on the metering.

Draft text proposal for the amendment of MI003 by requirements on a registration device

(Annex MI-002, 003 and MI004 are handled in principle in the same way, but specialties of electricity meters are taken into account)

Amendments are marked underlined for proposals A, points 11.3-6, 15

11.3 are marked bold

11.4 only underlined

11.5 italic and bold

11.6 are marked italic

Draft text proposal for the change of MI003 concerning “putting into use”.

Amendments are double underlined for proposal B, point 8.25

ANNEX MI-003

ACTIVE ELECTRICAL ENERGY METERS AND REGISTRATION DEVICES

The relevant requirements of Annex I, the specific requirements of this Annex and the conformity assessment procedures listed in this Annex, apply to active electrical energy meters and registration devices intended for residential, commercial and light industrial use.

Note: Electrical energy meters may be used in combination with external instrument transformers, depending upon the measurement technique applied. However, this Annex covers only electrical energy meters and registration devices but not instrument transformers.

DEFINITIONS

An active electrical energy meter is a device which measures the active electrical energy consumed in a circuit or delivered back into the grid.

A registration device is a device fitted to an active electrical energy meter (as an integral part or separate device) in order to register the amount of active electrical energy measured by the energy meter in registers during periods depending on conditions.

A register is a component of a registration device which counts the active electrical energy if activated and memorises the result.

An interval register belongs to a set of registers used for the registration of electrical energy during consecutive time intervals.

Note: To each measuring interval belongs a single interval value.

The demand represents the quotient of the active electrical energy divided by the time in which the active electrical energy was determined.

I = the electrical current flowing through the meter;

- I_n = the specified reference current for which the transformer operated meter has been designed;
- I_{st} = the lowest declared value of I at which the meter registers active electrical energy at unity power factor (polyphase meters with balanced load);
- I_{min} = the value of I above which the error lies within maximum permissible errors (MPEs) (polyphase meters with balanced load);
- I_{tr} = the value of I above which the error lies within the smallest MPE corresponding to the class index of the meter;
- I_{max} = the maximum value of I for which the error lies within the MPEs;
- U = the voltage of the electricity supplied to the meter;
- U_n = the specified reference voltage;
- f = the frequency of the voltage supplied to the meter;
- f_n = the specified reference frequency;
- PF = power factor = $\cos\varphi$ = the cosine of the phase difference φ between I and U .

PART I - SPECIFIC REQUIREMENTS – ACTIVE ELECTRICAL ENERGY METER

1. Accuracy

The manufacturer shall specify the class index of the meter. The class indices are defined as: Class A, B and C.

2. Rated operating conditions

The manufacturer shall specify the rated operating conditions of the meter; in particular:

The values of f_n , U_n , I_n , I_{st} , I_{min} , I_{tr} and I_{max} that apply to the meter. For the current values specified, the meter shall satisfy the conditions given in Table 1;

| | Class A | Class B | Class C | |
|--|---------|---------|---------|--|
|--|---------|---------|---------|--|

For direct-connected meters

| | | | | |
|-----------|--------------------------|--------------------------|--------------------------|--|
| I_{st} | $\leq 0.05 \cdot I_{tr}$ | $\leq 0.04 \cdot I_{tr}$ | $\leq 0.04 \cdot I_{tr}$ | |
| I_{min} | $\leq 0.5 \cdot I_{tr}$ | $\leq 0.5 \cdot I_{tr}$ | $\leq 0.3 \cdot I_{tr}$ | |
| I_{max} | $\geq 50 \cdot I_{tr}$ | $\geq 50 \cdot I_{tr}$ | $\geq 50 \cdot I_{tr}$ | |

For transformer-operated meters

| | | | | |
|-----------|--------------------------|------------------------------|--------------------------|--|
| I_{st} | $\leq 0.06 \cdot I_{tr}$ | $\leq 0.04 \cdot I_{tr}$ | $\leq 0.02 \cdot I_{tr}$ | |
| I_{min} | $\leq 0.4 \cdot I_{tr}$ | $\leq 0.2 \cdot I_{tr}^{*)}$ | $\leq 0.2 \cdot I_{tr}$ | |

| | | | | |
|-----------|----------------------|----------------------|----------------------|--|
| I_n | $= 20 \cdot I_{tr}$ | $= 20 \cdot I_{tr}$ | $= 20 \cdot I_{tr}$ | |
| I_{max} | $\geq 1.2 \cdot I_n$ | $\geq 1.2 \cdot I_n$ | $\geq 1.2 \cdot I_n$ | |

^{*)} For Class B electromechanical meters $I_{min} \leq 0.4 \cdot I_{tr}$ shall apply.

Table 1

The voltage, frequency and power factor ranges within which the meter shall satisfy the MPE requirements are specified in Table 2. These ranges shall recognise the typical characteristics of electricity supplied by public distribution systems.

The voltage and frequency ranges shall be at least:

$$0.9 \cdot U_n \leq U \leq 1.1 \cdot U_n$$

$$0.98 \cdot f_n \leq f \leq 1.02 \cdot f_n$$

power factor range at least from $\cos\varphi = 0.5$ inductive to $\cos\varphi = 0.8$ capacitive.

3. MPEs

The effects of the various measurands and influence quantities (a,b,c,...) are evaluated separately, all other measurands and influence quantities being kept relatively constant at their reference values. The error of measurement, that shall not exceed the MPE stated in Table 2, is calculated as:

$$\text{Error of measurement} = \sqrt{a^2 + b^2 + c^2} \dots$$

When the meter is operating under varying-load current, the percentage errors shall not exceed the limits given in Table 2.

| | Operating temperatures | | | | Operating temperatures | | | | Operating temperatures | | | | Operating temperatures | | | |
|-------------|------------------------|---|---|--|---|---|---|--|--|---|---|---|--|---|---|--|
| | +5°C ... +30°C | | | | -10°C ... +5°C or +30°C ... +40°C | | | | -25°C ... -10°C or +40°C ... +55°C | | | | -40°C ... -25°C or +55°C ... +70°C | | | |
| Meter class | A | B | C | | A | B | C | | A | B | C | D | A | B | C | |

Single phase meter; polyphase meter if operating with balanced loads

| | | | | | | | | | | | | | | | | |
|------------------------------|-----|---|-----|--|-----|-----|-----|--|---|-----|-----|--|---|---|-----|--|
| $I_{min} \leq I < I_{tr}$ | 3.5 | 2 | 1 | | 5 | 2.5 | 1.3 | | 7 | 3.5 | 1.7 | | 9 | 4 | 2 | |
| $I_{tr} \leq I \leq I_{max}$ | 3.5 | 2 | 0.7 | | 4.5 | 2.5 | 1 | | 7 | 3.5 | 1.3 | | 9 | 4 | 1.5 | |

Polyphase meter if operating with single phase load

| | | | | | | | | | | | | | | | | |
|--|---|-----|---|--|---|---|-----|--|---|---|-----|--|---|-----|---|--|
| $I_{tr} \leq I \leq I_{max}$, see exception below | 4 | 2.5 | 1 | | 5 | 3 | 1.3 | | 7 | 4 | 1.7 | | 9 | 4.5 | 2 | |
|--|---|-----|---|--|---|---|-----|--|---|---|-----|--|---|-----|---|--|

For electromechanical polyphase meters the current range for single-phase load is limited to $5I_{tr} \leq I \leq I_{max}$

Table 2 – MPEs in percent at rated operating conditions and defined load current levels and operating temperature. When a meter operates in different temperature ranges the relevant MPE values shall apply.

▼ M3

The meter shall not exploit the MPEs or systematically favour any party.

4. Permissible effect of disturbances

4.1. General

As electrical energy meters are directly connected to the mains supply and as mains current is also one of the measurands, a special electromagnetic environment is used for electricity meters.

The meter shall comply with the electromagnetic environment E2 and the additional requirements in 4.2. and 4.3.

The electromagnetic environment and permissible effects reflect the situation that there are disturbances of long duration which shall not affect the accuracy beyond the critical change values and transient disturbances, which may cause a temporary degradation or loss of function or performance but from which the meter shall recover and shall not affect the accuracy beyond the critical change values.

When there is a foreseeable high risk due to lightning or where overhead supply networks are predominant, the metrological characteristics of the meter shall be protected.

4.2. Effect of disturbances of long duration

| Disturbance | Critical change values in percent for meters of class | | |
|-------------|--|--|--|
|-------------|--|--|--|

| | A | B | C | |
|--|-----|-----|-----|--|
| Reversed phase sequence | 1.5 | 1.5 | 0.3 | |
| Voltage unbalance (only applicable to polyphase meters) | 4 | 2 | 1 | |
| Harmonic contents in the current circuits, * | 1 | 0.8 | 0.5 | |
| DC and harmonics in the current circuit, * | 6 | 3 | 1.5 | |
| Fast transient bursts | 6 | 4 | 2 | |
| Magnetic fields; HF (radiated RF) electromagnetic field; Conducted disturbances introduced by radio-frequency fields; and Oscillatory waves immunity | 3 | 2 | 1 | |

*) In the case of electromechanical electricity meters, no critical change values are defined for harmonic contents in the current circuits and for DC and harmonics in the current circuit

Table 3 – Critical change values for disturbances of long duration

4.3. Permissible effect of transient electromagnetic phenomena

4.3.1. The effect of an electromagnetic disturbance on an electrical energy meter shall be such that during and immediately after a disturbance

- any output intended for testing the accuracy of the meter does not produce pulses or signals corresponding to an energy of more than the critical change value

and in reasonable time after the disturbance the meter shall

- recover to operate within the MPE limits, and
- have all measurement functions safeguarded, and
- allow recovery of all measurement data present prior to the disturbance, and
- not indicate a change in the registered energy of more than the critical change value.

The critical change value in kWh is $m \cdot U_n \cdot I_{max} \cdot 10^{-6}$
(m being the number of measuring elements of the meter, U_n in Volts and I_{max} in Amps).

4.3.2. For overcurrent the critical change value is 1,5%.

5. Suitability

5.1. Below the rated operating voltage the positive error of the meter shall not exceed 10%.

5.2. The display of the total energy shall have a sufficient number of digits to ensure that when the meter is operated for 4 000 hours at full load ($I = I_{max}$, $U = U_n$ and $PF = 1$) the indication does not return to its initial value and shall not be able to be reset during use.

5.3. In the event of loss of electricity in the circuit, the amounts of electrical energy measured shall remain available for reading during a period of at least 4 months.

5.4. If a meter is designed to determine the electrical energy for both directions (import/export), the meter shall be fitted with

- two registers or displays respectively (one for each direction),
 - a display of the total energy adding the energy of both directions under consideration of the sign or (*)
 - a display of the total energy adding the energy of both directions as absolute sum.(*)
- The name plate shall include information about the applied solution

The meter shall fulfill the requirements of this annex for both directions of energy flow.

5.45. Running with no load

When the voltage is applied with no current flowing in the current circuit (current circuit shall be open circuit), the meter shall not register energy at any voltage between $0.8 \cdot U_n$ and $1.1 \cdot U_n$.

5.56. Starting

The meter shall start and continue to register at U_n , $PF = 1$ (polyphase meter with balanced loads) and a current which is equal to I_{sr} .

6. Units

The electrical energy measured shall be displayed in kilowatt-hours or in megawatt-hours.

PART II — SPECIFIC REQUIREMENTS — REGISTRATION DEVICES

A registration device constitutes a sub-assembly according to Article 4, definition (b), second indent.

For a registration device, the essential requirements for the meter according to Part I shall apply, if applicable. In addition, the following requirements shall apply

7. Rated operated conditions

Taking into account the internal resolution of the meter and the properties of the used interface, the manufacturer shall specify the rated operating conditions, *in particular the minimum length of intervals, in order to avoid inadmissible errors for the intended measurement task.*

8. MPE

8.1 Clock

1 s /day

8.2 Demand

Depending on the class of electricity meter used the values given in Table 2.

8.3 MPE of quantities used for threshold activation (see 9.2)

Depending on the class of electricity meter used (*2)

the values given in Table 2 for I

2 times the values given in Table 2 for PF

the values given in Table 2 for demand

the values given in Table 2 for frequency

For influences raised by the interface between the energy meter and registration device an additional increase of one third of the MPE is permitted.

9. Suitability

9.1. The accumulation in the active register shall have the same progress as the total electrical energy measured by the meter.

9.2. The registration device shall register energy in different registers activated by

- signals of an internal time switch,
- signals of an internal quantity dependent threshold indication and/or
- remote control signals at peripheral interface terminals.

9.3. A registration device shall be designed to provide

- one or several non-resettable registers counting the electrical energy after activation, starting with the value registered at the last deactivation and/ or
- a set of interval registers.(*3)

9.4 A registration device shall be able to provide the time and date at which an interval value has been registered and the related error status .

9.5 An interval value shall be marked as invalid if the clock was set by more then 30s.

9.6. The number of interval registers shall be sufficient to cover a sufficient time.(*4), if a new interval value is memorized the oldest value shall be deleted.

9.7 Demands shall be determined on the basis of discrete interval values. Maximum demands shall be determined for separate periods as a day; a week; a month or a year and stored in particular registers.

9.8 In addition to the interval values a registration device can determine and register average values of quantities, if measured by the electric energy meter.

10. Indication

The registration device shall provide on a legally controlled display

- the information which register is currently activated, (*5)
- values of registers and/ or interval registers,
- the unit of values,
- identifiers which are assigned to the displayed values

and if applicable

- information identifying the direction of energy flow belonging to import/ export value,
- the time,
- the time of use program (schedule) for registers,
- the threshold values of the quantities used for activating registers,
- parameters and information important for the correct working of the registration device and the inability of changing legally parameters in use.

The description of identifiers shall be on the nameplate or in the documentation accompanying the instrument

11. The registration device itself or an appropriate associated software for use by the consumer shall allow to verify the correct assignment of single interval values or sums of interval values to rates (like the maximum consumption or the sum of consumption during daily periods), if such processed values serve as basis for the price to pay. (6*)

PART III — PUTTING INTO USE AND CONFORMITY ASSESSMENT

7. 12 Putting into use

~~(a) Where a Member State imposes measurement of residential use, it shall allow such measurement to be performed by means of any Class A meter. For specified purposes the Member State is authorised to require any Class B meter.~~

~~(b) Where a Member State imposes measurement of commercial and/or light industrial use, it shall allow such measurement to be performed by any Class B meter. For specified purposes the Member State is authorised to require any Class C meter.~~

~~(e)~~

The Member State shall ensure that the current range and accuracy class be determined by the distributor or the person legally designated for installing the meter, so that the meter is appropriate for the accurate measurement of consumption that is foreseen or foreseeable.

CONFORMITY ASSESSMENT

The conformity assessment procedures referred to in Article 9 that the manufacturer can choose between are:

B + F or B + D or H1.

Explanations

* In principle the electricity meter can have two indications (one for import and one for export) or it can add the measurands of both directions taking into account the sign. In this case the main counter is the difference of the absolute values registered for export and import. It should be clear that only one or both solutions are acceptable.

An instrument shall consider always only one circuit, otherwise a different instrument shall be used.

For instance, in accordance to the regulations it may be necessary to install an electricity meter at the output of a solar panel, which delivers energy for the consumption in a household.

If the regulations ask for the measurement of the energy, which is delivered into the utility grid, then this should be covered by the same instrument which measures the consumption from the grid into the household.

*2 If the meter is designed to measure these values and to provide the results internal or via an interface to the registration device.

*3 An interval value may contain the progress of the main counter during the time of an interval or it may contain the value of the main counter at the end of an interval. In the latter case the progress during an interval is the difference between an interval value and the previous value.

*4 The number of intervals shall cover for instance 12 weeks in the case of a monthly billing in order to allow a consumer appeal.

*5 In the case of an interval register this is determined by the actual time.

*6 In the case of complicated rate structures an additional software provided by the manufacturer shall allow to check bills. For instance allocating of intervals for time frames (night, day, weekend etc.) shall be possible by this software. This allows to reduce the functionality on the meter at the ability to indicate the values only. The software may be easily updated if new structures become important.

Proposal A:

11.3 include requirements on time /clock

11.4 include requirements on multiple register

11.5 include requirements on interval meter

11.6 add requirement for display of all legally important results

11.18 include additional functions e.g. temperature data for billing purposes (overlap to 11.3-11.6)

in respect to heat meters

Aim:

Setting of requirements for advanced billing features in a meter by introducing a registration device as a subassembly.

The subassembly is an optional part of a meter.

It is up to the manufacturer to realize one, only a sub set of the features or to design a meter, which is able to cover different features.

Examples for realized features:

- only 2 registers for high and low rate (tariff) switched by an external signal,
- only 2 registers for high and low rate (tariff) switched by a time frame (in this case the meter shall have a clock which may be synchronized),
- only 2 registers for high and low rate (tariff) switched by an internal threshold,
- instead of 2 registers for low and high rate a interval registration of hourly consumption (in this case the meter shall have a clock which may be synchronized).

Note: If a result of an additional function will be determined by a part of the meter which was not conformity assessed (hard- or software) it shall be clearly distinctable from those results which were subject to the conformity assessment.

The distributor of energy (or the responsible stakeholder) shall bill a consumer only on the basis of measuring values which are measured by a conformity assessed meter.

Example:

- *If a meter has only 2 registers for high and low rate (tariff), switched by an external signal, the utility shall offer the consumer a contract in which the minimum amount of time during a day is specified in which the low tariff is offered.*

Reasons for the development of requirements for a registration device

Time depending functionality (time of use/interval metering) will become much more important in future in order to support the saving and control of energy consumption (**Energy End-Use Efficiency and Energy Services Directive, 2006/32/EC** ,). The registration of energy in registers or intervals is a known solution for the consumer protection especially if complicated rate structures shall be applied.

WG 11 considers these function as covered by Annex 1, clause 10 suitability but the amendment shall implement specific requirements in respect to this functionality.

The proposal improves the legal certainty for manufacturers, notified bodies and utilities by amendment to annexes.

Proposal B

11.17 Include measuring instruments for exchanged thermal energy (heating, cooling and combined meter)

Reasons for the development of requirements for measuring instruments for exchanged thermal energy (heating and/or cooling) as part of MI004

- The efforts needed to extend a heat meter for the purpose of measuring absorbed energy (cooling) is technically limited.
- EN1434 already includes parts for measuring absorbed energy (cooling) but the assessment of a meter in respect to the requirements of a standard by a notified body as well as the application of a standard by a manufacturer is not mandatory,
- the amendment will improve billing features and consumer protection
- the amendment avoid of national regulation/ approvals,
- the amendment will reduce costs for assessments
- the amendment will improve legal certainty for manufacturer and notified bodies
- the amendment will lead to a reduction of barriers on trade
- the amendment give the opportunity to update the requirement of 1.1 and to have symmetrical requirements for both kinds of meters (heating and cooling)

Draft text proposal for the amendment of MI004 by requirements on a registration device

(Annex MI-002, 003 and MI004 are handled in principle in the same way, but specialties of heat meters are taken into account)

Amendments are marked by a underline for the proposals 11.3-6 and 11.18 respectively

11.3 are marked bold

11.4 only underlined

11.5 italic and bold

11.6 are marked italic

Draft for the amendment of MI004 by requirements for absorbed energy

Amendments are marked by an double underline for proposal 11.17

ANNEX MI-004

Thermal Energy HEAT-METERS AND REGISTRATION DEVICES

The relevant requirements of Annex I, the specific requirements and the conformity assessment procedures listed in this Annex, apply to thermal energy heat meters and registration devices defined below, intended for residential, commercial and light industrial use.

DEFINITIONS

A thermal energy heat meter is an instrument designed to measure the thermal energy heat which, in a heat exchange circuit, is-given up (heating) or is absorbed (cooling) by a liquid called the heat-conveying liquid.

If not other stated the requirements shall apply for giving up and absorbing thermal energy.

A thermal energy heat meter is either a complete instrument or a combined instrument consisting of the sub-assemblies, flow sensor, temperature sensor pair, and calculator, as defined in Article 4(b), or a combination thereof

A registration device is an optional additional device fitted to an thermal energy meter (as an integral part or separate device) in order to register the amount of thermal energy measured by the thermal energy meter in additional registers during periods depending on conditions, e.g. inlet- or outlet temperatures, temperature differences or time points.

A register is a component of a registration device which counts the thermal energy if activated and memorises the result.

An interval register belongs to a set of registers used for the registration of thermal energy during consecutive time intervals.

Note: To each measuring interval belongs a single interval value.

The thermal power represents the quotient of the thermal energy divided by the time in which the thermal energy was determined.

θ = the temperature of the thermal energy heat-conveying liquid;

θ_{in} = the value of θ at the inlet of the thermal energy heat exchange circuit;

θ_{out} = the value of θ at the outlet of the thermal energy heat exchange circuit;

$\Delta\theta$ = the temperature difference $\theta_{in} - \theta_{out}$ for given up and $\theta_{out} - \theta_{in}$ for absorbed energy with $\Delta\theta \geq 0$;

θ_{max} = the upper limit of θ for the thermal energy heat meter to function correctly within the MPEs;

θ_{min} = the lower limit of θ for the thermal energy heat meter to function correctly within the MPEs;

$\Delta\theta_{max}$ = the upper limit of $\Delta\theta$ for the thermal energy heat meter to function correctly within the MPEs;

$\Delta\theta_{min}$ = the lower limit of $\Delta\theta$ for the thermal energy heat meter to function correctly within the MPEs;

q = the flow rate of the heat conveying liquid;

q_s = the highest value of q that is permitted for short periods of time for the thermal energy heat meter to function correctly;

- q_p = the highest value of q that is permitted permanently for the thermal energy heat-meter to function correctly;
- q_i = the lowest value of q that is permitted for the thermal energy heat meter to function correctly;
- P = the thermal power of the heat exchange;
- P_s = the upper limit of P that is permitted for the thermal energy heat meter to function correctly.

PART I - SPECIFIC REQUIREMENTS – THERMAL ENERGY METER

1. **Rated operating conditions**

The values of the rated operating conditions shall be specified by the manufacturer as follows:

1.1. For the temperature of the liquid: θ_{max} , θ_{min} ,

- for the temperature differences: $\Delta\theta_{max}$, $\Delta\theta_{min}$,
subject to the following restrictions:

given up energy (heating) $\Delta\theta_{max}/\Delta\theta_{min} \geq 10$; $\Delta\theta_{min} = 3 \text{ K}$ ~~or 5 K or 10 K.~~

absorbed energy (cooling) $\Delta\theta_{max}/\Delta\theta_{min} \geq 2$; $\Delta\theta_{min} = 3 \text{ K}$

1.2. For the pressure of the liquid: The maximum positive internal pressure that the thermal energy heat meter can withstand permanently at the upper limit of the temperature.

1.3. For the flow rates of the liquid: q_s , q_p , q_i , where the values of q_p and q_i are subject to the following restriction: $q_p/q_i \geq 10$.

1.4. For the thermal power: P_s .

2. **Accuracy classes**

The following accuracy classes are defined for thermal energy heat meters: 1, 2, 3.

3. **MPEs applicable to complete thermal energy heat meters**

–The maximum permissible relative errors applicable to a complete thermal energy heat meter, expressed in percent of the true value for each accuracy class, are:

- For class 1: $E = E_f + E_t + E_c$, with E_f , E_t , E_c according to paragraphs 7.1 to 7.3.

–For class 2: $E = E_f + E_t + E_c$, with E_f , E_t , E_c according to paragraphs 7.1 to 7.3.

–For class 3: $E = E_f + E_t + E_c$, with E_f , E_t , E_c according to paragraphs 7.1 to 7.3.

M3

The complete heat meter shall not exploit the MPEs or systematically favour any party.

4. Permissible influences of electromagnetic disturbances

- 4.1. The instrument shall not be influenced by static magnetic fields and by electromagnetic fields at mains frequency.
- 4.2. The influence of an electromagnetic disturbance shall be such that the change in the measurement result is not greater than the critical change value as laid down in requirement 4.3 or the indication of the measurement result is such that it cannot be interpreted as a valid result.
- 4.3. The critical change value for a complete thermal energy heat meter is equal to the absolute value of the MPE applicable to that thermal energy heat meter (see paragraph 3).

5. Durability

After an appropriate test, taking into account the period of time estimated by the manufacturer, has been performed, the following criteria shall be satisfied:

- 5.1. Flow sensors: The variation of the measurement result after the durability test, when compared with the initial measurement result, shall not exceed the critical change value.
- 5.2. Temperature sensors: The variation of the measurement result after the durability test, when compared with the initial measurement result, shall not exceed 0,1°C.

6. Inscriptions on a thermal energy heat meter:

- Accuracy class
- Limits of flow rate
- Limits of temperature
- Limits of temperature difference
- Place of the flow sensor installation – flow or return
- Indication of the direction of flow

7. Sub-assemblies:

The provisions for sub-assemblies may apply to sub-assemblies manufactured by the same or different manufacturers. Where a thermal energy heat meter consists of sub-assemblies, the essential requirements for the thermal energy heat meter apply to the sub-assemblies as relevant. In addition, the following apply:

7.1. The relative MPE of the flow sensor, expressed in %, for accuracy classes:

–Class 1: $E_f = (1 + 0.01 q_p/q)$, but not more than 3.5% 5%,

– Class 2: $E_f = (2 + 0.02 q_p/q)$, but not more than 5%,

–Class 3: $E_f = (3 + 0.05 q_p/q)$, but not more than 5%,

–where the error E_f relates the indicated value to the conventional true value of the relationship between flow sensor output signal and the mass or the volume.

7.2. The relative MPE of the temperature sensor pair, expressed in %:

– $E_t = (0.5 + 3 \cdot \Delta\theta_{\min}/\Delta\theta)$,

– where the error E_t relates the indicated value to the true value of the relationship between temperature sensor pair output and temperature difference.

7.3. The relative MPE of the calculator, expressed in %:

– $E_c = (0.5 + \Delta\theta_{\min}/\Delta\theta)$,

–where the error E_c relates the value of the thermal energy ~~heat~~ indicated to the true value of the thermal energy ~~heat~~.

7.4. The critical change value for a sub-assembly of a thermal energy ~~heat~~ meter is equal to the respective absolute value of the MPE applicable to the sub-assembly (see paragraphs 7.1, 7.2 or 7.3).

7.5. Inscriptions on the sub-assemblies

| | |
|--------------------------|--|
| Flow sensor: | Accuracy class Limits of flow rate Limits of temperature Nominal meter factor (e.g. litres/pulse) or corresponding output signal Indication of the direction of flow |
| Temperature sensor pair: | Type identification (e.g. Pt 100) Limits of temperature Limits of temperature difference |
| Calculator: | Type of temperature sensors –Limits of temperature –Limits of temperature difference |

–Required nominal meter factor (e.g. litres/pulse) or corresponding input signal coming from the flow sensor

–Place of the flow sensor installation – flow or return

8. Indication

8.1 The thermal energy meter shall have a non-resettable display the thermal energy accompanied by the unit.

8.1. If a meter is designed to determine the thermal energy for both directions (giving up/absorbing), the meter shall be fitted with

- two registers or displays respectively (one for each direction),
- a display of the total energy adding the energy of both directions under consideration of the sign or (*)
- a display of the total energy adding the energy of both directions as absolute sum. (*)

The name plate shall include information about the applied solution

PART II — SPECIFIC REQUIREMENTS — REGISTRATION DEVICES

A registration device constitutes a sub-assembly according to Article 4, definition (b), second indent.

For a registration device, the essential requirements for the meter according to Part I shall apply, if applicable. In addition, the following requirements shall apply:

9. Rated operated conditions:

Taking into account the internal resolution of the thermal energy meter and the properties of the used interface, the manufacturer shall specify the rated operating conditions, *in particular the minimum length of intervals, in order to avoid inadmissible errors for the intended measurement task.*

10. MPE

10.1 clock

For a time based switch between registers (e.g. for day and night rate) the deviation from legal time shall not be not more than 30 s.

For periodic interval registers(e.g. hourly, daily, weekly or monthly registers for periodical billing), the time deviation of one measurement period shall not be more than 1 % of length of measurement interval.

In this case the deviation of the internal clock from legal time is the accumulated deviation of all measurement periods.

10.2 Thermal Power

Depending on the class of the thermal energy meter used

the values given in 3 for thermal power

For influences raised by the interface between the thermal energy meter and registration device an additional increase of one third of the MPE is permitted.

10.3 MPE of quantities used for threshold activation. (see 11.2)

Depending on the class of thermal energy meter used (*2)

the values given in 7.1 for flow

the values given in 7.2 for temperature difference

0.7 K for outlet temperature in case of a complete thermal energy meter

0.5 K for outlet temperature in the case of a combined thermal energy meter (*7)

0.7 K for inlet temperature in case of a complete thermal energy meter

0.5 K for inlet temperature in the case of a combined thermal energy meter (*7)

the values given in 3 for thermal power

For influences raised by the interface between the thermal energy meter and registration device an additional increase of one third of the MPE is permitted.

11. Suitability

11.1. The accumulation in the active register shall have the same progress as the total thermal energy measured by the meter.

11.2. The registration device shall register thermal energy in different registers activated by

- signals of an internal time switch,
- signals of an internal quantity dependent threshold indication and or
- remote control signals at peripheral interface terminals.

11.3 A registration device shall be designed to provide

- one or several non-resettable registers counting the thermal energy after activation, starting with the value registered at the last deactivation and/ or
- a set of interval registers. (*3)

11.4 A registration device shall be able to provide the time and date at which an interval value has been registered and the related error status.

11.5 An interval register value shall be marked as invalid if the clock was set by more than 30s.

11.6. The number of interval registers shall be sufficient to cover a sufficient time.(*4)
If a new interval value is memorized the oldest value shall be deleted

11.7 Thermal power shall be determined on the basis of discrete interval values.
Maximum demands shall be determined for separate periods as a day; a week; a month or a year and stored in particular registers.

11.8 In addition to the interval values a registration device can determine and register average values of quantities, if measured by the thermal energy meter.

11.9 If an thermal energy meter according to Part I is able to determine the thermal energy for both directions (giving up, absorbing) the registration device shall contain separate registers or sets of registers for both directions.(*)

12. Indication

The registration device shall provide on a legally controlled display

- the information which register is currently activated, (*5)
- values of registers and/ or interval registers,
- the unit of values,
- identifiers which are assigned to the displayed values

and if applicable

- information identifying the direction of thermal energy flow belonging to the values for given up and absorbed energy,
- the time,
- the time of use program (schedule) for registers,
- the threshold values of the quantities used for activating registers and parameters and information important for the correct working of the registration device and the inability of changing legally parameters in use.

The description of identifiers shall be on the nameplate or in the documentation accompanying the instrument

13. The registration device itself or an appropriate associated software for use by the consumer shall allow to verify the correct assignment of single interval values or sums of interval values to rates (like the maximum consumption or the sum of consumption during daily periods), if such processed values serve as basis for the price to pay. (6*)

PART III PUTTING INTO USE

- 8.13 (a) Where a Member State imposes measurement of residential use, it shall allow such measurement to be performed by means of any Class 3 meter.
- (b) Where a Member State imposes measurement of commercial and/or light industrial use, it is authorised to require any Class 2 meter.
- (c) As regards the requirements under paragraphs 1.1 to 1.4 Member States shall ensure that the properties be determined by the distributor or the person legally designated for installing the meter, so that the meter is appropriate for the accurate measurement of consumption that is foreseen or foreseeable.

CONFORMITY ASSESSMENT

9. The conformity assessment procedures referred to in Article 9 that the manufacturer can choose between are:

B+F or B + D or H 1.

Explanations

* In principle the thermal energy meter can have two indications (one for giving up energy and one for absorption) or it can add the measurands of both directions in one display. In this case the main counter delivers the sum of the absolute values registered for giving up and for absorption. It should be clear that only one or several solutions are acceptable.

An instrument shall consider always only one circuit, otherwise a different instrument shall be used.

For instance, if the application needs the measurement of the energy of a solar panel, which delivers thermal energy into the utility grid, then this should be covered by the same instrument which measures the consumption from the grid into the household.

*2 If the meter is designed to measure these values and to provide the results internal or via an interface to the registration device.

*3 An interval value may contain the progress of the main counter during the time of an interval or it may contain the value of the main counter at the end of an interval. In the latter case the progress during an interval is the difference between an interval value and the previous value.

*4 The number of intervals shall cover for instance 12 weeks in the case of a monthly billing in order to allow a consumer appeal.

*5 In the case of an interval register this is determined by the actual time.

*6 In the case of complicated rate structures an additional software provided by the manufacturer shall allow to check bills. For instance allocating of intervals for time frames (night, day, weekend etc.) shall be possible by this software. This allows to reduce the functionality on the meter at the ability to indicate the values only. The software may be easily updated if new structures become important.

*7 the reduction of the MPE shall compensate increased uncertainties related to the calculator of combined thermal energy meters.

8.24: Fuel Dispenser Totalisers

Apart from the normally visible display of individual transactions, most Fuel Dispensers are fitted with a totaliser registering the sum of all deliveries via that particular Instrument. In some cases the indications provided by these totalisers are used as a basis for transactions between the station owner and the supplier or (tax) authority.

The proposal is intended to make it clear the totaliser is also under legal metrological control and can therefore form the basis of legal transactions. The technical requirements will be fully in-line with OIML International Recommendation R117-1.

Proposal: Add new article to MI-005

5.5.4 Additionally Fuel Dispensers may be fitted with a non-resettable totalizer, the scale interval of which may differ from that of the primary display.

10.8: Proposal Solve in clarity regarding gas elimination devices

Currently various authorities and Notified Bodies interpret article 5.3 in different ways (possibly depending on the translation in their respective languages).

For Accuracy Class 0.5 for example one reads a maximum permissible error of 1% whereas other read 1.5%.

The Secretariat of OIML International Recommendation R117-1 has promised to clarify the text there even further as well, although there the potential for misinterpretation is less likely.

Proposal concerns article 5.3 of MI-005:

Change "Any percentage of air or gas not easily detectable in the liquid shall not lead to a variation of error greater than:

"into" any percentage of air or gas not easily detectable in the liquid shall not lead to an error of the measuring instrument greater than:"

10.4 Define Self Service Devices as Sub-assemblies

SSD's (Self Service Devices) for fuel Dispensers are typically the devices at a petrol station which produce a printed ticket. This could be the PC based system in the kiosk or the machine which is used to pay by (credit)card.

As such they are not directly involved in the measurement of the amount of liquid, but just in processing data provided by the dispenser.

Defining them as sub-assemblies opens the route for producers of SSD's to connect their equipment to existing dispensers.

Also it would help some EU Member States to solve legal and/or practical challenges concerning the connection of new SSD's to existing (Pre-MID) dispensers

Item 2.3 and 8.9

Version 4.0

Amendment

Sub-assemblies.

Chapter of MID

Annex MI-006 chapter 1

Text of the amendments

See pages 2 to 3

Reason of the amendment

The use of sub-assemblies is generally used in the field of non-automatic weighing instruments, the same rules are also applicable for automatic weighing instruments, therefore the MID shall foresee this possibility

Total amount of pages, including this cover

3 pages

Amendment to MID Annex MI-006

CHAPTER I — Requirements common to all types of automatic weighing instruments

5 *Sub-assemblies*

DEFINITIONS

Essential part of the weighing instrument that can be tested separately and has direct influences in the weighing result.

The provisions may apply to devices manufactured by the same or different manufacturers. Where a automatic weighing instrument consists of sub-assemblies , the essential requirements for automatic weighing instruments apply to them as relevant.

In addition, the following apply:

5.1 *Apportioning of errors*

Where sub-assemblies of an instrument or system are tested separately the following requirements apply.

The error limits applicable to a sub-assembly which is examined separately are equal to a fraction p_i of the maximum permissible errors or the allowed variations of the indication of the complete instrument as specified in 2.5. The fractions for any module have to be taken for at least the same accuracy class as for the complete instrument incorporating the sub-assemblies.

The fractions p_i shall satisfy the following equation:

$$p_1^2 + p_2^2 + p_3^2 + \dots \leq 1$$

The fraction p_i shall be chosen by the manufacturer of the sub-assembly and shall be verified by an appropriate test, taking into account the following conditions:

- for digital devices p_i may be equal to 0;
- for weighing modules p_i may be equal to 1;
- for all other modules (including digital load cells), p_i shall not exceed 0.8 and shall not be less than 0.3, when more than one module contributes to the effect in question.

If the metrological characteristics of the load cell or other modules have been evaluated in accordance with the requirements of OIML R 60, or any other applicable OIML Recommendation, that evaluation shall be used to aid type evaluation if so requested by the applicant.

5.2 *Accuracy class*

The weighing module shall have the same accuracy class as the weighing instrument it is intended to be used with. A weighing module of a better accuracy class can also be used in a weighing instrument of less accurate class taking into account the requirements of the less accurate class.

5.3 *Number of verification scale intervals*

The number of verification scale intervals of the assembled instrument shall not exceed the number certified for the sub-assemblies.

5.4 *Temperature range*

The sub-assembly shall have the same or a wider temperature range as the weighing instrument is intended to be used with.

Item 2.7

Version 4.1

Amendment

Verification scale intervals for single or multi-interval instruments

Chapter of MID

MI-006, Chapter II Table 4
And Chapter II, no 1.2

Text of the amendments

See page 2

Reason of the amendment

Adapt Table 4 to Table 3
(separate the minimum number of verification scale intervals for class XIII and Y(a) for multi-interval instruments with $0,1 \text{ g} \leq e \leq 2 \text{ g}$ from $5 \text{ g} \leq e$)

OIML R51 makes no difference between the minimum number of verification scale intervals for single or multi-interval instruments. (MID has two tables, R51-1 only one)

Adapt the accuracy Class XIV has been an editorial error and should be XIII like OIML R51-1

Total amount of pages, including this cover

2 pages

Amendment to MID Annex MI-006

Chapter II – Automatic Catchweighers

1 These primary categories are further divided into four accuracy classes:
XI, XII, XIII, XIII

and

Y(I), Y(II), Y(a), Y(b)

which shall be specified by the manufacturer

4 *MPE*

Table 1: change category XIV to XIII

Delete 4.3 and Table 3, and rename 4.4 and table 4 as follows:

4.3 Verification scale interval – single and multi-interval instruments

Table 3

| Accuracy class | | Verification scale interval, e_i | Number of verification scale intervals $n = \text{Max} / e_i$ | |
|----------------|-------|--|--|---------|
| | | | Minimum | Maximum |
| XI | Y(I) | $0,001 \text{ g} \leq e_i$ | 50 000 | – |
| XII | Y(II) | $0,001 \text{ g} \leq e_i \leq 0,05 \text{ g}$ | 100 | 100 000 |
| | | $0,1 \text{ g} \leq e_i$ | 5 000 | 100 000 |
| XIII | Y(a) | $0,1 \text{ g} \leq e_i \leq 2 \text{ g}$ | 100 | 10 000 |
| | | $5 \text{ g} \leq e_i$ | 500 | 10 000 |
| XIII | Y(b) | $5 \text{ g} \leq e_i$ | 100 | 1 000 |

Where:

$i = 1, 2, \dots r$

i = partial weighing range, for single range $i = 1$

r = total number of partial ranges, for single interval instrument $r = 1$

Item 2.6

Version 4.0

Amendment

Category X instruments

Chapter of MID

MI-006, Chapter II Article 2.1

Text of the amendments

See page 2

Reason of the amendment

Category X was intended to apply for the use of pre-packages. 75/106/EEC only deals with e-marked pre-packages that restricts actually the category X instruments. The use of Category X instruments shall also be possible for non e-marked pre-packages

Total amount of pages, including this cover

2 pages

Amendment to MID Annex MI-006

Chapter II – Automatic Catchweighers

- 2.1 Category X applies to instruments used to check pre-packages including pre-packages made up in accordance with the requirements of Directive 2007/45/EC Of the European Parliament and of the Council of 5 September 2007 laying down rules on nominal quantities for pre-packed products.

Item 2.9

Version 3.0

Amendment

High precision weighing instruments

Chapter of MID

MI-006, Chapter II no 5

Text of the amendments

See page 2

Reason of the amendment

High precision weighing instruments of classes XI, Y(I), XII and Y(II) are used for analytical purposes and for checking the net content of pre-packed packages with expensive medicine. For these AWI instruments an exception is needed in accordance to the NAWI directive 2009/23/EC.

Total amount of pages, including this cover

2 pages

Amendment to MID Annex MI-006

Chapter II – Automatic Catchweighers

5 *Measurement Range*

In specifying the measurement range for class Y instruments the manufacturer shall take account that the minimum capacity shall not be less than:

class Y(I): 100 e

class Y(II): 20 e for $0,001 \text{ g} \leq e \leq 0,05 \text{ g}$, and 50 e for $0,1 \text{ g} \leq e$

class Y(a): 20 e

class Y(b): 10 e

Scales used for grading,
e.g. postal scales and
garbage weighers: 5 e

5.1 *Auxiliary indicating device*

Instruments equipped with auxiliary indicating devices shall belong to class XI, XII, Y(I) or Y(II).

For class Y(I) and class Y(II) the minimum capacity lower limits are obtained by replacement of the verification scale interval (e) by the actual scale division (d).

For class XI and class Y(I) with $d < 0,1 \text{ mg}$ the maximum capacity may be less than 50 000 e.

For class XI and class Y(I) with verification scale interval $e = 1 \text{ mg}$ the scale division (d) may be less than 0,1 mg.

5.1.1 *Following conditions apply:*

$$e = 1 \times 10^k \text{ g}$$

$$d < e \leq 10 d$$

except for instruments of class XI or Y(I) with $d < 10^{-4} \text{ g}$, for which $e = 10^{-3} \text{ g}$.

Item 2.8

Version 4.0

Amendment

Dynamic Setting

Chapter of MID

MI-006, Chapter II no 6.2

Text of the amendments

See page 2

Reason of the amendment

MI-006 Chapter II No. 6.2 differs from OIML R51-1:2006 No. 3.2.3.

As dynamic setting is described in MID and R51-1, it would mean that mentioned item could be ignored. The second sentence is important in some practical applications if it is necessary to change specific adjustment parameters to allow correct weighing. Any adjustment has to be recorded with a non-erasable method.

Total amount of pages, including this cover

2 pages

Amendment to MID Annex MI-006

Chapter II – Automatic Catchweighers

6.2 *When fitted, a dynamic setting facility that compensates for the dynamic effects of the load in motion shall be inhibited from operating outside the load range, and shall be capable of being secured.*

If dynamic setting by the user is allowed, a facility for automatic and non-erasable recording of any adjustment of the dynamic setting, e.g. an event logger, should be present.

Proposal : addition in MI 007 for taximeters of specification for the maximum permissible errors for the real time clock and safety requirement concerning automatic switching from position “Stopped” if trip is continued

Aim :

Fix appropriate level of performance for the clock and secure the functioning for consumer protection

Reasons for the development

The major issue identified is the need to include the requirements for the clock as it is a critical part of the taximeter and to include a safety measure concerning the functioning of the taximeter.

Nowadays even if taximeters are covered by MID, this is a field where regulation is very much national due to equipment installation. Other items had been identified for improvement of annex Mi007 on taximeter but as no proposal was ready they are not included in the proposal but should nevertheless be examined :

- Distance signal generator implemented in the MID as a subassembly
- Cryptographic protection of the distance signal against intentional and unintentional modification
- Other checking's of the distance signal

Draft for the amendment

Modification of Annex MI-007

For real time clock :

Proposal 1

Add to §7 (after ...digit of the fare indication)

- For the real time clock: $\pm 0,02$ %

minimum value of mpe: 1s.

and delete in §22:

- ~~The timekeeping shall have an accuracy of 0,02 %;~~

Proposal 2

Change §22 :

- The timekeeping shall have a mpe of $\pm 0,02$ %, minimum value of mpe: 1 s;

For automatic switching from position “Stopped” if trip is continued

Change §20:

20.1 The general essential requirement dealing with fraudulent use shall be fulfilled in such a way that the interests of the customer, the driver, the driver's employer and the fiscal authorities are protected.

20.2 In the operation position “Stopped” the fare calculation based on time is disabled. After traveling 200 m the operation position changes automatically to “For Hire”

20.3 The sequence of operation positions shall be: “For Hire” - “Hired” - “Stopped”

(alternative for 200 m : a distance fixed by the Member State)