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TITLE OF THE CD (English):
OIML R 137-3
Gas meters
Part 3: Report Format for Type Evaluation

TITRE DU CD (French):
OIML R 137-3
Gas meters
Partie 3 : Format de rapport pour l'Examen de Type
Original version in: English

Foreword

Ref: OIML "Directives for the technical work", Part 2, 4.3:
.....
The foreword is prepared by BIML after the approval of the Recommendation. At the draft stage of a Recommendation, an explanatory note may replace the foreword but it is not intended to be published after the approval of the Recommendation.
This text is not to be changed by the TC/SC, but it will be completed and updated by BIML in the final stage.

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This publication - referenced OIML R 137-3, Edition 2012 - was developed by the Technical Subcommittee TC 8/SC 7 *Gas meters*. It was approved for final publication by the International Committee of Legal Metrology in 201x and will be submitted to the International Conference of Legal Metrology in 2016 for formal sanction.

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PART 3: Report format for type evaluation

1 Introduction

This Report Format applies for any kind of gas measuring instruments (gas meters) independent of its technology. It presents a standardized format for the results of the various tests and examinations, described in Part 2 of R 137 (2012), to which a type of a gas meter shall be submitted with a view to its approval based on this OIML Recommendation.

It is recommended that all metrology services or laboratories evaluating and/or testing types of gas meters according to OIML R 137-1&2:2012, or to national or regional regulations based on that Recommendation, use this Report Format, directly or after translation into a language other than English or French. In case of a translation, it is highly recommended to leave the structure and the numbers of the clauses unchanged: in this case most of the contents is also understandable for those who can not read the language of the translation.

It is also recommended that this Report Format in English or in French (or in both languages) be transmitted by the country performing the tests to the relevant authorities of another country, when requested for issuing a national or regional type-approval.

In the practical application of the Report Format, in addition to a cover page by the Issuing Authority, as a minimum clauses A–F (as necessary) shall be included

2 Applicability of this Report Format

In the framework of the *OIML Certificate System for Measuring Instruments*, and the OIML *Mutual Acceptance Arrangement* (MAA) applicable to gas meters in conformity with OIML R 137-1&2:2012, use of this report format is mandatory, in French and/or in English with translation into the national languages of the countries issuing such certificates, if appropriate.

Implementation of this Report Format is informative with regard to the implementation of OIML Recommendation R 137-1:2012 in national regulations.

3 Guidance for the application of this Test Report Format

Key to the symbols and expressions used in the following pages:

The "summary of the results" and the "results of the tests" shall be completed according to the following examples:

	Class 0.5	Class 1	Class 1,5	No	Meaning
Passed for	x				passed for class 0.5
Passed for		x	x		passed for class 1 and 1.5
Passed for				x	failed for all classes
Passed for	/	/	/	/	test is not applicable for this instrument

Notes: (1) Unless prescribed otherwise, "Date" in the test reports refers to the date of testing.

(2) The name(s) or symbol(s) of the unit(s) used to express the test results shall be specified in each form.

In case a prescribed test is not relevant for the type of instrument to be tested, the reason why the test is omitted shall be clearly stated in the field "Remarks" (for instance surge tests on signal lines shorter than 30 m, tests related to AC mains supply in case of an instrument only powered by batteries, or partial testing after modification of a previously tested type).
The number of the report and the page numbers shall be completed in the heading.
Pages 1 - 5 of this Report Format are to be replaced by a cover page issued by the Issuing Authority.

4 The Evaluation Report

The following pages present the format for the Report

<Cover page
issued by the
Issuing Authority>

Contents of the Report

A Authority, responsible for this Report

Name	
Address	
Report number	
Application number (project number)	
Period of execution of the tests	
Report Issuing date	
Name and signature of the responsible person and stamp(s) (if applicable)	

B Synopsis of the results of the examination and tests

(To be completed by the Issuing Authority)

The tested specimen fulfils ALL the applicable requirements in OIML R 137 (2012) for: ☐ Class 0.5 ☐ Class 1 ☐ Class 1.5
☐ Yes ☐ No
Remarks:

C Summary of the results of the examination and tests

(To be completed by the Issuing Authority)

C.1 Examinations

For details, refer to the evaluation in chapter E referenced clauses.

Clause(s) in R 137-1	General requirements	Complies with OIML R 137		
		Pass	Fail	N.A.
4	Units of measurement			
5.2	Values of Q_{max}, Q_t and Q_{min}			
6.1	Construction			
6.2	Flow direction			
6.3	Indicating device			
6.4	Test element			
6.5	Ancillary devices			
6.6	Power sources			
6.7	Checks, limits and alarms for electronic gas meters			
6.8	Software			
7	Markings and inscriptions			
8.1	Instruction manual			
8.2	Installation conditions			
9	Sealing			
10.1	Pressure tappings			
Annex I	Software			

C.2 Performance tests

For details, refer to the tests: clause F of this Report, as indicated in the last column.

Clause R 137-2	Performance tests	Clause R137-1	Complies with R137-1			Details in
			pass	fail	N/A	
12.6.1	Error curve	5.3				F1
	WME	5.4				
	Cyclic volume	6.4.2				
	Determination of the value of the pulse generator	6.4.3				
12.6.2	Reproducibility	5.6				F2
12.6.3	Repeatability	5.7				F3
12.6.4	Orientation	5.13.1				F4
12.6.5	Flow direction	5.13.2				F5
12.6.6	Working pressure	5.8				F6
12.6.7	Temperature	5.9				F7
12.6.7.1	Flow tests with equal gas and ambient temperatures	5.9				F7.1
12.6.7.2	Flow tests with unequal gas and ambient temperatures	5.9				F7.2
12.6.8	Flow disturbance - single 90° bend - double out-of-plane bend - expander - reducer - diameter step - half pipe area plate	5.13.3				F8
12.6.9	Durability	5.10				F9
12.6.10	Drive shaft (torque)	5.13.4				F10
12.6.11	Overload flow	5.11				F11
12.6.12	Different gases	5.13.5				F12
12.6.13	Vibration and shocks	5.12				F13
12.6.14	Interchangeable components	5.13.6				F14
12.6.15	Electronics					
A.4.1.1	Dry heat	5.13.7				F15.1
A.4.1.2	Cold	5.13.7				F15.2
A.4.2.1	Damp heat, steady state (non condensing)	5.13.7				F15.3
A.4.2.2	Damp heat, cyclic (condensing):	5.13.7				F15.4
A.5.1	Vibration (random)	5.13.7				F15.5
A.5.2	Mechanical shock	5.13.7				F15.6
A.6.1.1	Radio frequency immunity (radiated)	5.13.7				F15.7
A.6.1.2	Radio frequency immunity (conducted)	5.13.7				F15.8
A.6.2	Electrostatic discharge	5.13.7				F15.9
A.6.3	Bursts on signal and control lines	5.13.7				F15.10
A.6.4	Surges on signal and control lines	5.13.7				F15.11
A.7.1	DC mains voltage variation	5.13.7				F15.12
A.7.2	AC mains voltage variation	5.13.7				F15.13
A.7.3	AC mains voltage dips and short interruptions	5.13.7				F15.14
A.7.4	DC mains voltage dips, short interruptions and voltage variations	5.13.7				F15.15
A.7.5	Bursts on mains	5.13.7				F15.16
A.7.6	Surges on mains	5.13.7				F15.17
A.7.7	Ripple on DC mains power	5.13.7				F15.18
A.8	Low voltage of internal battery	5.13.7				F15.19
12.6.16	Influences from ancillary devices	5.13.8				F16

D General Information

D.1 Manufacturer

Company	
Address	

D.2 Applicant

Company	
Representative	
Address	
Reference	
Date of application	

Applicant authorized by the manufacturer (documented)	☐ Yes ☐ No
Statement that no concurrent application for OIML type evaluation has been made to any other OIML Issuing Authority (see OIML B 003, 3.1.2)	☐ Yes ☐ No

Remarks:

D.3 Testing laboratories involved in the tests

(This table to be completed for each test laboratory)

Name			
Address			
Application number			
Tests by this laboratory			
Date/period of tests			
Name(s) of test engineer(s)			
Accredited by		Number:	Expires (date):
Accreditation includes R 137	☐ Yes	Edition: ☐	☐ No
Details of relevant peer assessment or assessment by other means			
In case tests have been performed on another location than the premises of this laboratory, give details here			
Name of the responsible person			
Date of signature			
Stamp (if applicable) and signature of the responsible person			

Remarks:

D.4 General information concerning the type

and the specimen(s) supplied for the tests
(as stated on the instrument / provided by the manufacturer)

Information, indicated on the instrument	
Manufacturer's trade mark	
Type designation	
Accuracy class	
Cyclic volume (if applicable)	
Minimum pressure p_{min}	
Maximum pressure p_{max}	
Ambient temperature range	
Gas temperature range	
Base pressure (if applicable)	
Base temperature (if applicable)	
t_{sp} (if applicable)	
Electrical power	
Identification of software	

The following specimens are used during the examination:

Specimen no.	Model	Serial no.	Year of fabrication	Q_{max} [m^3/h]	Q_t [m^3/h]	Q_{min} [m^3/h]
1						
2						
3						
4						
5						
…						

Relevant external/internal photographs taken during the examination and tests:

D.5 Adjustments and modifications

Adjustments, modifications, and repairs made to the specimens during the testing:

D.6 Additional information concerning the type

Additional remarks and/or information (connection equipment, interfaces, etc.):

D.7 Results of previous tests that were taken into account

D.8 Information concerning the test equipment used for the type evaluation
(including details of simulations and the way uncertainties are taken into account)

E Examination

(To be completed by the Evaluating Authority)

Requirements Checklist

Clause	Description		Yes	No	Not applicable	Remarks
4	**Units of measurement**					
	All quantities are expressed in:	SI units: ☐				Applied units: ....
		other legal units conform OIML D2 [2007]: ☐				
5.2	**Values of Qmax, Qt and Qmin**					
	The following ratios are applied:	$Q_{max}/Q_{min} \geq 50$ while $Q_{max}/Q_t \geq 10$: ☐				Applied ratios: Q_{max}/Q_{min} : …. Q_{max}/Q_t : ….
		$Q_{max}/Q_{min} \geq 5$ and < 50 while $Q_{max}/Q_t \geq 5$: ☐				
6.1	**Construction**					
	The quality of the applied materials and construction complies.					
	The case is gas-tight up to p_{max}.					
	Devices for reduction of condensation are incorporated.					The following devices are incorporated:
	The meter is protected against external interference.					Explain how.
	The indicating device is connected:	physically: ☐				
		remotely: ☐				
	The meter is equipped with a safety device that may shut off the gas flow in the event of calamities.					
	Connections between electronic parts are reliable and durable.					Explain how.
	Exchange of components doesn't influence the meters accuracy and can be done without subsequent verification.					
	At zero flow conditions the meters totalization is not changed.					
6.2	**Flow direction**					
	The direction of the flow is indicated by a clear indication: ☐					
	The gas flow is determined by the construction.: ☐					
	In case the meter can be used for bi-directional measurements, a double-headed arrow with a plus and minus sign is used.					
	In bi-directional use reverse flow quantities are:	subtracted: ☐				
		recorded separately: ☐				
	The maximum permissible errors are met for both forward and reverse flow.					
	If the meter is not designed to measure reverse flow:	reverse flow is prevented: ☐				
		the meter withstands incidental or accidental reverse flow: ☐				
	The meter is provided with a device preventing the indicating device from functioning in case of reverse flow.					

Clause	Description		Yes	No	Not applicable	Remarks
6.3	**Indicating device**					
	The indicating device is:	mechanical: ☐				
		electromechanical or electronic: ☐				
		a combination: ☐				
	The quantity of gas is indicated in a clear way and unambiguous, in a non-resettable method.					
	The indication cannot be reset and is non-volatile.					
	The applied decimal sign is clear.					
	The indicating device is able to show at least 1.000 h of operation at Q_{max} without returning to the original reading.					Number of digits:
	The least significant digit doesn't exceed the quantity of gas passed during one hour at Q_{min}.					Value of the least significant digit:
	The mechanical indicating device fulfils the requirements.					
	The electromechanical or electronic indicating device is provided with a display test.					
	The remote indicating device clearly identifies the associated gas meter. The communication is integer.					

Clause	Description		Yes	No	Not applicable	Remarks
6.4	**Test element**					
	The meter has:	an integral test element: ☐				
		a pulse generator: ☐				
		arrangements to permit the connection of a portable test unit: ☐				
	The integral test element fulfils the requirements.					
	The pulse generator fulfils the requirements.					
	The attachable test device fulfils the requirements.					
	The increment of the test element or pulse occurs at least every 60 seconds at Q_{min}.					
6.5	**Ancillary devices**					
	The gas meter is equipped with ancillary devices, which do not affect the correct operation of the meter.					The meter is equipped with the following ancillary devices:
	Exposed ends of drive shafts are suitable protected.					Applied protection method:
	When applying a torque up to three times the permissible torque the connection between measuring transducer and gearing doesn't break.					
6.6	**Power sources**					
	The gas meter is powered by means of a:	mains power source: ☐				
		non-replaceable power source: ☐				
		replaceable power source: ☐				
	Mains power:	in case of a mains power failure the indication is not lost.				
		the properties and parameters are not affected by the power failure.				
		the connection to the mains can be secured from tampering.				
	Non-replaceable power source:	The indicated lifetime of the power source is sufficient for the meters life time.				
		The remaining battery capacity is presented on the display or the lifetime is indicated on the meter.				
	Replaceable power source:	Detailed specification of the replacement is given.				
		The estimated life of the power source is displayed or a warning is given in case the remaining life time is below 10%.				
		Properties and parameters of the meter are not affected during exchange.				
		Replacement is possible without breaking a metrological seal and the compartment of the source is secured against tampering.				
6.7	**Checks, limits and alarms (Checking devices)**					
	The gas meter checks the presence and correct functioning of the transducers and critical devices, the integrity of data and pulse transmission.					Explanation how.
	The gas meter detects upon overload flow conditions, extreme measurement values and reverse flow.					Explanation how.
	In case of detected malfunctions a visible and/or audible alarm is given, which remains present until acknowledgement and the cause of the alarm is suppressed. Registration is continued in specific alarm registers. Alarms are registered in a log.					Explanation how.
7.1	**Markings**					
	The meter is marked with all relevant markings.					

Clause	Description	Yes	No	Not applicable	Remarks
8.1	**Instruction manual**				
	The instruction manual includes the following aspects: - Operating instructions; - Storage temperatures; - Rated operating conditions; - Warm up time; - Environmental conditions; - Details external power sources; - Specific installation conditions; - Specifications battery; - Instructions for installation, repair etc.; - Compatibility with interfaces etc.				
8.2	**Installation conditions**				
	The following installation conditions are specified: - the position to measure the working temperature of the gas; - filtering; - leveling and orientation; - flow disturbances (including minimum upstream and downstream pipe lengths); - pulsations of acoustic interference; - rapid pressure changes; - absence of mechanical stress; - mutual influence between gas meters; - mounting instructions; - maximum allowable diameter differences between the gas meter and connecting pipe work; - other relevant installation conditions.				HS: Discussie, aangezien niet alle aspecten vermeld behoeven te worden (metertype afhankelijk).
9.1.3	**Hardware sealing**				
	Dismantling of parts result in permanently visible damage to seals.				
	Information plates are sealed and all parts which affect the accuracy of the instrument.				
	The applied sealings withstand outdoor conditions.				
9.1.4	**Electronic sealing**				
	Parameters can only changed by means of a code or special device.				
	The code is alterable.				
	The meter indicates clearly if the configuration mode is activated.				
	The most recent intervention is recorded in an event logger, including an identification of the authorized person, an event counter or date and time, the old value of the changed parameters and totals.				
	In case of deletion of previous interventions the oldest one is deleted.				
	For devices with parts which can be disconnected: - parameter access is not possible via the disconnected port; - interposing is prevented by security provisions or mechanical means; - the meter doesn't operate in case of wrong configuration.				
10	**Suitability for testing**				
	The bore of the applied pressure tappings is large enough, while means of closure are provided and the correct markings are applied.				Bore of the pressure tappings:
	The pressure tappings for measuring the working pressure are clearly and indelibly marked "p_m" or "p_r" and other pressure tappings "p".				

Software requirements checklist

The two applicable validation procedures are as follows:

- AD : Analysis of the documentation and validation of the design
- VFTM : Validation by functional testing of metrological functions
- VFTSw : Validation by functional testing of software functions
- ~~DFA : Metrological data flow analysis~~
- ~~CIWT : Code inspection and walkthrough~~
- ~~SMT : Software module testing~~

In the table below for each requirement the explanation is given how the requirement is met while using the column 'remarks'.

Clause	Description	Yes	No	Not applicable	Remarks
I.1.1	**Software identification**				
	The legally relevant parts are clearly identified.				
	The identification number is:				
	The identification is presented by means of:				
	The identification is inextricably linked to the software.				
I.1.2	**Correctness of algorithms and functions**				
	The measuring algorithms and functions are appropriate and functionally correct.				
I.1.3	**Software protection (against fraud)**				
	The legally relevant software is protected against unauthorized modification, loading or changes by swapping the memory device.				
	Only clearly documented functions can be activated by the user interface, which do not facilitate fraudulent use.				
	Parameters that fix the legally relevant characteristics are secured against unauthorized modification.				
	Displaying of current parameter settings are possible.				
	Protection/sealing makes unauthorised access impossible or evident.				
	Detection by checking faciliteits of significant faults is performed by the software and in the legally relevant software part.				
	A list is available of anomalies which result in a significant fault and which are detected by the software.				
I.2.1	**Separation of electronic devices and sub-assemblies**				
	Constituents of the gas meter, performing legally relevant functions, are clearly identified, defined and document.				
	Those functions cannot be inadmissibly influenced by commands received via an interface.				
	All legally relevant software parts are clearly described.				
	An interface is available between legally relevant software and other software parts, which is clearly documented. All communication is performed exclusively via this interface.				
	The interface commands are documented with a statement of completeness.				
	The legally relevant software has priority using the resources over non-relevant software. The measurement task is not delayed or blocked by other tasks.				
I.2.2	**Shared indications**				
	The same display is used for presenting both information from the legally relevant part and the non-legally relevant part.				
	Software for the indication of measurement results belong to the legally relevant part.				
I.2.3	**Storage of data, transmission via communication system**				
	The measurement value stored or transmitted is accompanied by all relevant information for future legally relevant use.				
	The data is protected to guarantee the authenticity, integrity and correctness concerning the time of measurement.				
	The memory device is fitted with a checking facility, which guarantees that irregular data is discarded or marked unusable.				
	The software module that prepares the data for storing, sending and checking after reading or receiving is part of the legally relevant software.				
	Cryptographic methods are applied. Confidentiality key-codes are kept secret and secured.				
	The measurement is not inadmissibly influenced by a transmission delay.				
	No measurement data is lost in case the network services become in available.				
	Data storage is performed automatically.				
	The storage device has sufficient permanency to ensure that the data is not				

	corrupted under normal storage conditions.				
	There is sufficient memory storage.				
	All data necessary for the calculation is stored with the final calculated value.				
	Stored data is deleted when the transaction is settled under the following conditions: - deletion is performed in the same order as the recording order; - deletion is started automatically or after a specific manual operation.				

F Performance tests

During the performance tests the following maximum permissible errors are applied:

Flow rate Q	Accuracy class		
	☐	☐	☐
	0.5	1	1.5
$Q_{min} \leq Q < Q_t$	± 1 %	± 2 %	± 3 %
$Q_t \leq Q \leq Q_{max}$	± 0.5 %	± 1 %	± 1.5 %

If applicable the extra limits for meters with built-in conversion devices, showing the volume at base volume only, are applied:

☐	
For a gas meter with a built-in conversion device and displaying the volume at base conditions only:	the maximum permissible errors as indicated in the table above are increased by 0.5 % in the temperature range of (t_{sp} – 15) °C to (t_{sp} + 15) °C. Outside this temperature range an additional increase of 0.5 % per additional interval of 10 °C is applied to this extended MPE.
	Applied temperature t_{sp} :

The following values for the weighted mean error (WME) are applied:

Flow rate Q	Accuracy class		
	☐	☐	☐
	0.5	1	1.5
WME	± 0.2 %	± 0.4 %	± 0.6 %

F.1 Error *(12.6.1)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The error of the gas meter is determined at different flow rates.

Type of gas :
Pressure during the test :

Specimen number ..									
Flow rate [m^3/h]	Errors [%] 1	2	3	4	5	6	average error [%]	limit (MPE) [%]	result +/-

WME [%]	limit [%]	result +/-

Determination of the cyclic volume *(6.4.2)*:

Specimen number ..			
measured cyclic volume [dm^3]	nominal cyclic volume [dm^3]	limit [%]	result +/-
		5	

Determination of the value of the pulse generator *(6.4.3)*:

Specimen number ..			
measured value [pulses / m^3]	nominal value [pulses / m^3]	limit [%]	result +/-
		0,05	

Passed	☐ Yes	☐ No

F.2 Reproducibility *(12.6.2)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The reproducibility of the gas meter is determined at different flow rates.

Type of gas :
Pressure during the test :

Specimen number ..									
Flow rate [m^3/h]	Errors [%] 1	2	3	4	5	6	maximum difference [%]	limit (1/3 MPE) [%]	result +/-

Applied operating pressure:

Passed		Yes		No

F.3 Repeatability *(12.6.3)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The repeatability of the gas meter is determined at different flow rates.

Type of gas :
Pressure during the test :

Specimen number ..						
Flow rate [m^3/h]	Errors [%] 1	2	3	maximum difference [%]	limit (1/3 MPE) [%]	result +/-
Q_{max}						
Q_t						
Q_{min}						

Applied operating pressure:

Passed		Yes		No

F.4 Orientation *(12.6.4)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The error of the gas meter is determined at different orientations of the gas meter, as stated in the table below.

Type of gas :
Pressure during the test :

Specimen number ..					
Flow rate	Errors [%]			limit (MPE)	result
[m^3/h]	horizontal	vertical up	vertical down	[%]	+/-

Specimen number ..					
	WME [%]			limit (WME)	result
	horizontal	vertical up	vertical down	[%]	+/-

Intermediate adjustments are necessary to meet the requirements:

Mark to be applied:

Passed	☐	Yes	☐	No

F.5 Flow direction *(12.6.5)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The error of the gas meter is determined at different flow directions, as stated in the table below.

Type of gas :
Pressure during the test :

Specimen number ..				
Flow rate [m^3/h]	Errors [%] normal flow direction	Errors [%] reverse flow direction	limit (MPE) [%]	result +/-
WME				

Specimen number ..				
	Errors [%] normal flow direction	Errors [%] reverse flow direction	limit (WME) [%]	result +/-
WME				

Intermediate adjustments are necessary to meet the requirements:

Mark to be applied:

Passed	☐	Yes	☐	No

F.6 Working pressure *(12.6.6)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The error of the gas meter is determined at different operating pressures, as stated in the table below.

Type of gas :

Specimen number ..				
Flow rate [m^3/h]	Errors [%] at …. bar	Errors [%] at …. bar	limit (MPE) [%]	result +/-

Intermediate adjustments are necessary to meet the requirements:

Specified range(s) of operating pressure:

Passed		Yes			No

F.7 Temperature *(12.6.7)*

a) Flow tests at different temperatures

F.7.1 Flow tests with equal gas and ambient temperature *(12.6.7.1)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The error of the gas meter is determined at different ambient temperatures, as stated in the table below.
During the tests the gas temperature was equal to the ambient temperature.

Type of gas :
Pressure during the test :

Specimen number ..						
Flow rate [m^3/h]	Errors [%] at …. °C	at …. °C	at …. °C	at …. °C	limit (MPE) [%]	result +/-

Passed	☐	Yes	☐	No

F.7.2 Flow tests with unequal gas and ambient temperature *(12.6.7.2)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The error of the gas meter is determined at different ambient temperatures, as stated in the table below.
During the tests the gas temperature was unequal to the ambient temperature.

Specimen number ..				
Flow rate [m^3/h]	Errors [%] gas meter at +20 °C gas temperature +40 °C	gas meter at +20 °C gas temperature 0 °C	limit (2 MPE) [%]	result +/-
Q_{max}				
Q_t				

Passed	☐	Yes	☐	No

b) Monitoring the unsuppressed flow rate output of the meter at no-flow conditions at different temperatures

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The error of the gas meter is determined at different ambient temperatures, as stated in the table below.

Type of gas :
Pressure during the test :

Specimen number ..						
applied temperature [°C]	Indicated flow rate during no-flow conditions Q_0 [m^3/h]	calculated Δe at Q_{min} [%]	error at Q_{min} [%]	calculated error (= error at Q_{min} + Δe) [%]	limit (MPE) [%]	result +/-
at …. °C (reference)						
at …. °C						
at …. °C						
at …. °C (reference)						

Q_{min} = …. m^3/h

Influence Δe at Q_{min} is calculated as follows:

$$\Delta e = \frac{Q_{0,temp} - Q_{0,ref}}{Q_{min}} * 100\%$$

Passed		☐	Yes	☐	No

c) Evaluation of the construction of the meter

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The expected influence of temperature variations on the meter construction is evaluated.

Evaluation of the influence of temperature variations on the meter construction:

F.8 Flow disturbance *(12.6.8)*

The effect of disturbances to the accuracy of the gas meter is determined at different conditions, as stated in the tables below.

a) mild disturbances

Observer:	
Date:	

	At start	At end
Temperature (°C):		

Applied piping configuration :
Applied flow conditioner :
Applied operating pressure :
Type of gas :

Specimen number ..											
Flow rate [m^3/h]		at ref. condi-tions	single 90° bend	double out-of plane bend		expander	reducer	diameter step		max. shift (1/3 MPE)	result
				rotating right	rotating left			+3%	-3%	[%]	+/-
0,25 Q_{max}	error [%]										
	shift [%]										
0,4 Q_{max}	error [%]										
	shift [%]										
Q_{max}	error [%]										
	shift [%]										

For ultrasonic gas meters, the same test is performed while adding an extra 10D straight pipe length (B.2.5):

Specimen number ..											
Flow rate [m^3/h]		at ref. condi-tions	single 90° bend	double out-of plane bend		expander	reducer	diameter step		max. shift (1/3 MPE)	result
				rotating right	rotating left			+3%	-3%	[%]	+/-
0,25 Q_{max}	error [%]										
	shift [%]										
0,4 Q_{max}	error [%]										
	shift [%]										
Q_{max}	error [%]										
	shift [%]										

b) severe disturbances

Observer:	
Date:	

	At start	At end
Temperature (°C):		

Applied piping configuration :
Applied flow conditioner :
Applied operating pressure :
Type of gas :

Specimen number ..						
Flow rate [m^3/h]		Errors [%]			max. shift (1/3 MPE) [%]	result +/-
		at ref. conditions	double out-of plane bend with half pipe area plate			
			rotating right	rotating left		
0,25 Q_{max}	error [%]					
	shift [%]					
0,4 Q_{max}	error [%]					
	shift [%]					
Q_{max}	error [%]					
	shift [%]					

For ultrasonic gas meters, the same test is performed while adding an extra 10D straight pipe length (B.2.5):

Specimen number ..						
Flow rate [m^3/h]		Errors [%]			max. shift (1/3 MPE) [%]	result +/-
		at ref. conditions	double out-of plane bend with half pipe area plate			
			rotating right	rotating left		
0,25 Q_{max}	error [%]					
	shift [%]					
0,4 Q_{max}	error [%]					
	shift [%]					
Q_{max}	error [%]					
	shift [%]					

Passed		☐	Yes	☐ No

F.9 Durability *(12.6.9)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The accuracy measurements before and after the exposure to the durability test are performed with air.

The gas meters is exposed to a durability test with the following characteristics:
- duration : 2.000 h
- flow rate : Q_{max}
- type of gas : natural gas
- operating pressure :

Specimen number ..								
Flow rate [m³/h]	Errors [%] before the durability test	Errors [%] after the durability test	limit before durability (MPE) [%]	limit after durability (2 MPE) [%]	result +/-	shift [%]	limit *) [%]	result +/-

Specimen number ..								
Flow rate [m³/h]	Errors [%] before the durability test	Errors [%] after the durability test	limit before durability (MPE) [%]	limit after durability (2 MPE) [%]	result +/-	shift [%]	limit *) [%]	result +/-

Specimen number ..								
Flow rate [m³/h]	Errors [%] before the durability test	Errors [%] after the durability test	limit before durability (MPE) [%]	limit after durability (2 MPE) [%]	result +/-	shift [%]	limit *) [%]	result +/-

*) MPE for class 1,5 or ½ MPE for other classes.

Passed	☐ Yes	☐ No

F.10 Drive shaft (torque) *(12.6.10)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The gas meter is exposed to the maximum permissible torque with the following characteristics:
- torque : … N.mm

Type of gas :
Pressure during the test :

Specimen number ..					
Flow rate [m^3/h]	Errors [%] without any torque	Errors [%] with maximum torque	limit shift [%]	limit (1/3 MPE) [%]	result +/-
Q_{min}					

Passed	☐ Yes	☐ No

F.11 Overload flow *(12.6.11)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The gas meter is exposed to overload an flow rate with the following characteristics:
- overload flow rate : 1.2 Q_{max}
- duration : 1 hour

Type of gas :
Pressure during the test :

Specimen number ..								
Flow rate [m^3/h]	Errors [%] before overload flow	Errors [%] after overload flow	limit before overload flow (MPE) [%]	limit after overload flow (MPE) [%]	result +/-	limit shift [%]	limit (1/3 MPE) [%]	result +/-

Passed	☐ Yes	☐ No

F.12 Different gases *(12.6.12)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The gas meter is examined with the gases as stated in the table below.

Pressure during the test :

Specimen number ..					
Flow rate [m^3/h]	Errors [%] with air	with …….	with …….	limit (MPE) [%]	result +/-

Intermediate adjustments are necessary to meet the requirements:

Specified range of operating gases:

Passed		Yes			No

F.13 Vibrations and shocks *(12.6.13)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The gas meter is exposed to overload vibrations and shocks with the following characteristics:

vibrations:
- total frequency range : 10 Hz – 150 Hz
- total RMS level : 7 $m.s^{-2}$
- ASD level 10 – 20 Hz : 1 $m^2.s^{-3}$
- ASD level 20 – 150 Hz : -3 dB/octave

shocks:
- height of fall : 50 mm

Type of gas :
Pressure during the test :

Specimen number ..					
Flow rate [m^3/h]	Errors [%] before vibrations and shocks	Errors [%] after vibrations and shocks	shift [%]	limit (0,5 MPE) [%]	result +/-

Passed	☐	Yes	☐	No

F.14 Interchangeable components *(12.6.14)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The following component in the gas meter can be exchanged:

The accuracy of the gas meter is while using the starting configuration, after interchange of the component and after reinstalling the original component.

Type of gas :
Pressure during the test :

Specimen number ..						
Flow rate [m^3/h]		starting configuration	after interchange	after reinstalling	max. difference (1/3 MPE) [%]	result +/-
Q_t	error [%]					
	shift [%]					

Passed		☐	Yes	☐	No

F.15 Electronics *(12.6.15)*

The electronics are examined by means of the tests as stated below.

Examined part : complete gas meter / separate electronic device *(to be indicated)*

Conditions during the tests
Type of gas :
Pressure :

F15.1 Dry heat *(A.4.1.1)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

At the upper specified temperature the accuracy of the gas meter is examined.

Applied test method: with actual flow

Specimen number ..			
Flow rate [m^3/h]	Errors [%] at …. °C	limit (MPE) [%]	result +/-

Applied test method: at no-flow conditions while monitoring the unsuppressed flow rate output of the meter

Specimen number ..						
applied temperature [°C]	Indicated flow rate during no-flow conditions Q_0 [m^3/h]	calculated Δe at Q_{min} [%]	error at Q_{min} [%]	calculated error (= error at Q_{min} + Δe) [%]	limit (MPE) [%]	result +/-
at …. °C (reference)						
at …. °C						
at …. °C (reference)						

Q_{min} = …. m^3/h

Influence Δe at Q_{min} is calculated as follows:

$$\Delta e = \frac{Q_{0,temp} - Q_{0,ref}}{Q_{min}} * 100\%$$

Passed		☐	Yes	☐	No

F15.2 Cold *(A.4.1.2)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

At the lower specified temperature the accuracy of the gas meter is examined.

Applied test method: with actual flow

Specimen number ..			
Flow rate [m^3/h]	Errors [%] at …. °C	limit (MPE) [%]	result +/-

Applied test method: at no-flow conditions while monitoring the unsuppressed flow rate output of the meter

Specimen number ..						
applied temperature [°C]	Indicated flow rate during no-flow conditions Q_0 [m^3/h]	calculated Δe at Q_{min} [%]	error at Q_{min} [%]	calculated error (= error at Q_{min} + Δe) [%]	limit (MPE) [%]	result +/-
at …. °C (reference)						
at …. °C						
at …. °C (reference)						

Q_{min} = …. m^3/h

Influence Δe at Q_{min} is calculated as follows:

$$\Delta e = \frac{Q_{0,temp} - Q_{0,ref}}{Q_{min}} * 100\%$$

Passed		☐	Yes	☐	No

F15.3 Damp heat, steady-state (non condensing) *(A.4.2.1)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The gas meter is exposed to the upper temperature at 93% R.H. for 4 days.

The accuracy of the gas meter is examined:
- at reference conditions before the increase of the temperature;
- at the end of the upper temperature phase;
- at reference conditions, 24 hours after the decrease of temperature.

Applied test method: with actual flow

Specimen number ..					
Flow rate [m^3/h]	Errors [%] at …. °C (ref. conditions)	Errors [%] at …. °C	Errors [%] at …. °C (ref. conditions)	limit (MPE) [%]	result +/-

Applied test method: at no-flow conditions while monitoring the unsuppressed flow rate output of the meter

Specimen number ..						
applied temperature [°C]	Indicated flow rate during no-flow conditions Q_0 [m^3/h]	calculated Δe at Q_{min} [%]	error at Q_{min} [%]	calculated error (= error at Q_{min} + Δe) [%]	limit (MPE) [%]	result +/-
at …. °C (reference)						
at …. °C						
at …. °C (reference)						

Q_{min} = …. m^3/h

Influence Δe at Q_{min} is calculated as follows:

$$\Delta e = \frac{Q_{0,temp} - Q_{0,ref}}{Q_{min}} * 100\%$$

Passed	☐	Yes	☐	No

F15.4 Damp heat, cyclic (condensing) *(A.4.2.2)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The gas meter is exposed to 2 cyclic temperature variations between the lower temperature and the upper temperature, with the R.H. above 95% during the temperature change and low temperature phases, and at or above 93% R.H. at the upper temperature phases.

The accuracy of the gas meter is examined:
- at reference conditions before the increase of the temperature;
- at reference conditions, at least 4 hours after the last cycle.

Applied test method: with actual flow

Specimen number ..					
Flow rate [m^3/h]	Errors [%] at ref. conditions		shift [%]	fault limit (1/2 MPE) [%]	result +/-
	before	after			

Applied test method: at no-flow conditions while monitoring the unsuppressed flow rate output of the meter

Specimen number ..				
applied temperature	Indicated flow rate during no-flow conditions Q_0 [m^3/h]	calculated Δe at Q_{min} [%]	fault limit (1/2 MPE) [%]	result +/-
at …. °C (reference), before				
at …. °C (reference), after				

Q_{min} = …. m^3/h

Influence Δe at Q_{min} is calculated as follows:

$$\Delta e = \frac{Q_{0,ref,after} - Q_{0,ref,before}}{Q_{min}} * 100\%$$

Passed		☐	Yes	☐	No

F15.5 Vibration (random) *(A.5.1)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The gas meter is exposed to vibrations with the following characteristics:
- total frequency range : 10 Hz – 150 Hz
- total RMS level : 7 $m.s^{-2}$
- ASD level 10 – 20 Hz : 1 $m^2.s^{-3}$
- ASD level 20 – 150 Hz : -3 dB/octave

Applied test method: with actual flow

Specimen number ..					
Flow rate [m^3/h]	Errors [%] before vibrations	Errors [%] after vibrations	fault limit shift [%]	fault limit (1/2 MPE) [%]	result +/-

Applied test method: at no-flow conditions while monitoring the unsuppressed flow rate output of the meter

Specimen number ..				
condition	Indicated flow rate during no-flow conditions Q_0 [m^3/h]	calculated Δe at Q_{min} [%]	fault limit (1/2 MPE) [%]	result +/-
reference conditions, before				
reference conditions, after				

Q_{min} = …. m^3/h

Influence Δe at Q_{min} is calculated as follows:

$$\Delta e = \frac{Q_{0,ref,after} - Q_{0,ref,before}}{Q_{min}} * 100\%$$

Passed		☐	Yes	☐	No

F15.6 Mechanical shock *(A.5.2)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The gas meter is exposed to a shock with the following characteristics:
- height of fall : 50 mm

Applied test method: with actual flow

Specimen number ..					
Flow rate [m^3/h]	Errors [%] before shocks	Errors [%] after shocks	fault limit shift [%]	fault limit (1/2 MPE) [%]	result +/-

Applied test method: at no-flow conditions while monitoring the unsuppressed flow rate output of the meter

Specimen number ..				
condition	Indicated flow rate during no-flow conditions Q_0 [m^3/h]	calculated Δe at Q_{min} [%]	fault limit (1/2 MPE) [%]	result +/-
reference conditions, before				
reference conditions, after				

Q_{min} = …. m^3/h

Influence Δe at Q_{min} is calculated as follows:

$$\Delta e = \frac{Q_{0,ref,after} - Q_{0,ref,before}}{Q_{min}} * 100\%$$

Passed		☐	Yes	☐	No

F15.7 Radiated, RF, electromagnetic fields *(A.6.1.1)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The gas meter is exposed to radiated, RF, electromagnetic fields with the following characteristics:
- frequency range : …. MHz – 3 GHz
- field strength : 10 V/m
- modulation : 80 % AM, 1 kHz, sine wave

Applied test method: with actual flow

Specimen number ..					
Flow rate [m^3/h]	radiated field condition	measured errors [%]	fault limit shift [%]	fault limit (MPE) [%]	result +/-
	no field				
	horizontal, .. - .. MHz				
	vertical, .. - .. MHz				
	horizontal, .. - .. MHz				
	vertical, .. - .. MHz				

Applied test method: at no-flow conditions while monitoring the unsuppressed flow rate output of the meter

Specimen number ..				
radiated field condition	Indicated flow rate during no-flow conditions Q_0 [m^3/h]	fault limit calculated Δe at Q_{min} [%]	fault limit (MPE) [%]	result +/-
no field				
horizontal, .. - .. MHz				
vertical, .. - .. MHz				
horizontal, .. - .. MHz				
vertical, .. - .. MHz				

Q_{min} = …. m^3/h

Influence Δe at Q_{min} is calculated as follows:

$$\Delta e = \frac{Q_{0,frequency} - Q_{0,no\ field}}{Q_{min}} * 100\%$$

Passed		☐	Yes	☐	No

F15.8 Conducted radio-frequency fields *(A.6.1.2)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The gas meter is exposed to conducted radio-frequency fields with the following characteristics:
- frequency range : 0,15 MHz – 80 MHz
- field strength : 10 V e.m.f.
- modulation : 80 % AM, 1 kHz, sine wave

Applied test method: with actual flow

Specimen number ..					
Flow rate [m^3/h]	object which is exposed to the conducted fields	measured errors [%]	fault limit shift [%]	fault limit (MPE) [%]	result +/-
	none (reference conditions) power cable cable …. cable …. cable ….				

Applied test method: at no-flow conditions while monitoring the unsuppressed flow rate output of the meter

Specimen number ..				
object which is exposed to the conducted fields	Indicated flow rate during no-flow conditions Q_0 [m^3/h]	fault limit calculated Δe at Q_{min} [%]	fault limit (MPE) [%]	result +/-
none (reference conditions) power cable cable …. cable …. cable ….				

Q_{min} = …. m^3/h

Influence Δe at Q_{min} is calculated as follows:

$$\Delta e = \frac{Q_{0,cable} - Q_{0,ref.conditions}}{Q_{min}} * 100\%$$

Passed		☐	Yes	☐	No

F15.9 Electrostatic discharge *(A.6.2)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The gas meter is exposed to electrostatic discharges with the following characteristics:
- contact discharges : 6 kV
- air discharges : 8 kV

Applied test method: with actual flow

Specimen number ..					
Flow rate [m^3/h]	applied discharges	measured errors [%]	fault limit shift [%]	fault limit (0,5 MPE) [%]	result +/-
	none (reference conditions)				
	contact discharges positive				
	contact discharges negative				
	air discharges positive				
	air discharges negative				
	none (reference conditions)				

Applied test method: at no-flow conditions while monitoring the unsuppressed flow rate output of the meter

Specimen number ..				
applied discharges	Indicated flow rate during no-flow conditions Q_0 [m^3/h]	fault limit calculated Δe at Q_{min} [%]	fault limit (0,5 MPE) [%]	result +/-
none (reference conditions)				
contact discharges positive				
contact discharges negative				
air discharges positive				
air discharges negative				
none (reference conditions)				

Q_{min} = …. m^3/h

Influence Δe at Q_{min} is calculated as follows:

$$\Delta e = \frac{Q_{0,discharges} - Q_{0,ref.conditions}}{Q_{min}} * 100\%$$

Passed		☐	Yes	☐	No

F15.10 Bursts (transients) on signal, data and control lines *(A.6.3)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The gas meter is exposed to bursts (transients) on the signal, data and control lines, with the following characteristics:
- amplitude (peak value) : 1 kV
- repetition rate : 5 kHz

Applied test method: with actual flow

Specimen number ..					
Flow rate [m^3/h]	object which is exposed to the conducted fields	measured errors [%]	fault limit shift [%]	fault limit (0,5 MPE) [%]	result +/-
	none (reference conditions)				
	cable ….				
	cable ….				
	cable ….				

Applied test method: at no-flow conditions while monitoring the unsuppressed flow rate output of the meter

Specimen number ..				
object which is exposed to the conducted fields	Indicated flow rate during no-flow conditions Q_0 [m^3/h]	fault limit calculated Δe at Q_{min} [%]	fault limit (0,5 MPE) [%]	result +/-
none (reference conditions)				
cable ….				
cable ….				
cable ….				

Q_{min} = …. m^3/h

Influence Δe at Q_{min} is calculated as follows:

$$\Delta e = \frac{Q_{0,bursts} - Q_{0,ref.conditions}}{Q_{min}} * 100\%$$

Passed		☐	Yes	☐	No

F15.11 Surges on signal, data and control lines *(A.6.4)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The gas meter is exposed to surges on the signal, data and control lines, with the characteristics as stated in the table below.

Applied test method: with actual flow

Specimen number ..							
Flow rate [m^3/h]	object which is exposed to the surges	cable classification	test condition [kV]	measured errors [%]	shift [%]	fault limit (0,5 MPE) [%]	result +/-
	none (ref. conditions)						
	cable ….	unsymmetrical line	line to line: 0,5				
	cable ….	unsymmetrical line	line to ground: 1,0				
	cable ….	symmetrical line	line to ground: 1,0				
	cable ….	shielded I/O	line to ground: 0,5				

Applied test method: at no-flow conditions while monitoring the unsuppressed flow rate output of the meter

Specimen number ..						
object which is exposed to the surges	cable classification	test condition [kV]	Indicated flow rate during no-flow conditions Q_0 [m^3/h]	calculated Δe at Q_{min} [%]	fault limit (0,5 MPE) [%]	result +/-
none (ref. conditions)						
cable ….	unsymmetrical line	line to line: 0,5				
cable ….	unsymmetrical line	line to ground: 1,0				
cable ….	symmetrical line	line to ground: 1,0				
cable ….	shielded I/O	line to ground: 0,5				

Q_{min} = …. m^3/h

Influence Δe at Q_{min} is calculated as follows:

$$\Delta e = \frac{Q_{0,surges} - Q_{0,ref.conditions}}{Q_{min}} * 100\%$$

Passed		☐	Yes	☐	No

F15.12 DC mains voltage variation *(A.7.1)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The gas meter is exposed to DC mains voltage variations between the upper and lower limit.

Applied test method: with actual flow

Specimen number ..				
Flow rate [m^3/h]	applied voltage [V]	measured errors [%]	limit (MPE) [%]	result +/-
	…. (reference conditions) …. (upper limit) …. (lower limit)			

Applied test method: at no-flow conditions while monitoring the unsuppressed flow rate output of the meter

Specimen number ..						
applied voltage [V]	Indicated flow rate during no-flow conditions Q_0 [m^3/h]	calculated Δe at Q_{min} [%]	error at Q_{min} [%]	calculated error (= error at Q_{min} + Δe) [%]	limit (MPE) [%]	result +/-
…. (reference conditions) …. (upper limit) …. (lower limit)						

Q_{min} = …. m^3/h

Influence Δe at Q_{min} is calculated as follows:

$$\Delta e = \frac{Q_{0,voltage} - Q_{0,ref.conditions}}{Q_{min}} * 100\%$$

Passed	☐	Yes	☐	No

F15.13 AC mains voltage variation *(A.7.2)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The gas meter is exposed to AC mains voltage variations between the following limits:
- upper limit : Unom + 10%
- lower limit : Unom – 15%

Applied test method: with actual flow

Specimen number ..				
Flow rate [m^3/h]	applied voltage [V]	measured errors [%]	limit (MPE) [%]	result +/-
	…. (reference conditions) …. (upper limit) …. (lower limit)			

Applied test method: at no-flow conditions while monitoring the unsuppressed flow rate output of the meter

Specimen number ..						
applied voltage [V]	Indicated flow rate during no-flow conditions Q_0 [m^3/h]	calculated Δe at Q_{min} [%]	error at Q_{min} [%]	calculated error (= error at Q_{min} + Δe) [%]	limit (MPE) [%]	result +/-
…. (reference conditions) …. (upper limit) …. (lower limit)						

Q_{min} = …. m^3/h

Influence Δe at Q_{min} is calculated as follows:

$$\Delta e = \frac{Q_{0,voltage} - Q_{0,ref.conditions}}{Q_{min}} * 100\%$$

Passed		☐	Yes	☐	No

F15.14 AC mains voltage dips and short interruptions *(A.7.3)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The gas meter is exposed to AC mains voltage dips and short interruptions, with the characteristics as stated in the table below.

Applied test method: with actual flow

Specimen number ..						
Flow rate [m^3/h]	voltage reduction		measured errors [%]	fault limit		
	reduction to [%]	duration [cycles]		shift [%]	(1/2 MPE) [%]	result +/-
	no reduction (ref. conditions)					
	0	0,5				
	0	1				
	40	10 / 12				
	70	25 / 30				
	80	250 / 300				

Applied test method: at no-flow conditions while monitoring the unsuppressed flow rate output of the meter

Specimen number ..							
reduction to [%]	duration [cycles]	Indicated flow rate during no-flow conditions Q_0 [m^3/h]	calculated Δe at Q_{min} [%]	error at Q_{min} [%]	calculated error (= error at Q_{min} + Δe) [%]	fault limit (1/2 MPE) [%]	result +/-
no reduction (ref. conditions)							
0	0,5						
0	1						
40	10 / 12						
70	25 / 30						
80	250 / 300						

Q_{min} = …. m^3/h

Influence Δe at Q_{min} is calculated as follows:

$$\Delta e = \frac{Q_{0,reduction} - Q_{0,ref.conditions}}{Q_{min}} * 100\%$$

Passed	☐ Yes	☐ No

F15.15 Voltage dips, short interruptions and voltage variations on DC mains power *(A.7.4)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The gas meter is exposed to DC mains voltage dips, short interruptions and voltage variations, with the characteristics as stated in the table below.

Applied test method: with actual flow

Specimen number ..						
Flow rate [m^3/h]	voltage reduction		measured errors [%]	fault limit		
	voltage amplitude [%]	duration [ms]		shift [%]	(1/2 MPE) [%]	result +/-
	no reduction (ref. conditions)					
	40	10				
		30				
		100				
	70	10				
		30				
		100				
	0	1				
		3				
		10				
	85	0,1				
		0,3				
		1				
		3				
		10				
	120	0,1				
		0,3				
		1				
		3				
		10				

Applied test method: at no-flow conditions while monitoring the unsuppressed flow rate output of the meter

Specimen number ..							
voltage amplitude [%]	duration [ms]	Indicated flow rate during no-flow conditions Q_0 [m^3/h]	calculated Δe at Q_{min} [%]	error at Q_{min} [%]	calculated error (= error at Q_{min} + Δe) [%]	fault limit (1/2 MPE) [%]	result +/-
no reduction (ref. conditions)							
40	10 30 100						
70	10 30 100						
0	1 3 10						
85	0,1 0,3 1 3 10						
120	0,1 0,3 1 3 10						

Q_{min} = …. m^3/h

Influence Δe at Q_{min} is calculated as follows:

$$\Delta e = \frac{Q_{0,reduction} - Q_{0,ref.conditions}}{Q_{min}} * 100\%$$

Passed	☐ Yes	☐ No

F15.16 Bursts (transients) on AC and DC mains *(A.7.5)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The gas meter is exposed to bursts (transients) on the mains, with the following characteristics:
- amplitude (peak value) : 2 kV
- repetition rate : 5 kHz

Applied test method: with actual flow

Specimen number ..					
Flow rate [m^3/h]	object which is exposed to the conducted fields	measured errors [%]	fault limit shift [%]	fault limit (1/2 MPE) [%]	result +/-
	none (reference conditions) mains				

Applied test method: at no-flow conditions while monitoring the unsuppressed flow rate output of the meter

Specimen number ..				
object which is exposed to the conducted fields	Indicated flow rate during no-flow conditions Q_0 [m^3/h]	fault limit calculated Δe at Q_{min} [%]	fault limit (1/2 MPE) [%]	result +/-
none (reference conditions) mains				

Q_{min} = …. m^3/h

Influence Δe at Q_{min} is calculated as follows:

$$\Delta e = \frac{Q_{0,bursts} - Q_{0,ref.conditions}}{Q_{min}} * 100\%$$

Passed		☐	Yes	☐	No

F15.17 Surges on AC and DC mains *(A.7.6)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The gas meter is exposed to surges on the mains, with the characteristics as stated in the table below.

Applied test method: with actual flow

Specimen number ..						
Flow rate [m^3/h]	object which is exposed to the surges	test condition [kV]	measured errors [%]	shift [%]	fault limit (1/2 MPE) [%]	result +/-
	none (ref. conditions)					
	mains	line to line: 1,0				
	mains	line to ground: 2,0				

Applied test method: at no-flow conditions while monitoring the unsuppressed flow rate output of the meter

Specimen number ..					
object which is exposed to the surges	test condition [kV]	Indicated flow rate during no-flow conditions Q_0 [m^3/h]	calculated Δe at Q_{min} [%]	fault limit (1/2 MPE) [%]	result +/-
none (ref. conditions)					
mains	line to line: 1,0				
mains	line to ground: 2,0				

Q_{min} = …. m^3/h

Influence Δe at Q_{min} is calculated as follows:

$$\Delta e = \frac{Q_{0,surges} - Q_{0,ref.conditions}}{Q_{min}} * 100\%$$

Passed	☐	Yes	☐	No

F15.18 Ripple on DC mains power *(A.7.7)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The gas meter is exposed to ripple voltages on the DC mains, with the following characteristics:
- percentage of the nominal DC voltage : 2

Applied test method: with actual flow

Specimen number ..					
Flow rate [m^3/h]	object which is exposed to the conducted fields	measured errors [%]	fault limit shift [%]	fault limit (1/2 MPE) [%]	result +/-
	none (reference conditions) mains				

Applied test method: at no-flow conditions while monitoring the unsuppressed flow rate output of the meter

Specimen number ..				
object which is exposed to the conducted fields	Indicated flow rate during no-flow conditions Q_0 [m^3/h]	fault limit calculated Δe at Q_{min} [%]	fault limit (1/2 MPE) [%]	result +/-
none (reference conditions) mains				

Q_{min} = …. m^3/h

Influence Δe at Q_{min} is calculated as follows:

$$\Delta e = \frac{Q_{0,ripple} - Q_{0,ref.conditions}}{Q_{min}} * 100\%$$

Passed	☐	Yes	☐	No

F15.19 Low voltage of internal battery (not connected to the mains power) *(A.8)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The gas meter is exposed to low battery voltage conditions as indicated in the table below.

Specifications:
- nominal battery supply voltage U_{nom} [V] :
- minimum battery supply voltage U_{bmin} [V] :

Applied test method: with actual flow

Specimen number ..				
Flow rate [m^3/h]	applied voltage [V]	measured errors [%]	limit (MPE) [%]	result +/-
	U_{nom} (reference conditions) U_{bmin} 0,9 U_{bmin}			

Applied test method: at no-flow conditions while monitoring the unsuppressed flow rate output of the meter

Specimen number ..						
applied voltage [V]	Indicated flow rate during no-flow conditions Q_0 [m^3/h]	calculated Δe at Q_{min} [%]	error at Q_{min} [%]	calculated error (= error at Q_{min} + Δe) [%]	limit (MPE) [%]	result +/-
U_{nom} (reference conditions) U_{bmin} 0,9 U_{bmin}						

Q_{min} = …. m^3/h

Influence Δe at Q_{min} is calculated as follows:

$$\Delta e = \frac{Q_{0,voltage} - Q_{0,ref.conditions}}{Q_{min}} * 100\%$$

Passed		☐	Yes	☐	No

F.16 Influences from ancillary devices *(12.6.16)*

Observer:	
Date:	

	At start	At end
Temperature (°C):		

The effect of the following ancillary device to the gas meter is examined:
- …….

Type of gas :
Pressure during the test :

Specimen number ..					
Flow rate [m^3/h]		no function of ancillary device	with function of ancillary device	max. difference (0,1 MPE) [%]	result +/-
Q_{min}	error [%]				
	shift [%]				

Passed		☐	Yes	☐	No