INTERNATIONAL RECOMMENDATION

OIML R 137-3

Edition 2014 (E)

Gas meters

Part 3: Test report format

Compteurs de gaz

Partie 3: Format du rapport d'essai

OIML R 137-3 Edition 2014 (E)

ORGANISATION INTERNATIONALE DE MÉTROLOGIE LÉGALE

INTERNATIONAL ORGANIZATION OF LEGAL METROLOGY

Contents

Foreword

The International Organization of Legal Metrology (OIML) is a worldwide, intergovernmental organization whose primary aim is to harmonize the regulations and metrological controls applied by the national metrological services, or related organizations, of its Member States. The main categories of OIML publications are:

- **International Recommendations (OIML R),** which are model regulations that establish the metrological characteristics required of certain measuring instruments and which specify methods and equipment for checking their conformity. OIML Member States shall implement these Recommendations to the greatest possible extent;
- **International Documents (OIML D),** which are informative in nature and which are intended to harmonize and improve work in the field of legal metrology;
- **International Guides (OIML G),** which are also informative in nature and which are intended to give guidelines for the application of certain requirements to legal metrology; and
- **International Basic Publications (OIML B),** which define the operating rules of the various OIML structures and systems.

OIML Draft Recommendations, Documents and Guides are developed by Project Groups linked to Technical Committees or Subcommittees which comprise representatives from the Member States. Certain international and regional institutions also participate on a consultation basis. Cooperative agreements have been established between the OIML and certain institutions, such as ISO and the IEC, with the objective of avoiding contradictory requirements. Consequently, manufacturers and users of measuring instruments, test laboratories, etc. may simultaneously apply OIML publications and those of other institutions.

International Recommendations, Documents, Guides and Basic Publications are published in English (E) and translated into French (F) and are subject to periodic revision.

Additionally, the OIML publishes or participates in the publication of **Vocabularies (OIML V)** and periodically commissions legal metrology experts to write **Expert Reports (OIML E)**. Expert Reports are intended to provide information and advice, and are written solely from the viewpoint of their author, without the involvement of a Technical Committee or Subcommittee, nor that of the CIML. Thus, they do not necessarily represent the views of the OIML.

This publication - referenced OIML R 137-3, Edition 2014 - was developed by the Technical Subcommittee TC 8/SC 7 *Gas metering*. It was approved for final publication by the International Committee of Legal Metrology in 2014 and will be submitted to the International Conference of Legal Metrology in 2016 for formal sanction.

OIML Publications may be downloaded from the OIML web site in the form of PDF files. Additional information on OIML Publications may be obtained from the Organization’s headquarters:

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OIML R 137 *Gas meters.* Part 3: Test report format

1 Introduction

Part 3 of this Recommendation describes the type evaluation report format (hereafter called the "report format") applicable to any kind of gas measuring instruments (gas meters) independent of its technology. It presents a standardized format for recording the results of the various tests and examinations, described in Part 2 of OIML R 137-1 & -2:2012, to which a type of a gas meter shall be submitted with a view to its approval based on this OIML Recommendation.

The use of this report, as is, or translated into a different language is recommended to 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 this Recommendation. If this Recommendation is translated, it is highly recommended to leave the structure and the numbering of the clauses unchanged, in order to facilitate the interpretation of most of the contents even for those readers that are not able to easily interpret the applied language.

The report format, in the practical application, shall as a minimum contain clauses A–F (where applicable) in addition to a cover page issued by the Issuing Authority.

2 Applicability of this report format

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

Concerning the implementation of OIML Recommendation R 137-1 & -2:2012 in national regulations this report format is informative.

3 Guidance for the application of the 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 classes 1 and 1.5
Passed for				X	Failed for all classes
Passed for	/	/	/	/	test is not applicable for this instrument

- Unless prescribed otherwise, “Date” in the test report refers to the date of testing.
- The name(s) or symbol(s) of the unit(s) used to express the test results shall be specified where applied.
- Where in a table one or several choices can be made, checkboxes are used. In such cases columns Y, N, N/A are generally not applicable and are therefore presented crosshatched (see the example below)

Clause	**Description**		**Yes**	**No**	**Not applicable**	**Observations**
		☐				

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 “Observations” (for instance tests related to AC mains supply in the case of an instrument only powered by batteries, or partial testing after modification of a previously approved type).

The numbering of the report and the page numbers shall be completed in the heading.

Pages 1–5 of this document shall be replaced by a cover page issued by the Issuing Authority.

4 Evaluation report

The following pages concern the format for the individual report, starting with space for the cover page.

**<Cover page
issued by the
Issuing Authority>**

Contents of the report

A References of the authority responsible for this report

Name	
Address	
Report number	
Application number (project number)	
Period of execution of the tests	
Date of issuing the report	
Name and signature of the person responsible for the report 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 applicable requirements in OIML R 137:2012 for: ☐ Class 0.5 ☐ Class 1 ☐ Class 1.5
☐ Yes ☐ No
Observations:

C Summary of the results of the examination and tests

(To be completed by the Issuing Authority)

C.1 Examinations

Details of the evaluation results are available in the corresponding referenced rows in clause E

Clause in R 137-1	General requirements	Compliancy 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

Details of the test results are available in the referenced sub clauses of clause F of this evaluation report

Clause in R 137-2	Performance tests	Clause in R 137-1	Complies with R 137-1			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 is authorized by the manufacturer (documented)		☐ Yes ☐ No
It has been verified that no application for OIML type evaluation was made to any other OIML Issuing Authority (see OIML B 3, 3.1.2)		☐ Yes ☐ No

Observations:

D.3 Testing laboratories involved in the tests

(This table to be completed for each test laboratory)

Name			
Address			
Application number			
Tests performed by this laboratory			
Date/period of the tests			
Name(s) of test engineer(s)			
Statement of compliance with the requirement of proven competence for performing the above referred tests within the scope of OIML R 137-1 & -2:2012 (OIML B 3 [5.3.1])			
Where applicable accredited for	QA standard	Accreditation Number:	Expires (date):
Details of relevant peer assessment or assessment by other means where applicable			
In case tests have been performed on another location than the premises of this laboratory, give details here			
Name of the person in charge			
Date of signature			
Stamp (where applicable) and signature of the responsible person			

Observations:

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 were examined:

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

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

Details:

D.8 Information concerning the test equipment used for the type evaluation

(including details of simulations and the way measurement uncertainty is taken into account)

Details:

E Examination

(To be completed by the Evaluating Authority)

E.1 Requirements checklist

Clause in R 137-1	Description		Yes	No	Not applicable	Observations
4	**Units of measurement**					
	All applied quantity values are expressed in:	SI units: ☐				Applied units: ....
		other legal units conforming OIML D 2:2007: ☐				
5.2	**Values of Q_{max}, Q_t and Q_{min}**					
	The following ratios apply:	$Q_{max}/Q_{min} \geq 50$ 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 construction and quality of the applied materials comply the criterion on physical, chemical and thermal durability.					
	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 mechanical 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.
	The specific components identified by the manufacturer are not of influence to the accuracy of the meter and allow an exchange without an intermediate subsequent verification.					
	At zero flow rate the meter totalization register does not change.					
6.2	**Flow direction**					
	The direction of the gas flow is:	indicated by a clear indication: ☐				
		determined by the construction of the gas meter ☐				
	Where the meter can be applied for bi-directional measurements, a double-headed arrow with a plus and minus sign is used.					
	In bi-directional use any quantified reverse flow is:	subtracted from the indicated quantity: ☐				
		recorded separately: ☐				
	The maximum permissible error requirements are met both for forward and reverse flow.					
	Where the meter is not designed for measuring reverse flow:	measures preventing reverse flow are installed: ☐				
		the meter is able to withstand incidental or accidental reverse flow without deterioration of, or change in any forward flow measurement ☐				
	The meter is provided with a device preventing the indicating device from functioning in case of reverse flow.					

Clause in R 137-1	Description		Yes	No	Not applicable	Observations
6.3	**Indicating device**					
	Kind of indicating device:	a) mechanical: ☐				
		b) electromechanical or electronic: ☐				
		a combination of a) and b) above: ☐				
	The quantity of gas is indicated in a clear way and unambiguous.					
	The indication cannot be reset and is non-volatile.					
	The applied decimal separator is clear.					
	In case one display is applied for different indications it is made clear which is the actual kind of quantity displayed.					
	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 does not 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 on dimensions and appearance of digits.					
	A display test facility is provided (electromechanical or electronic indicating devices only).					
	Any applied remote indicating device clearly identifies the associated gas meter. The integrity of the communication is checked.					

Clause in R 137-1	Description		Yes	No	Not applicable	Observations
6.4	**Test element**					
	The meter is equipped with:	an integral test element: ☐				Value of the scale interval:
		a pulse generator: ☐				Pulse frequency (relative to flow rate):
		arrangements to permit the connection of a portable test unit: ☐				
	The integral test element fulfils the required construction criteria.					
	The pulse generator fulfils the required construction and synchronizing criteria.					
	The value of the pulse made available for attachable test devices is marked on the gas meter (which allows for the application of an attachable test device as a test element).					
	At Q_{min} the test element or pulse is incremented at least each 60 s.					
6.5	**Ancillary devices**					
	The gas meter is equipped with ancillary devices not affecting the correct operation of the meter.					The meter is equipped with the following ancillary devices:
	Exposed ends of drive shafts are suitable protected when not connected.					Applied protection method:
	Applying a torque up to three times the permissible torque does not result in breaking the connection between measuring transducer and gearing					
6.6	**Power sources (electrical power supply)**					
	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 for the replacement of the power source is provided .				
		The estimated remaining 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 replacement.				
		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 verifies 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 gas meter is marked with all relevant markings.					

Clause in R 137-1	Description	Yes	No	Not applicable	Observations
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 (due to torque and bending); - mutual influence between gas meters; - mounting instructions; - maximum allowable diameter differences between the gas meter and connecting pipe work; - other relevant installation conditions.				
9.1.3	**Hardware sealing**				
	Dismantling of parts result in permanently visible damage to seals.				
	Marking plates containing metrological information are sealed and all parts which affect the accuracy of the instrument.				
	The applied sealings can withstand outdoor conditions.				
9.1.4	**Electronic sealing**				
	Parameters can only be changed by applying a security code (password) or a special device.				
	The security code can be altered by authorized persons.				
	When the configuration mode is activated this is clearly indicated.				
	The most recent intervention is recorded in an event logger. The record includes an identification of the authorized person, an event counter or date and time, the former value of the changed parameters and totals.				
	The principle of first-in-first-out (FIFO) is applied in case a need for deletion of previous records of intervention.				
	For devices equipped 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 does not operate in case of wrong configuration.				
10	**Suitability for testing**				
	The bore of the applied pressure tappings is sufficiently large				Bore of the pressure tappings:
	Closure means are provided				
	The pressure tappings for measuring the working pressure are clearly and indelibly marked "p_m" or "p_r" and other pressure tappings "p".				

E.2 Software requirements checklist

Applicable evaluation procedures:

Clause in R 137-1	Requirement	Evaluation procedure
I.1.1	Software identification	AD + VFTSw
I.1.2	Correctness of algorithms	AD + VFTSw
I.1.3	Fraud protection	AD + VFTSw + DFA/CIWT/SMT
	Parameter protection	AD + VFTSw + DFA/CIWT/SMT
I.2.1	Separation of electronic devices and sub-assemblies	AD
I.2.2	Separation of software parts	AD
I.2.3	Storage of data, transmission via communication systems	AD + VFTSw + CIWT/SMT
I.2.3.1	Data protection with respect to time of measurement	AD + VFTSw + SMT
I.2.4	Automatic storing	AD + VFTSw
I.2.3.4	Transmission delay	AD + VFTSw
I.2.3.5	Transmission interruption	AD + VFTSw
	Time stamp	AD + VFTSw

Abbreviation	Description	Not applicable	Related clause from OIML D 31:2008
AD	Analysis of the documentation and validation of the design		6.2.3.1
VFTM	Validation by functional testing of metrological functions		6.2.3.2
VFTSw	Validation by functional testing of software functions		6.2.3.3
DFA	Metrological data flow analysis		6.2.3.4
CIWT	Code inspection and walkthrough		6.2.3.5
SMT	Software module testing		6.2.3.6

For each of the applicable requirements an explanation on the manner in which the requirement is met is presented in the column ‘observations’.

Clause in R 137-1	Description	Yes	No	Not applicable	Observations
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 facilities 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

Concerning the performance tests the following maximum permissible errors have been 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 following increased MPE has been applied:
(Applicable to gas meters with built-in conversion devices, showing the volume at base volume only)

☐
In addition to the maximum permissible errors as indicated in the table above an increase by 0.5 % in the temperature range of (t_{sp} – 15) °C to (t_{sp} + 15) °C and an additional increase of 0.5 % per additional interval of 10 °C outside this temperature range
Applicable temperature t_{sp} :

The following rate for the weighted mean error (WME) has been applied:

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

F.1 Error (12.6.1)

Observer:	
Date:	

Temperature during the test (°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] *)	Error [%] 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	

*) For mass meters the flow rate may be presented in kg/h (applicable to all instances within this report where the flow rate is expressed in volumetric units)

F.2 **Reproducibility** (12.6.2)

Observer:	
Date:	

Temperature during the test (°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]	Error [%]						Maximum difference [%]	Limit (⅓ MPE) [%]	Result +/-
	1	2	3	4	5	6			

Passed		Yes		No

F.3 **Repeatability** (12.6.3)

Observer:	
Date:	

Temperature during the test (°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]	Error [%]			Maximum difference [%]	Limit (⅓ MPE) [%]	Result +/-
	1	2	3			
Q_{max}						
Q_t						
Q_{min}						

Passed		Yes		No

F.4 Orientation (12.6.4)

Observer:	
Date:	

Temperature during the test (°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	Error [%]			Limit (MPE)	Result
[m^3/h]	Horizontal	Vertical up	Vertical down	[%]	+/-

Specimen number ..					
				Limit (WME)	Result
	Horizontal	Vertical up	Vertical down	[%]	+/-
WME [%]					

Intermediate adjustments are necessary to meet the requirements:

Mark to be applied:

Passed	☐	Yes		☐	No

F.5 Flow direction (12.6.5)

Observer:	
Date:	

Temperature during the test (°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]	Error [%] Normal flow direction	Error [%] Reverse flow direction	Limit (MPE) [%]	Result +/-

Specimen number ..				
	Normal flow direction	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:	

Temperature during the test (°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]	Error [%] at …. bar	Error [%] 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:	

Temperature during the test (°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]	Error [%]				Limit (MPE) [%]	Result +/-
	at …. °C	at …. °C	at …. °C	at …. °C		

Passed		Yes		No

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

Observer:	
Date:	

Temperature during the test (°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.

Type of gas :
Pressure during the test :

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

Passed		Yes		No

[*)] The test is only applicable for gas meters indicating the volume at base conditions only (see 5.9). For other gas meters this test is not applicable.

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

Observer:	
Date:	

Temperature during the test (°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:

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

Passed	☐	Yes	☐	No

c) Evaluation of the construction of the meter

Observer:	
Date:	

Temperature during the test (°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:	

Temperature during the test (°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		Ex-pander	Reducer	Diameter step		Max. shift (⅓ 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 10 D 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		Ex-pander	Reducer	Diameter step		Max. shift (⅓ 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:	

Temperature during the test (°C):	.. ± ..

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

Specimen number ..						
Flow rate [m^3/h]		Error [%]			Max. shift (⅓ 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]		Error [%]			Max. shift (⅓ 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:	

Temperature during the test (°C):	.. ± ..

The accuracy measurements before and after the exposure to the durability test are performed using ... *<type of gas or air>*.

The gas meter is exposed to a durability test with the following characteristics:

- required volume: m^3
- duration : h
- flow rate : .... *Q_{max}
- type of gas :
- operating pressure :

Note: Durability is tested using a flow rate between 0.8 Q_{max} and Q_{max} comprising a total volume equivalent to a flow at Q_{max} during a period of 2 000 hours.

Specimen number ..								
Flow rate [m^3/h]	Error [%] before the durability test	Error [%] after the durability test	Limit before durability (MPE) [%]	Limit after durability (2 MPE) [%]	Result +/-	Shift [%]	Limit *) [%]	Result +/-

Specimen number ..								
Flow rate [m^3/h]	Error [%] before the durability test	Error [%] after the durability test	Limit before durability (MPE) [%]	Limit after durability (2 MPE) [%]	Result +/-	Shift [%]	Limit *) [%]	Result +/-

Specimen number ..								
Flow rate [m^3/h]	Error [%] before the durability test	Error [%] 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:	

Temperature during the test (°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]	Error [%] without any torque	Error [%] with maximum torque	Shift [%]	Limit (⅓ MPE) [%]	Result +/-
Q_{min}					

Passed	☐	Yes	☐	No

F.11 Overload flow (12.6.11)

Observer:	
Date:	

Temperature during the test (°C):	.. ± ..

The gas meter is exposed to an overload 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]	Error [%] before overload flow	Error [%] after overload flow	Limit before overload flow (MPE) [%]	Limit after overload flow (MPE) [%]	Result +/-	Limit Shift [%]	Limit (⅓ MPE) [%]	Result +/-

Passed	☐	Yes	☐	No

F.12 Different gases (12.6.12)

Observer:	
Date:	

Temperature during the test (°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]	Error [%] 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:	

Temperature during the test (°C):	.. ± ..

The gas meter is exposed to vibrations and shocks having 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]	Error [%] before vibrations	Error [%] after vibrations	Shift [%]	Limit (½ MPE) [%]	Result +/-
Flow rate [m^3/h]	Error [%] before shocks	Error [%] after shocks	Shift [%]	Limit (½ MPE) [%]	Result +/-

Passed	☐	Yes	☐	No

F.14 Interchangeable components (12.6.14)

Observer:	
Date:	

Temperature during the test (°C):	.. ± ..

The following component in the gas meter can be exchanged:

The accuracy of the gas meter is determined 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 (⅓ 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 :

F.15.1 Dry heat (A.4.1.1)

Observer:	
Date:	

Temperature during the test (°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]	Error [%] 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:

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

Passed	☐	Yes	☐	No

F.15.2 Cold (A.4.1.2)

Observer:	
Date:	

Temperature during the test (°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]	Error [%] 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:

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

Passed		☐	Yes	☐	No

F.15.3 Damp heat, steady-state (non-condensing) (A.4.2.1)

Observer:	
Date:	

Temperature during the test (°C):	.. ± ..

The gas meter is exposed to the upper temperature at 93 % RH 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 h after the decrease of temperature.

Applied test method: with actual flow

Specimen number ..					
Flow rate [m^3/h]	Error [%] at …. °C (ref. conditions)	Error [%] at …. °C	Error [%] 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:

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

Passed	☐	Yes	☐	No

F.15.4 Damp heat, cyclic (condensing) (A.4.2.2)

Observer:	
Date:	

Temperature during the test (°C):	.. ± ..

The gas meter is exposed to two cyclic temperature variations between the lower temperature and the upper temperature, with the RH above 95 % during the temperature change and low temperature phases, and at or above 93 % RH 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 h after the last cycle.

Applied test method: with actual flow

Specimen number ..					
Flow rate [m^3/h]	Error [%] at ref. conditions		Shift [%]	Fault limit (½ 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 (½ MPE) [%]	Result +/-
at …. °C (reference), before				
at …. °C (reference), after				

Q_{min} = …. m^3/h

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

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

Passed		☐	Yes	☐	No

F.15.5 Vibration (random) (A.5.1)

Observer:	
Date:	

Temperature during the test (°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]	Error [%] before vibrations	Error [%] after vibrations	Fault limit Shift [%]	Fault limit (½ 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 (½ MPE) [%]	Result +/-
Reference conditions, before				
Reference conditions, after				

Q_{min} = …. m^3/h

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

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

Passed		☐	Yes	☐	No

F.15.6 Mechanical shock (A.5.2)

Observer:	
Date:	

Temperature during the test (°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]	Error [%] before shocks	Error [%] after shocks	Fault limit Shift [%]	Fault limit (½ 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 (½ MPE) [%]	Result +/-
Reference conditions, before				
Reference conditions, after				

Q_{min} = …. m^3/h

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

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

Passed		☐	Yes	☐	No

F.15.7 Radiated, RF, electromagnetic fields (A.6.1.1)

Observer:	
Date:	

Temperature during the test (°C):	.. ± ..

The gas meter is exposed to radio-frequency. electromagnetic fields with the following characteristics:
- frequency range : ..... MHz – 3 GHz *)
- field strength : 10 V/m
- modulation : 80 % AM, 1 kHz, sine wave
- step size : 1 % of the preceding frequency value **)

Applied test method: with actual flow

Specimen number ..					
Flow rate [m^3/h]	Radiated field condition	Measured error [%]	Fault limit Shift [%]	Fault limit (MPE) [%]	Result +/-
	No field				
	Horizontal polarised field				
	Vertical polarised field				

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]	Calculated Δe at Q_{min} [%]	Fault limit (MPE) [%]	Result +/-
No field				
Horizontal polarized field				
Vertical polarized field				

Q_{min} = …. m^3/h

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

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

Passed		☐	Yes	☐	No

*) Start frequency of the sweep 26 MHz or 80 MHz depending on whether cabling is applied

**) A stepwise frequency sweep is performed over the whole frequency range. At each step a measurement is performed and the fault value calculated. However, in the test report the results of individual frequencies can be combined by presenting the overall result over the whole frequency range. Details on extremes, where relevant, shall be reported separately.

F.15.8 Conducted radio-frequency fields (A.6.1.2)

Observer:	
Date:	

Temperature during the test (°C):	.. ± ..

The gas meter is exposed to radio-frequency electromagnetic currents with the following characteristics:
- frequency range : 0.15 MHz – 80 MHz
- RF voltage amplitude : 10 V e.m.f. (50 Ω)
- modulation : 80 % AM, 1 kHz, sine wave

Applied test method: with actual flow

Specimen number ..					
Flow rate [m^3/h]	Cable which is exposed to the RF currents	Measured error [%]	Fault limit Shift [%]	(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 ..				
Cable 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} [%]	(MPE) [%]	Result +/-
None (reference conditions) Power cable Cable …. Cable …. Cable ….				

Q_{min} = …. m^3/h

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

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

Passed	☐	Yes	☐	No

F.15.9 Electrostatic discharge (A.6.2)

Observer:	
Date:	

Temperature during the test (°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 error [%]	Fault limit Shift [%]	Fault limit (½ 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 (½ 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:

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

Passed	☐	Yes	☐	No

F.15.10 Bursts (transients) on signal, data and control lines (A.6.3)

Observer:	
Date:	

Temperature during the test (°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]	Cable which is exposed to bursts	Measured error [%]	Fault limit Shift [%]	(½ 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 ..				
Cable which is exposed to bursts	Indicated flow rate during no-flow conditions Q_0 [m^3/h]	Fault limit Calculated Δe at Q_{min} [%]	(½ MPE) [%]	Result +/-
None (reference conditions) Cable …. Cable …. Cable ….				

Q_{min} = …. m^3/h

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

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

Passed		☐	Yes	☐	No

F.15.11 Surges on signal, data and control lines (A.6.4)

Observer:	
Date:	

Temperature during the test (°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]	Cable which is exposed to the surges	Cable classification	Test condition [kV]	Measured error [%]	Fault limit Shift [%]	Fault limit (½ MPE) [%]	Result +/-
	None (reference 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				
	None (reference conditions)	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 ..						
Cable 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 (½ MPE) [%]	Result +/-
None (reference 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				
None (reference conditions)	Shielded I/O	Line to ground: 0.5				

Q_{min} = …. m^3/h

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

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

Passed		Yes		No

F.15.12 DC mains voltage variation (A.7.1)

Observer:	
Date:	

Temperature during the test (°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 error [%]	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:

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

Passed		☐	Yes	☐	No

F.15.13 AC mains voltage variation (A.7.2)

Observer:	
Date:	

Temperature during the test (°C):	.. ± ..

The gas meter is exposed to AC mains voltage variations. The following limits apply:
- upper limit : U_{nom} + 10 %
- lower limit : U_{nom} – 15 %

Applied test method: with actual flow

Specimen number ..				
Flow rate [m^3/h]	Applied voltage [V]	Measured error [%]	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:

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

Passed		☐	Yes	☐	No

F.15.14 AC mains voltage dips and short interruptions (A.7.3)

Observer:	
Date:	

Temperature during the test (°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 error [%]	Fault limit		
	Reduction to [%]	Duration [cycles]		Shift [%]	(½ 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 (½ 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:

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

Passed		☐	Yes	☐	No

F.15.15 Voltage dips, short interruptions and voltage variations on DC mains power (A.7.4)

Observer:	
Date:	

Temperature during the test (°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 error [%]	Fault limit		
	Voltage amplitude [%]	Duration [ms]		Shift [%]	(½ MPE) [%]	Result +/-
	No reduction (ref. conditions)					
	40	10				
		30				
		100				
	70	10				
		30				
		100				
	0	1				
		3				
		10				
		duration [s]				
	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 (½ MPE) [%]	Result +/-
No reduction (ref. conditions)							
40	10 30 100						
70	10 30 100						
0	1 3 10						
	Duration [s]						
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:

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

Passed	☐ Yes	☐ No

F.15.16 Bursts (transients) on AC and DC mains (A.7.5)

Observer:	
Date:	

Temperature during the test (°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 bursts	Measured error [%]	Fault limit Shift [%]	Fault limit (½ MPE) [%]	Result +/-
	None (reference conditions) Mains power 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 (½ MPE) [%]	Result +/-
None (reference conditions) Mains power cable				

Q_{min} = …. m^3/h

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

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

Passed		☐	Yes	☐ No

F.15.17 Surges on AC and DC mains (A.7.6)

Observer:	
Date:	

Temperature during the test (°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 error [%]	Fault limit Shift [%]	Fault limit (½ MPE) [%]	Result +/-
	None (ref. conditions)					
	Mains power cable	Line to line: 1.0				
	Mains power cable	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 (½ MPE) [%]	Result +/-
None (ref. Conditions)					
Mains power cable	Line to line: 1.0				
Mains power cable	Line to ground: 2.0				

Q_{min} = …. m^3/h

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

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

Passed		☐	Yes	☐	No

F.15.18 Ripple on DC mains power (A.7.7)

Observer:	
Date:	

Temperature during the test (°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 ripple on DC voltage	Measured error [%]	Fault limit Shift [%]	(½ MPE) [%]	Result +/-
	None (reference conditions) Mains power 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 ripple on DC voltage	Indicated flow rate during no-flow conditions Q_0 [m^3/h]	Fault limit Calculated Δe at Q_{min} [%]	(½ MPE) [%]	Result +/-
None (reference conditions) Mains power cable				

Q_{min} = …. m^3/h

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

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

Passed		☐	Yes	☐	No

F.15.19 Low voltage of internal battery (not connected to the mains power) (A.8)

Observer:	
Date:	

Temperature during the test (°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 error [%]	Limit (MPE) [%]	Result +/-
	U_{nom} (reference conditions)			
	U_{bmin}			
	0.9 U_{bmin}	Low battery voltage alarm		
		☐ **Yes** ☐ **No**		

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}	Low battery voltage alarm					
	☐ **Yes** ☐ **No**					

Q_{min} = …. m^3/h

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

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

Passed	☐	Yes	☐	No

F.16 Influences from ancillary devices (12.6.16)

Observer:	
Date:	

Temperature during the test (°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 ($^1/_{10}$ MPE) [%]	Result +/-
Q_{min}	Error [%]				
	Shift [%]				

Passed		☐	Yes	☐	No