

INTERNATIONAL
RECOMMENDATION

OIML R 81
Annex D

Edition 2006 (E)

Dynamic measuring devices and systems
for cryogenic liquids

Annex D: Test Report Format

Dispositifs et systèmes de mesure dynamique des liquides cryogéniques

Annexe D: Format du rapport d'essai



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Foreword

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- **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 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 - reference OIML R 81 Annex D, Edition 2006 (E) - was developed by the OIML Technical Subcommittee TC 8/SC 6 *Measurement of cryogenic liquids*. It was approved for final publication by the International Committee of Legal Metrology in 1999.

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Dynamic measuring devices and systems for cryogenic fluids

Annex D: Test Report Format

Introduction

This Annex is **informative** with regard to the implementation of OIML Recommendation R 81 in national regulations; however, use of the Test Report Format is **mandatory** for application of the Recommendation within the OIML Certificate System.

Test procedures are included in Annex A and Annex B of OIML R 81.

Possible situations that may occur in testing dynamic measuring systems:

Meter	Measurement transducer	Calculator (including the indicating device)	Remarks
Included	Included	Included	During the test the reference value (also called “true value”) is provided by the reference (or working) standard (see 3.3 in R 81); the gravimetric method is recommended (see A.1 in R 81); other suitable methods may be used provided that the requirements of A.1.1 in R 81 are met (see A.1 in R 81).
Not included	Included	Not included	The measurement transducer may be tested alone provided that the computing and indicating devices have been subject to separate pattern (type) approvals (see 15.1.5.1, fourth paragraph in R 81); if applicable, the correction algorithm shall be applied to the output signal of the transducer to determine its errors (see 15.1.5.1, fourth paragraph in R 81); if applicable, the pulser is part of the transducer (see 3.6 in R 81) but may be tested together with the calculator (see third row below). See also the remark above in the first sentence.
Not included	Not included	Included	Tests are conducted by simulating the different inputs (see 15.1.6 in R 81). The signal generated by the measurement transducer should be simulated (for example by an impulse generator), generating a preset amount of pulses or by the pulser of the transducer which should be driven by a stepper motor; in the latter case the stepper motor should be driven by an impulse generator, generating a preset amount of pulses. When simulation of the transducer is not possible (for example in case of a Coriolis meter) other solutions may be acceptable.

Explanatory note to the use of the Test Report Format

General information

Numbers in brackets after the title on the test forms refer to the corresponding clause/subclause of OIML R 81.

Each of the following test forms contains four tables. **Select only one of the four tables for test results** (even when they are spread over two pages from D.13 to D.17).

Information on gravimetric test tables

Three tables accommodate the measurement results indicated in terms of:

1. Mass,
2. Liquid volume at the normal boiling point (NBP), or
3. Gas equivalent of a liquid volume at base conditions.

The reference value used in the tables is provided by the reference (or working) standard (See 3.3 in R 81) and shall be greater than or equal to five times the minimum measured quantity (A.1.2.1 and 6.5 in R 81).

Information on the master meter test table

- The temperature in the master meter table is at metering conditions (see 3.16 in R 81).
- The pressure of the product in the master meter table is at metering conditions (see 3.16 in R 81).
- The volume indication of the master meter is the total pulses divided by the K-factor (expressed as accumulated pulses per unit volume).
- In the master meter table, use temperature and pressure to obtain the density and correction factor (for non-linearity of the meter's K-factor as a function of temperature and pressure).
- Use the correction factor to obtain the volume indication of the master meter corrected for meter error.

Meaning of symbols and abbreviations used in this Annex

mpe = maximum permissible error	Calc. = calculated	Avg.= average
mmq = minimum measured quantity	Vol. = volume	Temp. = temperature
NBP = normal boiling point	Ind. = indication or indicated	H = horizontal
Ref. = reference	Corr. = corrected	V = vertical
EUT = equipment under test	n/a = not applicable	

For each examination and test, the checklist shall be completed according to one of these examples:

Pass	Fail
X	
	X
n/a	n/a

Page numbering

A space has been left on the top of each page (starting on page 7) for numbering the pages of reports established following this model. In particular, each test is reported individually on a separate page following the relevant format.

For a given report, it is advisable to complete the sequential numbering of each page by indicating the total number of pages in the report.

Pattern (type) evaluation test report

D.1 General information concerning the pattern (type)

Application No.: _____ Date: _____

Model designation: _____

Manufacturer: _____

Address: _____

Applicant: _____

Address: _____

Representative: _____

Telephone: _____ Fax: _____

E-mail: _____

Technical manual provided: _____

Operating manual provided: _____

Description of device or system: _____

Accuracy class designation: _____

Maximum flowrate: _____

Minimum flowrate: _____

Unit for flowrate: _____

Minimum measured quantity (mmq): _____

Unit for mmq: _____

D.2 General information concerning the test conditions

Device submitted Model: _____ Serial No.: _____ Date: _____

A. Measurement standards

1. Gravimetric system Description: _____

Uncertainty: _____

Accuracy: _____

2. Volumetric system Description: _____

Uncertainty: _____

Accuracy: _____

Test liquid(s): _____

B. Environmental test equipment Description: _____

Temperature range: _____

Humidity range: _____

Disturbance test equipment: _____

Test location: _____

D.3 Metrological requirements: Checklist

Application No.: _____
 Model No.: _____
 Serial No.: _____
 Date: _____
 Observer: _____

Table D.3 Metrological requirements: Checklist

Clause	Title	PASS	FAIL	REMARKS
7	Flowrates of a measuring system or meter			
7.1	The maximum and minimum authorized flowrates for a measuring system are specified by the manufacturer.			
7.2	The ratio between the maximum and minimum flowrates of a meter shall be at least equal to 5.			
8	Minimum measured quantity			
8.1	The minimum measured quantity of the system shall be specified by the manufacturer.			
8.2	The minimum measured quantity shall not be less than 100 scale intervals.			
8.3	The value of the minimum measured quantity shall be in the form 1×10^n or 2×10^n or 5×10^n authorized units, n being a positive or negative whole number or zero.			

Remarks:

D.4 Technical requirements: Checklist

Application No.: _____
 Model No.: _____
 Serial No.: _____
 Date: _____
 Observer: _____

Table D.4 Technical requirements: Checklist

Clause	Title	PASS	FAIL	REMARKS
9	Indicating devices (indicators)			
9.1	General provisions			
	Indications shall be in legal units as described in subclause 5.1 and shall be accompanied by the name or symbol of the unit.			
	Indications that are not subject to metrological control are allowed, provided that they cannot be confused with metrological information.			
	Reading of the indications shall be precise, easy and non-ambiguous when the indicating device comes to rest.			
	If the indicating device comprises several elements, the installation shall be arranged in such a way that the readings of the measurand can be effected by simple juxtaposition of the indications of the different elements.			
9.1.1	The scale interval of the indication shall be in the form of 1×10^n or 2×10^n or 5×10^n authorized units, n being a positive or negative whole number or zero.			
9.1.2	The indicated units specified in subclause 5.1 shall be clearly defined.			
9.1.3	The decimal mark shall appear distinctly.			

Remarks:

D.4 Technical requirements: Checklist (Cont.)

Application No.: _____

Model No.: _____

Serial No.: _____

Date: _____

Observer: _____

Table D.4 Technical requirements: Checklist (Cont.)

Clause	Title	PASS	FAIL	REMARKS
9.2	Zero-setting device			
9.2.1	An indicating device may be provided with a device which returns the indication to zero either by manual operation or by automatic means.			
9.2.2	The zero-setting device shall not permit any alteration of the measurement result shown by the indicator (other than by making the result disappear and replacing it by zeros).			
9.2.3	Once the zeroing operation has begun it shall be impossible for the indicator to show a result different from that of the measurement which has just been made, until the zeroing operation has been completed.			
	Indicating devices shall not be capable of being reset to zero during measurement.			
9.3	Totalizing indicator			
	An indicator with a zeroing device may be equipped with a device for totalizing the different quantities shown successively by the indicator.			
	The totalizing indicator shall be non-resettable.			
10	Printing devices (printers)			
10.1	A printing device may be connected to an indicator.			

Remarks:

D.4 Technical requirements: Checklist (Cont.)

Application No.: _____
 Model No.: _____
 Serial No.: _____
 Date: _____
 Observer: _____

Table D.4 Technical requirements: Checklist (Cont.)

Clause	Title	PASS	FAIL	REMARKS
10.2	The printed scale interval shall be the same as the scale interval of the indicator.			
10.3	The quantity printed shall be expressed in one of the units authorized for the indicator.			
	The unit used or its symbols, and the decimal mark if any, shall be indicated on the ticket.			
	The printed quantities shall be adequately and clearly defined.			
10.4	The printer may print other information identifying the measurement such as: serial number, date, place of measurement, type of liquid, etc.			
	The totalizing indicator shall be non-resettable.			
10.5	If a printer allows repetition of the printing before a new measurement has started, copies shall be clearly marked as such, for example by printing "duplicate".			
10.6	For any quantity, the printed values shall be the same as those indicated.			
10.7	Printed ticket			
	In the case of a volume indication, the ticket shall have printed on it the base conditions in terms of gas or liquid.			
11	Measuring systems			
11.1	Maintenance of liquid state.			
	A measuring system shall be so designed and operated that the product being measured will remain in a liquid state during passage through the meter.			

Remarks:

D.4 Technical requirements: Checklist (Cont.)

Application No.: _____
 Model No.: _____
 Serial No.: _____
 Date: _____
 Observer: _____

Table D.4 Technical requirements: Checklist (Cont.)

Clause	Title	PASS	FAIL	REMARKS
11.2	Adjusting means			
11.2.1	Meters shall be provided with adjusting means that permit adjustments of the ratio between the quantity indicated and the actual quantity of liquid which has passed through the measuring device.			
11.2.2	If the adjusting means modifies this ratio in a discontinuous manner, the consecutive values of the ratio shall not differ by more than 0.002.			
11.2.3	Adjustment by means of a by-pass on the measuring device is prohibited.			
11.3	Sealing			
	Sealing means shall be provided for those parts that can affect the accuracy of the measurement and the parameters (e.g. correction and conversion) that can affect the measurement results.			
11.3.1	Mechanical sealing			
	Mechanical sealing shall be carried out by means of lead and wire seals or other equally effective means.			
11.3.2	Electronic sealing			
	When access to parameters that affect the determination of the results of a measurement is not protected by mechanical sealing means, the protection shall fulfill the following:			
	<ul style="list-style-type: none"> • Access shall only be possible by such means as an alpha or numeric code, or "hard key". • An event counter (000-999) shall be provided to indicate that interventions have been made. 			

Remarks:

D.4 Technical requirements: Checklist (Cont.)

Application No.: _____
 Model No.: _____
 Serial No.: _____
 Date: _____
 Observer: _____

Table D.4 Technical requirements: Checklist (Cont.)

Clause	Title	PASS	FAIL	REMARKS
11.3.2 (Cont.)	The electronic sealing device shall have a means of identifying if an intervention occurs and by whom. The responsible national body may require such means as the use of labels or an event logger that includes an event counter, date and time of intervention, and the identity and value of the parameter changed.			
11.4	Memory devices			
11.4.1	Measuring systems may be fitted with a memory device to store measurement results until their use or to keep a trace of commercial transactions, providing proof in case of dispute. Devices used to read stored information are considered as included in the memory devices.			
11.4.2	The medium on which the data are stored shall have sufficient permanency to ensure that the data are not corrupted under normal storage conditions.			
	Sealing means shall be provided for those parts that can affect the accuracy of the measurement and the parameters (e.g. correction and conversion) that can affect the measurement results.			
11.4.3	When the storage is full, memorized data may be deleted when the following conditions are met:			
	a. The rules established for the particular application are respected,			
	b. Data are deleted in the same order as the recording order, and			
	c. Deletion is carried out after a special manual operation.			
12	Discharge lines			
12.1	Vapor return lines			
	A vapor return line between the supplier's tank and the customer's tank shall not be permitted, unless this is required to complete a delivery.			

Remarks:

D.4 Technical requirements: Checklist (Cont.)

Application No.: _____
 Model No.: _____
 Serial No.: _____
 Date: _____
 Observer: _____

Table D.4 Technical requirements: Checklist (Cont.)

Clause	Title	PASS	FAIL	REMARKS
12.2	Directional flow valve			
	Valve(s) or other means intended to prevent flow reversal, that is(are) automatic in operation shall be installed either on the outlet side of the meter or in the inlet line of the receiving tank.			
12.3	Diversion of measured liquid			
	No means shall be provided by which any measured liquid can be diverted from the measuring element of the meter or from the discharge line.			
	A manually controlled outlet that may be opened for purging or draining the measuring system shall be permitted.			
	Effective means shall be provided to prevent the passage of liquid through any such outlet during normal operation of the measuring system.			
12.4	Transfer point			
12.4.1	The measuring systems shall incorporate a transfer point.			
	The transfer point shall be located downstream of the meter in a delivery system, and upstream of the meter in a receiving system.			
12.4.2	The transfer point may be in the form of a closing device combined with a system which ensures the evacuation of the discharge hose after each measuring operation.			

Remarks:

D.4 Technical requirements: Checklist (Cont.)

Application No.: _____
 Model No.: _____
 Serial No.: _____
 Date: _____
 Observer: _____

Table D.4 Technical requirements: Checklist (Cont.)

Clause	Title	PASS	FAIL	REMARKS
12.5	Valves and control mechanisms			
	Check valves and closing mechanisms not used to define the measuring quantity shall, if necessary, have relief valves in order to dissipate any abnormally high pressures which may arise in the measuring system.			
	A vapor return line between the supplier's tank and the customer's tank shall not be permitted, unless this is required to complete a delivery.			
12.6	Discharge hose			
	The discharge hose of a measuring system shall be of the empty-hose type.			
13	Markings			
	A measuring system shall be legibly and clearly marked with the following information:			
a)	Pattern (type) approval mark;			
b)	Manufacturer's identification mark or trademark;			
c)	Designation selected by the manufacturer;			
d)	Serial number and year of manufacture;			
e)	Maximum and minimum flowrates, Q_{\max} and Q_{\min} ;			
f)	Maximum working pressure, P_{\max} ;			
g)	Maximum and minimum temperatures, T_{\max} and T_{\min} ;			
h)	Minimum measured quantity, mmq.			

Remarks:

D.5 Requirements for electronic measuring systems: Checklist

Application No.: _____
 Model No.: _____
 Serial No.: _____
 Date: _____
 Observer: _____

Table D.5 Requirements for electronic measuring systems: Checklist

Clause	Title	PASS	FAIL	REMARKS
14.1	General requirements			
14.1.1	Electronic measuring systems shall be designed and manufactured such that their errors do not exceed the maximum permissible errors (mpe), as defined in clause 6, under rated operating conditions.			
14.1.1.1	Interruptible electronic measuring systems shall be designed and manufactured such that, when they are exposed to the disturbances specified in B.4, either:			
	a) significant faults do not occur, or			
	b) significant faults are detected and acted upon by means of checking facilities.			
	Note: This provision may apply separately to each individual cause of significant fault and/or each part of the measuring system.			
14.1.1.2	Non-interruptible electronic measuring systems shall be designed and manufactured in such a way that no significant faults occur when they are exposed to the disturbances specified in B.4.			
14.1.2	It is the responsibility of the manufacturer to decide whether a given type of measuring system is interruptible or not, taking account of the applicable rules of security.			

Remarks:

D.5 Requirements for electronic measuring systems: Checklist (Cont.)

Application No.: _____
 Model No.: _____
 Serial No.: _____
 Date: _____
 Observer: _____

Table D.5 Requirements for electronic measuring systems: Checklist (Cont.)

Clause	Title	PASS	FAIL	REMARKS
14.1.2.1	Measuring systems for direct selling to the public shall be interruptible.			
	When, at the time of pattern (type) approval, it is not possible to specify the future utilization of the instrument, the requirements in subclause 14.1.1.2 shall apply.			
14.1.3	Electronic measuring systems shall be provided with the checking facilities specified in subclause 14.3.			
14.1.4	A type of a measuring system is presumed to comply with the requirements in subclauses 14.1.1 and 14.1.3 if it passes the inspection and tests specified in subclause 15.1.10.			
14.1.5	When a significant fault occurs, measuring systems shall permit the retrieval of the information relating to the measured quantity, that is contained within the measuring system.			
14.2	Power supply device			
	When the flow is interrupted during a failure of the principal power supply device:			
	1. The measuring system shall be provided with an emergency power supply device to safeguard all the measuring functions during that failure; or,			
	2. Data contained at the moment of the failure shall be saved and displayed on the resumption of power on an indicating device subject to legal metrological control for a sufficient time to permit the conclusion of the current transaction.			

Remarks:

D.5 Requirements for electronic measuring systems: Checklist (Cont.)

Application No.: _____
 Model No.: _____
 Serial No.: _____
 Date: _____
 Observer: _____

Table D.5 Requirements for electronic measuring systems: Checklist (Cont.)

Clause	Title	PASS	FAIL	REMARKS
14.2 (Cont.)	The absolute value of the maximum permissible error for the indicated volume is increased by 5 % of the minimum measured quantity (subclause 8.1).			
14.3	Checking facilities			
14.3.1	Action of checking facilities			
	The detection by the checking facilities of significant faults shall result in the following actions, according to the type:			
14.3.1.1a)	Checking facilities of type I or P (non-interruptible)			
	a) Non-interruptible measuring systems (such as pipelines) shall:			
	1. Have automatic correction of the fault, or			
	2. Allow stopping of the faulty device when the measuring system without that device continues to comply with the regulations, or			
	3. Have a visible or audible alarm for the operator; this alarm shall continue until such time as the cause of the alarm is suppressed (not applicable for the disturbances specified in B.4).			
	When the measuring system transmits data to any peripheral equipment, the transmission shall be accompanied by a message indicating the presence of a fault.			

Remarks:

D.5 Requirements for electronic measuring systems: Checklist (Cont.)

Application No.: _____

Model No.: _____

Serial No.: _____

Date: _____

Observer: _____

Table D.5 Requirements for electronic measuring systems: Checklist (Cont.)

Clause	Title	PASS	FAIL	REMARKS
14.3.1.1 a) (Cont.)	The instrument may be provided with devices to estimate the amount of liquid having passed through the installation during the occurrence of the fault. The result of this estimate shall not be capable of being mistaken for a valid indication.			
14.3.1.1 b)	Checking facilities of type I or P (interruptible) shall:			
	1. Have automatic correction of the fault, or			
	2. Allow stopping only the faulty device, when the measuring system without that device continues to comply with the regulations, or			
	3. Allow stopping the flow.			
14.3.2	Checking facilities for the measurement transducer			
	The object of these checking facilities after the presence of the transducer has been confirmed, is to verify its correct operation and the correctness of data transmission.			
	Checking facilities shall provide a level of security equivalent to ISO 6551, part 3 Levels of security, 3.1.4 Level B, except for equipment with a cable length of 3 meters or less, for which 3.1.3 Level C applies. This requirement can be fulfilled without generating two pulses.			

Remarks:

D.5 Requirements for electronic measuring systems: Checklist (Cont.)

Application No.: _____

Model No.: _____

Serial No.: _____

Date: _____

Observer: _____

Table D.5 Requirements for electronic measuring systems: Checklist (Cont.)

Clause	Title	PASS	FAIL	REMARKS
14.3.3	Checking facilities for the calculator (Type P or I)			
	The object of these checking facilities is to check if the calculator system functions correctly and to ensure the validity of the calculations made.			
	There are no special means required for indicating that these checking facilities function correctly. The correct value of all data relating to the measurement shall be checked by the instrument whenever these data are transmitted to an ancillary device through an interface.			
	In addition, the calculation system shall be provided with a means for controlling the continuity of the calculation program.			
14.3.4	Checking facilities for the indicating device (Type N)			
	The object of this checking facility is to verify that the primary indications are displayed and correspond to the data provided by the calculator.			
	In addition, it aims at verifying the presence of the indicating devices, when they are removable.			
	The checking facility for the indicating device shall include at least a visual checking of the display as follows:			
	1. Displaying all the elements ("eights" test),			
	2. Blanking all the elements ("blank" test),			
	3. Displaying "zeros".			
	Each step of the sequence shall last at least 0.75 second.			
The produced signal shall originate from the calculator.				

Remarks:

D.5 Requirements for electronic measuring systems: Checklist (Cont.)

Application No.: _____

Model No.: _____

Serial No.: _____

Date: _____

Observer: _____

Table D.5 Requirements for electronic measuring systems: Checklist (Cont.)

Clause	Title	PASS	FAIL	REMARKS
14.3.5	Checking facilities for an ancillary device			
	Any ancillary device with primary indications shall include a checking facility of type I or P.			
	The object of this checking facility is to verify the presence of the ancillary device, when it is a necessary device, and to validate the data transmitted by the calculator.			
	The object of the checking of a printing device is to ensure that the printing controls function properly so that output corresponds to the data transmitted by the calculator.			
	The presence of paper shall be checked.			
	Where the action of the checking facility is a warning, this shall be given on or by the ancillary device which is at its origin.			
14.3.6	Checking facilities for the associated measuring instruments			
	Associated measuring instruments shall include a checking facility of type P.			
	The aim of this checking facility is to ensure that the signal given by these associated instruments is within a pre-determined measuring range.			

Remarks:

D.6 Summary of the tests

Application No.: _____

Model No.: _____

Serial No.: _____

Date: _____

Observer: _____

Table D.6 Summary of the tests

Clause	Title		PASS	FAIL	REMARKS
D.7	Tests for maximum errors (Flowrate and accuracy test)	A.1.3 - Liquids			
		A.1.4 - Flowrates			
D.8	Dry heat test (B.4.1)				
D.9	Cold test (B.4.2)				
D.10	Damp heat, cyclic test (B.4.3)				
D.11	Vibration test (B.4.4)				
D.12.1	AC power voltage variations test (B.4.5.1)				
D.12.2	DC power voltage variation test (B.4.5.2)				
D.13	Short-time power reduction test (B.4.6)				
D.14	Electrical burst test (B.4.7)				
D.15	Electrostatic discharge test (B.4.8)				
D.16	Electromagnetic susceptibility test (B.4.9)				
D.17	Perturbations on DC voltage powered instruments (B.4.10)				
D.18	Endurance test (A.1.5)				
D.19	Repeatability test (6.5 and A.1.2.1)				

Note: The repeatability test result (D.19) is based on tests conducted under D.7.1

Remarks:

D.7 Tests for maximum errors

D.7.1 Tests for maximum errors - Flowrate, accuracy and repeatability test (.....of 6) (A.1.2, A.1.3, A.1.4)

Application No: _____
 Model No.: _____
 Serial No.: _____
 Test liquid: _____
 Date test performed: _____
 Test type Simulated: Operational:
 Density of test liquid: _____ kg/cm³ at _____ °C and at 101 325 Pa (NBP)
 Observer: _____
 Flowrate: Nominal value (in % of Q_{max}) = _____ %

Environmental conditions

	at start	at end	
Temperature:			°C
Rel. humidity:			%
Bar. pressure:			hPa
Time:			actual

Table D.7.1 Flowrate, accuracy and repeatability test (test for maximum errors) – at flowrate² #...
 (SELECT ONLY ONE TABLE)

GRAVIMETRIC TEST:

Indications in mass

Test No.	Flowrate (mass unit/time)	Indicated value (mass unit)	Reference value (mass unit)	Error %	mpe %
1					
2					
3					
Avg.					

Indications in liquid volume at NBP

Test No.	Flowrate (mass or volume unit/time)	Indicated value (unit – liquid volume at NBP)	Reference value (mass unit)	Ref. value calc. to liquid vol. at NBP (volume unit)	Error %	mpe %
1						
2						
3						
Avg.						

Indications in equivalent gas volume at base conditions

Test No.	Flowrate (mass or volume unit/time)	Indicated value (normal cubic meters)	Reference value (mass unit)	Ref. value calc. to vol. at NBP (unit of liquid volume at NBP)	Ref. value calc. to gas vol. at base cond. (normal cubic metres)	Error %	mpe %
1							
2							
3							
Avg.							

MASTER METER TEST:

Indications in mass

Test No.	Flowrate (mass or vol. unit/time)	Master meter temp. (°C)	Master meter pressure (kPa)	Master meter volume indication (liters)	Master meter K-factor	Master meter vol. ind. corrected for meter error	Calc. mass from master meter indication	Indicated value (mass unit)	Error %	mpe %
1										
2										
3										
Avg.										

mpe² at flowrate #: _____ **Passed:** **Failed:**
 Repeatability^{1,2} at flowrate #: _____ **Passed:** **Failed:**

- Notes 1. The repeatability shall not be greater than 1 % of the measured quantity (see 3.19, 6.5 of OIML R 81).
 2. Copy this form and use for test at each flowrate (minimum 6). Indicate serial number of flowrate after #.

Remarks:

D.7.2 Tests for maximum errors - Minimum measured quantity (Ref. R 81: 15.1.5.2.2)

Application No: _____
 Model No.: _____
 Serial No.: _____
 Test liquid: _____
 Date test performed: _____
 Test type Simulated: Operational:
 Density of test liquid: _____ kg/cm³ at _____ °C and at 101 325 Pa (NBP)
 Observer: _____
 Flowrate: Nominal value (in % of Q_{max}) = _____ %

Environmental conditions

	at start	at end	
Temperature:			°C
Rel. humidity:			%
Bar. pressure:			hPa
Time:			actual

Table D.7.2 Tests for maximum errors at minimum measured quantity
Minimum measured quantity: -----

(SELECT ONLY ONE TABLE)

GRAVIMETRIC TEST:

Indications in mass

Test No.	Flowrate (mass unit/time)	Indicated value (mass unit)	Reference value (mass unit)	Error %	mpe %
1					
2					
3					
Avg.					

Indications in liquid volume at NBP

Test No.	Flowrate (mass or volume unit/time)	Indicated value (unit – liquid volume at NBP)	Reference value (mass unit)	Ref. value calc. to liquid vol. at NBP (volume unit)	Error %	mpe %
1						
2						
3						
Avg.						

Indications in equivalent gas volume at base conditions

Test No.	Flowrate (mass or volume unit/time)	Indicated value (normal cubic meters)	Reference value (mass unit)	Ref. value calc. to vol. at NBP (unit of liquid volume at NBP)	Ref. value calc. to gas vol. at base cond. (normal cubic metres)	Error %	mpe %
1							
2							
3							
Avg.							

MASTER METER TEST:

Indications in mass

Test No.	Flowrate (mass or vol. unit/time)	Master meter temp. (°C)	Master meter pressure (kPa)	Master meter volume indication (liters)	Master meter K-factor	Master meter vol. ind. corrected for meter error	Calc. mass from master meter indication	Indicated value (mass unit)	Error %	mpe %
1										
2										
3										
Avg.										

Passed: Failed:

Note: ¹Test to be performed if practical.

Remarks:

D.7.3 Tests for maximum errors – Flow disturbances (Ref. R 81: 15.1.5.2.2.)

Application No: _____
 Model No.: _____
 Serial No.: _____
 Test liquid: _____
 Date test performed: _____
 Test type Simulated: Operational:
 Density of test liquid: _____ kg/cm³ at _____ °C and at 101 325 Pa (NBP)
 Observer: _____
 Flowrate: Normal value (in % of Q_{max}) = _____ %

Environmental conditions

	at start	at end	
Temperature:			°C
Rel. humidity:			%
Bar. pressure:			hPa
Time:			actual

Table D.7.3 Tests for maximum errors with flow disturbances
 Description of the disturbance:

(SELECT ONLY ONE TABLE)

GRAVIMETRIC TEST:

Indications in mass

Test No.	Flowrate (mass unit/time)	Indicated value (mass unit)	Reference value (mass unit)	Error %	mpe %
1					
2					
3					
Avg.					

Indications in liquid volume at NBP

Test No.	Flowrate (mass or volume unit/time)	Indicated value (unit – liquid volume at NBP)	Reference value (mass unit)	Ref. value calc. to liquid vol. at NBP (volume unit)	Error %	mpe %
1						
2						
3						
Avg.						

Indications in equivalent gas volume at base conditions

Test No.	Flowrate (mass or volume unit/time)	Indicated value (normal cubic meters)	Reference value (mass unit)	Ref. value calc. to vol. at NBP (unit of liquid volume at NBP)	Ref. value calc. to gas vol. at base cond. (normal cubic metres)	Error %	mpe %
1							
2							
3							
Avg.							

MASTER METER TEST:

Indications in mass

Test No.	Flowrate (mass or vol. unit/time)	Master meter temp. (°C)	Master meter pressure (kPa)	Master meter volume indication (liters)	Master meter K-factor	Master meter vol. ind. corrected for meter error	Calc. mass from master meter indication	Indicated value (mass unit)	Error %	mpe %
1										
2										
3										
Avg.										

Passed: Failed:

- Notes: 1. Test to be performed if appropriate.
 2. Copy this test form if several disturbances can be applied.

Remarks:

D.8 Dry heat test (B.4.1)

Application No: _____
 Model No.: _____
 Serial No.: _____
 Test liquid: _____
 Date test performed: _____
 Test type Simulated: Operational:
 Density of test liquid: _____ kg/cm³ at _____ °C and at 101 325 Pa (NBP)
 Observer: _____

Environmental conditions

	at start	at end
Temperature:		°C
Rel. humidity:		%
Bar. pressure:		hPa
Time:		actual

Table D.8 Dry heat test

(SELECT ONLY ONE TABLE)

GRAVIMETRIC TEST:

Indications in mass

Test No.	Reference temp. ¹ (°C)	Flowrate (mass unit/time)	Indicated value (mass unit)	Reference value (mass unit)	Error %	mpe %
1	20 °C					
2	max ¹ =					
3	20 °C					

Indications in liquid volume at NBP

Test No.	Reference temp. ¹ (°C)	Flowrate (mass unit/time)	Flowrate (mass unit/time)	Reference value (mass unit)	Ref. value calc. to liquid vol. at NBP (volume unit)	Error %	mpe %
1	20 °C						
2	max ¹ =						
3	20 °C						

Indications in equivalent gas volume at base conditions

Test No.	Reference temp. ¹ (°C)	Flowrate (mass unit/time)	Indicated value (normal cubic meters)	Reference value (mass unit)	Ref. value calc. to vol. at NBP (unit of liquid volume at NBP)	Ref. value calc. to gas vol. at base cond. (normal cubic metres)	Error %	mpe %
1	20 °C							
2	max ¹ =							
3	20 °C							

MASTER METER TEST:

Indications in mass

Test No.	Reference temp. ¹ (°C)	Flowrate (mass or vol. unit/time)	Master meter temp. (°C)	Master meter pressure (kPa)	Master meter volume indication (liters)	Master meter K-factor	Master meter vol. ind. corrected for meter error	Calc. mass from master meter indication	Indicated value (mass unit)	Error %	mpe %
1	20 °C										
2	max ¹ =										
3	20 °C										

Passed: Failed:

Notes:

- Maximum temperature shall be 55 °C for Class C of I (Severity level 3) or 40 °C for Class B (Severity level 2) (See B.4.3 of R 81).
- Shall be tested at at least one flowrate.
- Duration is 2 hours.
- The temperature recorded in the table is the product temperature, measured in test measure or master meter.
- All functions shall operate as designed.
- All indications shall be within the maximum permissible errors.

Remarks:

D.9 Cold test (B.4.2)

Application No: _____
 Model No.: _____
 Serial No.: _____
 Test liquid: _____
 Date test performed: _____
 Test type Simulated: Operational:
 Density of test liquid: _____ kg/cm³ at _____ °C and at 101 325 Pa (NBP)
 Observer: _____

Environmental conditions
 at start at end

Temperature:	_____	_____	°C
Rel. humidity:	_____	_____	%
Bar. pressure:	_____	_____	hPa
Time:	_____	_____	actual

Table D.9 Cold test

(SELECT ONLY ONE TABLE)

GRAVIMETRIC TEST:

Indications in mass

Test No.	Reference temp. ¹ (°C)	Flowrate (mass unit/time)	Indicated value (mass unit)	Reference value (mass unit)	Error %	mpe %
1	20 °C					
2	min ¹ =					
3	20 °C					

Indications in liquid volume at NBP

Test No.	Reference temp. ¹ (°C)	Flowrate (mass unit/time)	Flowrate (mass unit/time)	Reference value (mass unit)	Ref. value calc. to liquid vol. at NBP (volume unit)	Error %	mpe %
1	20 °C						
2	min ¹ =						
3	20 °C						

Indications in equivalent gas volume at base conditions

Test No.	Reference temp. ¹ (°C)	Flowrate (mass unit/time)	Indicated value (normal cubic meters)	Reference value (mass unit)	Ref. value calc. to vol. at NBP (unit of liquid volume at NBP)	Ref. value calc. to gas vol. at base cond. (normal cubic metres)	Error %	mpe %
1	20 °C							
2	min ¹ =							
3	20 °C							

MASTER METER TEST:

Indications in mass

Test No.	Reference temp. ¹ (°C)	Flowrate (mass or vol. unit/time)	Master meter temp. (°C)	Master meter pressure (kPa)	Master meter volume indication (liters)	Master meter K-factor	Master meter vol. ind. corrected for meter error	Calc. mass from master meter indication	Indicated value (mass unit)	Error %	mpe %
1	20 °C										
2	min ¹ =										
3	20 °C										

Passed: Failed:

Notes:

1. Minimum temperature shall be -25 °C for Class C of I (Severity level 3) or -10 °C for Class B (Severity level 2) (See B.4.3 of R 81).
2. Shall be tested at at least one flowrate.
3. Duration is 2 hours.
4. The temperature recorded in the table is the product temperature, measured in test measure or master meter.
5. All functions shall operate as designed.
6. All indications shall be within the maximum permissible errors.

Remarks:

D.10 Damp heat. Performance test after cycle 2 (B.4.3)

Application No: _____
 Model No.: _____
 Serial No.: _____
 Test liquid: _____
 Date test performed: _____
 Test type Simulated: Operational:
 Density of test liquid: _____ kg/cm³ at _____ °C and at 101 325 Pa (NBP)
 Observer: _____

Environmental conditions
 at start at end
 Temperature: _____ °C
 Rel. humidity: _____ %
 Bar. pressure: _____ hPa
 Time: _____ actual

Table D.10 Damp heat. Performance test after cycle 2 (SELECT ONLY ONE TABLE)

GRAVIMETRIC TEST:

Indications in mass

Test No.	Flowrate (mass unit/time)	Indicated value (mass unit)	Reference value ¹ (mass unit)	Error %	mpe %
1					
2					
3					
Avg.					

Indications in liquid volume at NBP

Test No.	Flowrate (mass or volume unit/time)	Indicated value (unit – liquid volume at NBP)	Reference value (mass unit)	Ref. value calc. to liquid vol. at NBP (volume unit)	Error %	mpe %
1						
2						
3						
Avg.						

Indications in equivalent gas volume at base conditions

Test No.	Flowrate (mass or volume unit/time)	Indicated value (normal cubic meters)	Reference value (mass unit)	Ref. value calc. to vol. at NBP (unit of liquid volume at NBP)	Ref. value calc. to gas vol. at base cond. (normal cubic metres)	Error %	mpe %
1							
2							
3							
Avg.							

MASTER METER TEST:

Indications in mass

Test No.	Flowrate (mass or vol. unit/time)	Master meter temp. (°C)	Master meter pressure (kPa)	Master meter volume indication (liters)	Master meter K-factor	Master meter vol. ind. corrected for meter error	Calc. mass from master meter indication	Indicated value (mass unit)	Error %	mpe %
1										
2										
3										
Avg.										

Passed: Failed:

1. Pre-condition meter.
2. Apply damp heat cycles (duration 24 hours), 2 cycles between 25 °C and 40 °C for Class B (Severity level 1) or 55 °C for Class C or I (Severity Level 2) (See B.4.3. of R 81).
3. Duration is 24 hours.
4. Maintain RH above 95 % during temperature changes and during phases of low temperature.
5. RH shall be 93 % or greater at the upper temperature range.
6. Test cannot be conducted by simulating the flow without any actual product passing through the measuring system.
7. All functions shall operate as designed.
8. All indications shall be within the maximum permissible errors.
9. After the damp heat test, a performance test under reference conditions consisting of three consecutive measurements for at least one flowrate is conducted.

Remarks: _____

D.11 Vibration test (B.4.4)

Application No: _____
 Model No.: _____
 Serial No.: _____
 Test liquid: _____
 Date test performed: _____
 Test type Simulated: Operational:
 Density of test liquid: _____ kg/cm³ at _____ °C and at 101 325 Pa (NBP)
 Observer: _____

Environmental conditions

	at start	at end	
Temperature:			°C
Rel. humidity:			%
Bar. pressure:			hPa
Time:			actual

Table D.11 Vibration test for Axis⁹ (SELECT ONLY ONE TABLE)

GRAVIMETRIC TEST: Indications in mass

	Flowrate (mass/time)	Indicated value (mass unit)	Reference value (mass unit)	Error %	mpe %
Before exposure					
After exposure					

Indications in liquid volume at NBP

	Flowrate (mass or volume unit)	Indicated value (unit – liquid volume at NBP)	Reference value (mass unit)	Ref. value calc. to liquid vol. at NBP (volume unit)	Error %	mpe %
Before exposure						
After exposure						

Indications in equivalent gas volume at base conditions

	Flowrate (mass or volume unit/time)	Indicated value (normal cubic meters)	Reference value (mass unit)	Ref. value calc. to vol. at NBP (unit of liquid volume at NBP)	Ref. value calc. to gas vol. at base cond. (normal cubic metres)	Error %	mpe %
Before exposure							
After exposure							

MASTER METER TEST: Indications in mass

	Flowrate (mass or vol. unit/time)	Master meter temp. (°C)	Master meter pressure (kPa)	Master meter volume indication (liters)	Master meter K-factor	Master meter vol. ind. corrected for meter error	Calc. mass from master meter indication	Indicated value (mass unit)	Error %	mpe %
Before exposure										
After exposure										

Passed: Failed:

Notes:

1. Frequency range is from 10 Hz to 150 Hz.
2. Maximum acceleration level is 20 m/s².
3. Number of test cycles is 20 cycles per axis.
4. Test cannot be conducted by simulating the flow without any actual product passing through the measuring system.
5. The non-operational device shall be tested by sweeping the frequency in the specified frequency range, at 1 octave/minute, at the specified acceleration level with a specified number of sweep cycles per axis.
6. The device shall be tested in its three, mutually perpendicular main axes, mounted on a rigid fixture by its normal mounting means.
7. It shall normally be mounted so that the gravitational force acts in the same direction as it would in normal use.
8. After the vibration test, a performance test under reference conditions at least one flowrate is conducted.
9. Copy this form and use for test on each axis.

Remarks:

D.12 Power voltage variation test (B.4.5)
D.12.1 AC power voltage variation test (B.4.5.1)

Application No: _____
 Model No.: _____
 Serial No.: _____
 Test liquid: _____
 Date test performed: _____
 Test type Simulated: Operational:
 Density of test liquid: _____ kg/cm³ at _____ °C and at 101 325 Pa (NBP)
 Observer: _____

Environmental conditions

	at start	at end	
Temperature:			°C
Rel. humidity:			%
Bar. pressure:			hPa
Time:			actual

Table D.12.1 AC power voltage variation test
Marked nominal voltage (U_{nom}) _____ V

(SELECT ONLY ONE TABLE)

GRAVIMETRIC TEST:

Indications in mass

Test No.	Voltage 1	Flowrate (mass unit/time)	Indicated value (mass unit)	Reference value (mass unit)	Error %	mpe %
1	Ref. volt.					
2	10 %					
3	-15 %					
Avg.	Ref. volt.					

Indications in liquid volume at NBP

Test No.	Voltage 1	Flowrate (mass or volume unit)	Indicated value (unit – liquid volume at NBP)	Reference value (mass unit)	Ref. value calc. to liquid vol. at NBP (volume unit)	Error %	mpe %
1	Ref. volt.						
2	10 %						
3	-15 %						
Avg.	Ref. volt.						

Indications in equivalent gas volume at base conditions

Test No.	Voltage 1	Flowrate (mass or volume unit/time)	Indicated value (normal cubic meters)	Reference value (mass unit)	Ref. value calc. to vol. at NBP (unit of liquid volume at NBP)	Ref. value calc. to gas vol. at base cond. (normal cubic metres)	Error %	mpe %
1	Ref. volt.							
2	10 %							
3	-15 %							
Avg.	Ref. volt.							

Passed: Failed:

Remarks:

.../cont'd

MASTER METER TEST: Indications in mass

Test No.	Voltage 1	Flowrate (mass or vol. unit/time)	Master meter temp. (°C)	Master meter pressure (kPa)	Master meter volume indication (liters)	Master meter K-factor	Master meter vol. ind. corrected for meter error	Calc. mass from master meter indication	Indicated value (mass unit)	Error %	mpe %
1	Ref. volt.										
2	10 %										
3	-15 %										
Avg.	Ref. volt.										

Passed: Failed:

Notes:

1. Shall be tested at at least one flowrate (or simulated flowrate), at the upper and lower voltage limits.
2. Number of cycles shall be one.
3. The test consists of exposure of the device to power voltage variations, while the device is operating under normal atmospheric conditions.
4. All functions shall operate as designed.
5. All indications shall be within the maximum permissible errors.

Remarks:

D.12.2 DC power voltage variation test (B.4.5.2)

Application No: _____
 Model No.: _____
 Serial No.: _____
 Test liquid: _____
 Date test performed: _____
 Test type Simulated: Operational:
 Density of test liquid: _____ kg/cm³ at _____ °C and at 101 325 Pa (NBP)
 Observer: _____

Environmental conditions

	at start	at end	
Temperature:			°C
Rel. humidity:			%
Bar. pressure:			hPa
Time:			actual

Table D.12.2 DC power voltage variation test

Marked nominal voltage (U_{nom}) _____ V

(SELECT ONLY ONE TABLE)

GRAVIMETRIC TEST:

Indications in mass

Test No.	Voltage	Flowrate (mass unit/time)	Indicated value (mass unit)	Reference value (mass unit)	Error %	mpe %
1	Nominal =					
2	Lower =					
3	Upper =					
Avg.	Nominal =					

Indications in liquid volume at NBP

Test No.	Voltage	Flowrate (mass or volume unit)	Indicated value (unit – liquid volume at NBP)	Reference value (mass unit)	Ref. value calc. to liquid vol. at NBP (volume unit)	Error %	mpe %
1	Nominal =						
2	Lower =						
3	Upper =						
Avg.	Nominal =						

Indications in equivalent gas volume at base conditions

Test No.	Voltage 1	Flowrate (mass or volume unit/time)	Indicated value (normal cubic meters)	Reference value (mass unit)	Ref. value calc. to vol. at NBP (unit of liquid volume at NBP)	Ref. value calc. to gas vol. at base cond. (normal cubic metres)	Error %	mpe %
1	Nominal =							
2	Lower =							
3	Upper =							
Avg.	Nominal =							

Passed: Failed:

.../cont'd

MASTER METER TEST: Indications in mass

Test No.	Voltage l	Flowrate (mass or vol. unit/time)	Master meter temp. (°C)	Master meter pressure (kPa)	Master meter volume indication (liters)	Master meter K-factor	Master meter vol. ind. corrected for meter error	Calc. mass from master meter indication	Indicated value (mass unit)	Error %	mpe %
1	Nominal										
2	Lower										
3	Upper										
Avg.	Nominal										

Passed: **Failed:**

Notes:

1. Shall be tested at at least one flowrate (or simulated flowrate), at the upper and lower voltage limits.
2. Number of cycles shall be one.
3. The test consists of exposure of the device to power voltage variations.
4. All functions shall operate as designed.
5. Indications shall be within the maximum permissible errors.

Remarks:

D.13 Short-time power reduction test (B.4.6)

Application No: _____
 Model No.: _____
 Serial No.: _____
 Test liquid: _____
 Date test performed: _____
 Test type Simulated: Operational:
 Density of test liquid: _____ kg/cm³ at _____ °C
 Observer: _____
 Marked nominal voltage, U_{nom} = _____

Environmental conditions

	at start	at end	
Temperature:			°C
Rel. humidity:			%
Bar. pressure:			hPa
Time:			actual

Table D.13 Short-time power reduction test

(SELECT ONLY ONE TABLE)

GRAVIMETRIC TEST:

Indications in mass

Flowrate (mass unit/time)	Reference value (mass unit)	Disturbance				Result			
		Amplitude % of U_{nom}	Duration (ms)	Number of disturbances	Repetition intervals	Indication	Difference (unit)	Significant fault (fault > 20 % mpe)	
								No	Yes (remarks)
Without disturbance									
		0	10	10					
		50	20	10					

Indications in liquid volume at NBP

Flowrate (mass or volume unit/time)	Reference value (mass unit)	Ref. value calc. to vol. at NBP	Disturbance				Result			
			Amplitude % of U_{nom}	Duration (ms)	Number of disturbances	Repetition intervals	Indication	Difference (unit)	Significant fault (fault > 20 % mpe)	
									No	Yes (remarks)
Without disturbance										
			0	10	10					
			50	20	10					

Passed: Failed:

Remarks:

Table D.13 Short-time power reduction test (B.4.6) (Cont.)

Application No: _____
 Model No.: _____
 Serial No.: _____
 Test liquid: _____
 Date test performed: _____
 Test type Simulated: Operational:
 Density of test liquid: _____ kg/cm³ at _____ °C and at 101 325 Pa (NBP)
 Observer: _____
 Marked nominal voltage, U_{nom} = _____

Environmental conditions

	at start	at end	
Temperature:			°C
Rel. humidity:			%
Bar. pressure:			hPa
Time:			actual

Indications in equivalent gas volume at base conditions

Flowrate (mass unit/time)	Reference value (mass unit)	Ref. value calc. to vol. at NBP (unit liq. vol. at NBP)	Ref. value calc. to gas vol. at base cond. (normal cubic meters)	Disturbance				Result			
				Amplitude % of U_{nom}	Duration (ms)	Number of disturbances	Repetition intervals	Indication	Difference (unit)	Significant fault (fault > 20 % mpe)	
										No	Yes (remarks)
				Without disturbance							
				0	10	10					
				50	20	10					

MASTER METER TEST:

Indications in liquid volume at NBP

Flowrate (mass or vol. unit/time)	Master meter temp. (°C)	Master meter pressure (kPa)	Master meter volume indication (liters)	Master meter K-factor	Master meter vol. ind. corrected for meter error	Calc. mass from master meter indication	Disturbance				Result			
							Amplitude % of U_{nom}	Duration (ms)	Number of disturbances	Repetition intervals	Indication	Difference (unit)	Significant fault (fault > 20 % mpe)	
													No	Yes (remarks)
							Without disturbance							
							0	10	10					
							50	20	10					

Passed: Failed:

Remarks:

D.14 Electrical bursts test (B.4.7)

D.14.1 Electrical bursts test for power supply lines (B.4.7)

Application No: _____
 Model No.: _____
 Serial No.: _____
 Test liquid: _____
 Date test performed: _____
 Test type Simulated: Operational:
 Density of test liquid: _____ kg/cm³ at _____ °C and at 101 325 Pa (NBP)
 Observer: _____
 Indicated value: _____ mass Liquid volume at NBP Volume of reference conditions

Environmental conditions

	at start	at end	
Temperature:			°C
Rel. humidity:			%
Bar. pressure:			hPa
Time:			actual

a) Power supply lines:

Number of test cycles	10	10
Marked nominal voltage, U_{nom} =		
Amplitude =	1 000 V	

Table D.14.1 Electrical bursts test for power supply lines

(SELECT ONLY ONE TABLE)

GRAVIMETRIC TEST:

Indications in mass

Flowrate (unit)	Ref. value (unit)	Disturbance			Polarity	Indication	Result	
		Line ↓ ground	Neutral ↓ ground	Protective Earth ↓ ground			Significant fault (fault > 20 % mpe)	
							No	Yes (remarks)
		Without disturbance						
		X			pos			
					neg			
		Without disturbance						
			X		pos			
					neg			
		Without disturbance						
				X	pos			
					neg			

Passed: Failed:

Remarks:

Table D.14.1 Electrical bursts test for power supply lines (Cont.)

Indications in liquid volume at NBP									
Flowrate (mass or volume unit/time)	Ref. value (mass unit)	Ref. value calc. to vol. at NBP	Disturbance			Polarity	Result		
			Line ↓ ground	Neutral ↓ ground	Protective earth ↓ ground		Indication	Significant fault (fault > 20 % mpe)	
								No	Yes (remarks)
			Without disturbance						
			X			pos			
						neg			
			Without disturbance						
				X		pos			
						neg			
			Without disturbance						
					X	pos			
						neg			

Passed: Failed:

Remarks:

D.14.1 Electrical bursts test for power supply lines (B.4.7) (Cont.)

Application No: _____
 Model No.: _____
 Serial No.: _____
 Test liquid: _____
 Date test performed: _____
 Test type Simulated: Operational:
 Density of test liquid: _____ kg/cm³ at _____ °C and at 101 325 Pa (NBP)
 Observer: _____
 Indicated value: _____ mass Liquid volume at NBP Volume of reference conditions

Environmental conditions

	at start	at end	
Temperature:			°C
Rel. humidity:			%
Bar. pressure:			hPa
Time:			actual

a) **Power supply lines:**

Number of test cycles	10	10
Marked nominal voltage, U_{nom} =		
Amplitude =	1 000 V	

Table D.14.1 Electrical bursts test for power supply lines

(SELECT ONLY ONE TABLE)

Indications in equivalent gas volume at base conditions

Flowrate (mass or volume unit/time)	Reference value (mass unit)	Ref. value calc. to vol. at NBP (unit liq. vol. at NBP)	Ref. value calc. to gas vol. at base cond. (normal cubic meters)	Disturbance			Polarity	Result		
				Line ↓ ground	Neutral ↓ ground	Protective Earth ↓ ground		Indication	Significant fault (fault > 20 % mpe)	
									No	Yes (remarks)
				Without disturbance						
				X			pos			
							neg			
				Without disturbance						
					X		pos			
							neg			
				Without disturbance						
						X	pos			
							neg			

Passed: Failed:

Remarks:

Table D.14.1 Electrical bursts test for power supply lines (Cont.)

MASTER METER TEST:

Indications in mass

Flowrate (mass or volume unit/time)	Master meter temp. (°C)	Master meter pressure (kPa)	Master meter volume indication (liters)	Master meter K-factor	Ref. value (mass unit)	Ref. value calc. to volume at NBP	Disturbance			Polarity	Result		
							Line ↓ ground	Neutral ↓ ground	Protective earth ↓ ground		Indication	Significant fault (fault > 20 % mpe)	
							No	Yes (remarks)					
							Without disturbance						
							X			pos			
										neg			
							Without disturbance						
								X		pos			
										neg			
							Without disturbance						
									X	pos			
										neg			

Passed: Failed:

Remarks:

D.14.2 Electrical bursts test for I/O circuits and communication devices (B.4.7)

Application No: _____
 Model No.: _____
 Serial No.: _____
 Test liquid: _____
 Date test performed: _____
 Test type Simulated: Operational:
 Density of test liquid: _____ kg/cm³ at _____ °C and at 101 325 Pa (NBP)
 Observer: _____
 Indicated value: _____ mass Liquid volume at NBP Volume of reference conditions

Environmental conditions

	at start	at end	
Temperature:			°C
Rel. humidity:			%
Bar. pressure:			hPa
Time:			actual

b) I/O circuits & communication devices

Number of test cycles	10	10
Marked nominal voltage, U_{nom} =		
Amplitude =	1 000 V	

Table D.14.2 Electrical bursts test for I/O circuits and communication devices

(SELECT ONLY ONE TABLE)

GRAVIMETRIC TEST:

Indications in mass

Flowrate (unit)	Ref. value (unit)	Tested cable/interface	Polarity	Indication	Result	
					Significant fault (fault > 20 % mpe)	
					No	Yes (remarks)
		Without disturbance				
		X	pos			
			neg			
		Without disturbance				
		X	pos			
			neg			
		Without disturbance				
			X	pos		
			neg			

Passed: Failed:

Remarks:

Table D.14.2 Electrical bursts test for I/O circuits and communication devices (Cont.)

Indications in liquid volume at NBP

Flowrate (mass or volume unit/time)	Ref. value (mass unit)	Ref. value calc. to volume at NBP	Tested cable/interface		Polarity	Result		
						Indication	Significant fault (fault > 20 % mpe)	
							No	Yes (remarks)
			Without disturbance					
			X		pos			
					neg			
			Without disturbance					
			X		pos			
					neg			
			Without disturbance					
			X		pos			
					neg			

Passed: Failed:

Remarks:

D.14.2 Electrical bursts test for I/O circuits and communication devices (Cont.)

Application No: _____
 Model No.: _____
 Serial No.: _____
 Test liquid: _____
 Date test performed: _____
 Test type Simulated: Operational:
 Density of test liquid: _____ kg/cm³ at _____ °C and at 101 325 Pa (NBP)
 Observer: _____
 Indicated value: _____ mass Liquid volume at NBP Volume of reference conditions

Environmental conditions

	at start	at end	
Temperature:			°C
Rel. humidity:			%
Bar. pressure:			hPa
Time:			actual

Number of test cycles 10 10
 Marked nominal voltage, U_{nom} = _____
 Amplitude = 1 000 V

Table D.14.2 Electrical bursts test for I/O circuits and communication devices (Cont.)
 (SELECT ONLY ONE TABLE)

Indications in equivalent gas volume at base conditions

Flowrate (mass or volume unit/ time)	Reference value (mass unit)	Ref. value calc. to vol. at NBP (unit liq. vol. at NBP)	Ref. value calc. to gas vol. at base cond. (normal cubic meters)	Tested cable/interface	Polarity	Result		
						Indication	Significant fault (fault > 20 % mpe)	
							No	Yes (remarks)
				Without disturbance				
			X		pos			
					neg			
				Without disturbance				
			X		pos			
					neg			
				Without disturbance				
			X		pos			
					neg			

Passed: Failed:

Remarks:

MASTER METER TEST:

Indications in mass

Flowrate (mass or vol. unit/time)	Master meter temp. (°C)	Master meter pressure (kPa)	Master meter volume indication (liters)	Master meter K-factor	Ref. value (mass unit)	Ref. value calc. to volume at NBP	Tested cable/interface		Polarity	Result		
										Indication	Significant fault (fault > 20 % mpe)	
											No	Yes (remarks)
							X		pos			
								neg				
							Without disturbance					
							X		pos			
								neg				
							Without disturbance					
							X		pos			
								neg				

Passed: Failed

Remarks:

D.15 Electrostatic discharge test

D.15.1 Electrostatic discharge test – Direct application (B.4.8)

Application No: _____

Model No.: _____

Serial No.: _____

Test liquid: _____

Date test performed: _____

Test type Simulated: Operational:

Density of test liquid: _____ kg/cm³ at _____ °C and at 101 325 Pa (NBP)

Observer: _____

Air discharge Polarity (**): pos neg

Environmental conditions

at start at end

Temperature: _____ °C

Rel. humidity: _____ %

Bar. pressure: _____ hPa

Time: _____ actual

Table D.15.1 Electrostatic discharge test - Direct application

(SELECT ONLY ONE TABLE)

GRAVIMETRIC TEST:

Indications in mass

Type of test	Flowrate (unit)	Reference value (unit)	Discharges			Result		
			Test voltage (kV)	Number of discharges ≥ 10	Repetition interval (s)	Indication	Significant fault (fault > 20 % mpe)	
							No	Yes (remarks)
Air discharge			Without disturbance					
			2					
			4					
			6					
			8					
Contact discharge			Without disturbance					
			2					
			4					
			6					

Passed: Failed

Remarks:

Table D.15.1 Electrostatic discharge test - Direct application (Cont.)

Indications in liquid volume at NBP									
Type of test	Flowrate (mass or volume unit/time)	Reference value (mass unit)	Ref. value calc. to volume at NBP	Discharges			Indication	Result	
				Test voltage (kV)	Number of discharges ≥ 10	Repetition interval (s)		Significant fault (fault > 20 % mpe)	
								No	Yes (remarks)
Air discharge				Without disturbance					
				2					
				4					
				6					
				8					
Contact discharge				Without disturbance					
				2					
				4					
				6					

Passed: Failed

Remarks:

**IEC 1000-4-2 specifies that the test shall be conducted with the most sensitive polarity.

D.15.1 Electrostatic discharge test - Direct application (B.4.8) (Cont.)

Application No: _____
 Model No.: _____
 Serial No.: _____
 Test liquid: _____
 Date test performed: _____
 Test type Simulated: Operational:
 Density of test liquid: _____ kg/cm³ at _____ °C and at 101 325 Pa (NBP)
 Observer: _____
 Air discharge Polarity (**): pos neg

Environmental conditions

	at start	at end	
Temperature:			°C
Rel. humidity:			%
Bar. pressure:			hPa
Time:			actual

Table D.15.1 Electrostatic discharge test - Direct application (Cont.)

(SELECT ONLY ONE TABLE)

Indications in equivalent gas volume at base conditions

Type of test	Flowrate (mass or volume unit/time)	Reference value (mass unit)	Ref. value cal. to vol. at NBP (unit liq. vol. at NBP)	Ref. value calc. to gas vol. at base cond. (normal cubic meters)	Discharges			Result		
					Test voltage (kV)	Number of discharges ≥ 10	Repetition interval (s)	Indication	Significant fault (fault > 20 % mpe)	
									No	Yes (remarks)
Air discharge					Without disturbance					
					2					
					4					
					6					
					8					
Contact discharge					Without disturbance					
					2					
					4					
					6					

Passed: Failed

Remarks:

Table D.15.1 Electrostatic discharge test - Direct application (Cont.)

MASTER METER TEST:								Indications in mass					
Type of test	Flowrate (mass or vol. unit/time)	Master meter temp. (°C)	Master meter pressure (kPa)	Master meter volume indication (liters)	Master meter K-factor	Reference value (mass unit)	Ref. value calc. to volume at NBP	Discharges			Indication	Result	
								Test voltage (kV)	Number of discharges ≥ 10	Repetition interval (s)		Significant fault (fault > 20 % mpe)	
												No	Yes (remarks)
Air discharge								Without disturbance					
								2					
								4					
								6					
								8					
Contact discharge								Without disturbance					
								2					
								4					
								6					

Passed: Failed

Remarks:

**IEC 1000-4-2 specifies that the test shall be conducted with the most sensitive polarity.

D.15.2 Electrostatic discharge test - Indirect application (B.4.8)

Application No: _____
 Model No.: _____
 Serial No.: _____
 Test liquid: _____
 Date test performed: _____
 Test type Simulated: Operational:
 Density of test liquid: _____ kg/cm³ at _____ °C and at 101 325 Pa (NBP)
 Observer: _____

Environmental conditions

	at start	at end	
Temperature:			°C
Rel. humidity:			%
Bar. pressure:			hPa
Time:			actual

Indirect application - Contact discharge only

a) Vertical coupling plane Polarity (**): pos neg

Table D.15.2.1 Electrostatic discharge test - Indirect application

(SELECT ONLY ONE TABLE)

GRAVIMETRIC TEST:

Indications in mass

Flowrate (unit)	Reference value (unit)	Discharges			Indication	Result	
		Test voltage (kV)	Number of discharges ≥ 10	Repetition interval (s)		Significant fault (fault > 20 % mpe)	
						No	Yes (remarks)
		Without disturbance					
		2					
		4					
		6					

Indications in liquid volume at NBP

Flowrate (mass or volume unit/time)	Reference value (mass unit)	Ref. value calc. to vol. at NBP	Discharges			Indication	Result	
			Test voltage (kV)	Number of discharges ≥ 10	Repetition interval (s)		Significant fault (fault > 20 % mpe)	
							No	Yes (remarks)
			Without disturbance					
			2					
			4					
			6					

Passed: **Failed**

Remarks:

**IEC 1000-4-2 specifies that the test shall be conducted with the most sensitive polarity.

D.15.2 Electrostatic discharge test - Indirect application (B.4.8) (Cont.)

Application No: _____
 Model No.: _____
 Serial No.: _____
 Test liquid: _____
 Date test performed: _____
 Test type Simulated: Operational:
 Density of test liquid: _____ kg/cm³ at _____ °C and at 101 325 Pa (NBP)
 Observer: _____

Environmental conditions

	at start	at end	
Temperature:			°C
Rel. humidity:			%
Bar. pressure:			hPa
Time:			actual

Indirect application – Contact discharge only

a) Vertical coupling plane (Cont.) Polarity (**): pos neg

Table D.15.2.1 Electrostatic discharge test - Indirect application (Cont.)

(SELECT ONLY ONE TABLE)

Indications in equivalent gas volume at base conditions

Flowrate (mass or volume unit/time)	Reference value (mass unit)	Ref. value cal. to vol. at NBP (unit liq. vol. at NBP)	Ref. value calc. to gas vol. at base cond. (normal cubic meters)	Discharges			Result		
				Test voltage (kV)	Number of discharges ≥ 10	Repetition interval (s)	Indication	Significant fault (fault > 20 % mpe)	
								No	Yes (remarks)
				Without disturbance					
				2					
				4					
				6					

MASTER METER TEST:

Indications in mass

Flowrate (mass or vol. unit/time)	Master meter temp. (°C)	Master meter pressure (kPa)	Master meter volume indication (liters)	Master meter K-factor	Vol. ind. master meter corrected for meter error	Calc. mass from master meter indication	Discharges			Result		
							Test voltage (kV)	Number of discharges ≥ 10	Repetition interval (s)	Indication	Significant fault (fault > 20 % mpe)	
											No	Yes (remarks)
							Without disturbance					
							2					
							4					
							6					

Passed: Failed

Remarks:

**IEC 1000-4-2 specifies that the test shall be conducted with the most sensitive polarity.

D.15.2 Electrostatic discharge test - Indirect application (B.4.8) (Cont.)

Application No: _____
 Model No.: _____
 Serial No.: _____
 Test liquid: _____
 Date test performed: _____
 Test type Simulated: Operational:
 Density of test liquid: _____ kg/cm³ at _____ °C and at 101 325 Pa (NBP)
 Observer: _____

Environmental conditions

	at start	at end	
Temperature:			°C
Rel. humidity:			%
Bar. pressure:			hPa
Time:			actual

Indirect application – Contact discharge only

b) Horizontal coupling plane

Polarity (**): pos neg

Table D.15.2.2 Electrostatic discharge test - Indirect application

(SELECT ONLY ONE TABLE)

GRAVIMETRIC TEST:

Indications in mass

Flowrate (mass unit/time)	Reference value (mass unit)	Discharges			Indication	Result	
		Test voltage (kV)	Number of discharges ≥ 10	Repetition interval (s)		Significant fault (fault > 20 % mpe)	
						No	Yes (remarks)
		Without disturbance					
		2					
		4					
		6					

Indications in liquid volume at NBP

Flowrate (mass or volume unit/time)	Reference value (mass unit)	Ref. value calc. to vol. at NBP	Discharges			Indication	Result	
			Test voltage (kV)	Number of discharges ≥ 10	Repetition interval (s)		Significant fault (fault > 20 % mpe)	
							No	Yes (remarks)
			Without disturbance					
			2					
			4					
			6					

Passed: Failed

Remarks:

**IEC 1000-4-2 specifies that the test shall be conducted with the most sensitive polarity.

D.15.2 Electrostatic discharge test – Indirect application (B.4.8) (Cont.)

Application No: _____
 Model No.: _____
 Serial No.: _____
 Test liquid: _____
 Date test performed: _____
 Test type Simulated: Operational:
 Density of test liquid: _____ kg/cm³ at _____ °C and at 101 325 Pa (NBP)
 Observer: _____

Environmental conditions

	at start	at end	
Temperature:			°C
Rel. humidity:			%
Bar. pressure:			hPa
Time:			actual

Indirect application – Contact discharge only

b) Horizontal coupling plane (Cont.) Polarity (**): pos neg

Table D.15.2.2 Electrostatic discharge test - Indirect application (Cont.) (SELECT ONLY ONE TABLE)

Indications in equivalent gas volume at base conditions

Flowrate (mass or volume unit/time)	Reference value (mass unit)	Ref. value calc. to vol. at NBP (unit liq. vol. at NBP)	Ref. value calc. to gas vol. at base cond. (normal cubic meters)	Discharges			Indication I	Result	
				Test voltage (kV)	Number of discharges ≥ 10	Repetition interval (s)		Significant fault (fault > 20 % mpe)	
								No	Yes (remarks)
				Without disturbance					
				2					
				4					
				6					

MASTER METER TEST: **Indications in mass**

Flowrate (mass or vol. unit/time)	Master meter temp. (°C)	Master meter pressure (kPa)	Master meter volume indication (liters)	Master meter K-factor	Vol. ind. master meter corrected for meter error	Calc. mass from master meter indication	Discharges			Indication I	Result	
							Test voltage (kV)	Number of discharges ≥ 10	Repetition interval (s)		Significant fault (fault > 20 % mpe)	
											No	Yes (remarks)
							Without disturbance					
							2					
							4					
							6					

Passed: **Failed**

Remarks:

**IEC 1000-4-2 specifies that the test shall be conducted with the most sensitive polarity report.

D. 15.3 Electrostatic discharge test – Test setup (B.4.8)

Specifications of test points (direct application), e.g. by photos or sketches

a) Direct application

Contact discharge:

Air discharge:

b) Indirect application

D.16 Electromagnetic susceptibility test (B.4.9 and 14.1.1)

Application No: _____
 Model No.: _____
 Serial No.: _____
 Test liquid: _____
 Date test performed: _____

Test type Simulated: Operational:

Density of test liquid: _____ kg/cm³ at _____ °C and at 101 325 Pa (NBP)
 Observer: _____

Frequency range: 26 – 1 000 MHz Rate of sweep:
 Field strength: 3 V/m
 Modulation: 80 % AM, 1 kHz sine wave

Environmental conditions

	at start	at end	
Temperature:	<input type="text"/>	<input type="text"/>	°C
Rel. humidity:	<input type="text"/>	<input type="text"/>	%
Bar. pressure:	<input type="text"/>	<input type="text"/>	hPa
Time:	<input type="text"/>	<input type="text"/>	actual

Table D.16 Electromagnetic susceptibility test

(SELECT ONLY ONE TABLE)

GRAVIMETRIC TEST:

Indications in mass

Flowrate (mass unit/time)	Reference value (mass unit)	Disturbance				Result		
		Antenna	Frequency range (MHz)	Polarization	Facing	Indication	No	Yes (Remark)
		Without disturbance						
					Front			
					Right			
					Left			
					Rear			
					Front			
					Right			
					Left			
					Rear			

Table D.16 Electromagnetic susceptibility test (Cont.)

Flowrate (mass or volume unit/time)	Reference value (mass unit)	Ref. value calc. to vol. at NBP (volume unit)	Indications in liquid volume at NBP				Result		
			Disturbance				Indication	No	Yes (Remark)
			Antenna	Frequency range (MHz)	Polarization	Facing			
			Without disturbance						
						Front			
						Right			
						Left			
						Rear			
						Front			
						Right			
						Left			
						Rear			

Passed: Failed

Remarks:

D.16 Electromagnetic susceptibility test (B.4.9 and 14.1.1) (Cont.)

Application No: _____
 Model No.: _____
 Serial No.: _____
 Test liquid: _____
 Date test performed: _____
 Test type Simulated: Operational:
 Density of test liquid: _____ kg/cm³ at _____ °C
 Observer: _____

Environmental conditions

	at start	at end	
Temperature:			°C
Rel. humidity:			%
Bar. pressure:			hPa
Time:			actual

Frequency range: 26 – 1 000 MHz

Rate of sweep:

Field strength: 3 V/m

Modulation: 80 % AM, 1 kHz sine wave

Table D.16 Electromagnetic susceptibility test (Cont.)

(SELECT ONLY ONE TABLE)

Indications in equivalent gas volume at base conditions

Flowrate (mass or volume unit/time)	Reference value (mass unit)	Ref. value calc. to vol. at NBP (unit liq. vol. at NBP)	Ref. value calc. to gas vol. at base cond. (normal cubic meters)	Disturbance				Result		
				Antenna	Frequency range (MHz)	Polarization	Facing	Indication	No	Yes (Remark)
				Without disturbance						
							Front			
							Right			
							Left			
							Rear			
							Front			
							Right			
							Left			
							Rear			

MASTER METER TEST:

Indications in liquid volume at NBP

Flowrate (mass or vol. unit/time)	Master meter temp. (°C)	Master meter pressure (kPa)	Master meter volume indica- tion (liters)	Master meter K-factor	Vol. ind. master meter corrected for meter error	Calc. mass from master meter indica- tion	Disturbance				Result			
							Antenna	Frequency range (MHz)	Polarization	Facing	Indication	No	Yes (Remarks)	
														Without disturbance
									Front					
									Right					
									Left					
									Rear					
									Front					
									Right					
									Left					
									Rear					

Passed: Failed

Remarks:

D.16 Electromagnetic susceptibility test - Test setup (B.4.9 and 14.1.1) (Cont.)

Description of the setup, e.g. by photos or sketches

D.17 Perturbations on DC voltage-powered instruments (B.4.10)

Application No: _____
 Model No.: _____
 Serial No.: _____
 Test liquid: _____
 Date test performed: _____
 Test type Simulated: Operational: (_____)
 Density of test liquid: _____ kg/cm³ at _____ °C and at 101 325 Pa (NBP)
 Observer: _____

Environmental conditions	
at start	at end
Temperature: _____	_____ °C
Rel. humidity: _____	_____ %
Bar. pressure: _____	_____ hPa
Time: _____	_____ actual

1. Test pulses as in ISO 7637-2, 4.6.
2. Values agreed to between manufacturer & supplier.
3. The amplitudes are the values of Va, as defined for each test pulse in ISO 7637-2, 4.6.
4. If power < -15 % Unom or > +10 % Unom shall indicate within mpe or provide no indication that can be used as a measurement.
 (Minimum severity level for pattern (type) approval is level II)

Table D.17 Perturbations on DC voltage powered instruments

(SELECT ONLY ONE TABLE)

GRAVIMETRIC TEST:

Indications in mass

Test pulse ¹	Selected test level ²	Test levels ³ voltage			Minimum number of pulses or test time	Pulse cycle time		Flowrate (mass unit/time)	Indicated value (mass unit)	Reference value (mass unit)	Error %	mpe %
		I	II	III		min.	max.					
1a												
1b												
2												
3a												
3b												

Indications in liquid volume at NBP

Test pulse ¹	Selected test level ²	Test levels ³ voltage			Minimum number of pulses or test time	Pulse cycle time		Flowrate (mass unit/time)	Indicated value (mass unit)	Reference value (mass unit)	Ref. value calc. vol. at NBP (unit liquid volume)	Error %	mpe %
		I	II	III		min.	max.						
1a													
1b													
2													
3a													
3b													

Remarks:

Passed: **Failed**

D.17 Perturbations on DC voltage-powered instruments (B.4.10) (Cont.)

Application No: _____
 Model No.: _____
 Serial No.: _____
 Test liquid: _____
 Date test performed: _____
 Test type Simulated: Operational:
 Density of test liquid: _____ kg/cm³ at _____ °C and at 101 325 Pa (NBP)
 Observer: _____

<i>Environmental conditions</i>	
at start	at end
Temperature: _____	_____ °C
Rel. humidity: _____	_____ %
Bar. pressure: _____	_____ hPa
Time: _____	_____ actual

1. Test pulses as in ISO 7637-2.4.6.
2. Values agreed to between manufacturer & supplier.
3. The amplitudes are the values of Va, as defined for each test pulse in ISO 7637-2.4.6.
4. If power < -15% U_{nom} shall indicate within mpe or provide no indication that can be used as a measurement.
 (Minimum severity level for pattern (type) approval is level II)

Table D.17 Perturbations on DC voltage powered instruments (Cont.)

(SELECT ONLY ONE TABLE)

Indications in equivalent gas volume at base conditions

Test pulse ¹	Selected test level ²	Test levels ³ voltage			Minimum number of pulses or test time	Pulse cycle time		Flowrate (mass/time)	Indicated value (normal cubic meters)	Reference value (mass unit)	Ref. value calc. vol. at NBP (unit of liquid volume at NBP)	Ref. value calc. gas vol. at NBP (unit in normal cubic meters)	Error %	mpe %
		I	II	III		min.	max.							
1a														
1b														
2														
3a														
3b														

Table D.17 Perturbations on DC voltage powered instruments (Cont.)

MASTER METER TEST:

Indications in mass

Test pulse ¹	Selected test level ²	Test levels ³ voltage			Minimum number of pulses or test time	Pulse cycle time		Flowrate (mass/time)	Indicated value (normal cubic meters)	Reference value (mass unit)	Ref. value calc. vol. at NBP (unit of liquid volume at NBP)	Ref. value calc. gas Vol. at NBP (unit in normal cubic meters)	Error %	mpe %
		I	II	III		min.	max.							
1a														
1b														
2														
3a														
3b														

Passed: **Failed**

Remarks:

D.18 Endurance test (A.1.5, 15.1.5.3)

D.18.1 Performance test before endurance test

Application No: _____
 Model No.: _____
 Serial No.: _____
 Test liquid: _____
 Date test performed: _____
 Test type Simulated: Operational:
 Density of test liquid: _____ kg/cm³ at _____ °C and at 101 325 Pa (NBP)
 Observer: _____

Environmental conditions

	at start	at end	
Temperature:	_____	_____	°C
Rel. humidity:	_____	_____	%
Bar. pressure:	_____	_____	hPa
Time:	_____	_____	actual

1. Perform initial test, according to A.1.4 and 15.1.5.2 prior to endurance test
2. Error of initial test is within mpe: Yes No
3. Operate for 100 hours at flowrate between 0.8 Q_{max} and Q_{max} with the liquid the device is intended to measure, or one with similar characteristics.
 Maximum flowrate of meter, Q_{max} = _____
4. Perform final test with the same liquid, according to A.1.4 and 15.1.5.2. The test results shall not vary from the initial test by more than 1.5 % of the measured quantity.

Table D.18.1 Performance test before endurance test

(SELECT ONLY ONE TABLE)

GRAVIMETRIC TEST:

Indications in mass

Test No.	Flowrate (mass unit/time)	Indicated value (mass unit)	Reference value ¹ (mass unit)	Error %	mpe %
1					
2					
3					
Avg.					

Indications in liquid volume at NBP

Test No.	Flowrate (mass or volume unit/time)	Indicated value (unit – liquid volume at NBP)	Reference value (mass unit)	Ref. value calc. to liquid vol. at NBP (volume unit)	Error %	mpe %
1						
2						
3						
Avg.						

Indications in equivalent gas volume at base conditions

Test No.	Flowrate (mass or volume unit/time)	Indicated value (normal cubic meters)	Reference value (mass unit)	Ref. value calc. to vol. at NBP (unit of liquid volume at NBP)	Ref. value calc. to gas vol. at base cond. (unit in normal cubic meters)	Error %	mpe %
1							
2							
3							
Avg.							

MASTER METER TEST:

Indications in mass

Test No.	Flowrate (mass or vol. unit/time)	Master meter temp. (°C)	Master meter pressure (kPa)	Master meter volume indication (liters)	Master meter K-factor	Vol. ind. master meter corrected for meter error	Calc. mass from master meter indication	Indicated value (mass unit)	Error %	mpe %
1										
2										
3										
Avg.										

Passed: Failed:

Remarks:

D.18 Endurance test (A.1.5, 15.1.5.3) (Cont.)

D.18.2 Performance test after endurance test

Application No: _____
 Model No.: _____
 Serial No.: _____
 Test liquid: _____
 Date test performed: _____
 Test type Simulated: Operational:
 Density of test liquid: _____ kg/cm³ at _____ °C and at 101 325 Pa (NBP)
 Observer: _____

Environmental conditions

	at start	at end	
Temperature:			°C
Rel. humidity:			%
Bar. pressure:			hPa
Time:			actual

After endurance testing:

Perform final test with the same liquid, according to A.1.4. and 15.1.5.2. The test results shall not vary from the initial test by more than 1.5 % of the measured quantity.

Table D.18.2 Performance test after endurance test

(SELECT ONLY ONE TABLE)

GRAVIMETRIC TEST:

Indications in mass

Test No.	Flowrate (mass unit/time)	Indicated value (mass unit)	Reference value (mass unit)	% Error	mpe %
1					
2					
3					
Avg.					

Indications in liquid volume at NBP

Test No.	Flowrate (mass or volume unit/time)	Indicated value (unit - liquid volume at NBP)	Reference value (mass unit)	Ref. value calc. to liquid vol. at NBP (volume unit)	Error %	mpe %
1						
2						
3						
Avg.						

Indications in equivalent gas volume at base conditions

Test No.	Flowrate (mass or volume unit/time)	Indicated value (normal cubic meters)	Reference value (mass unit)	Ref value calc. to vol. at NBP (unit of liquid volume at NBP)	Ref. value calc. to gas vol. at base cond. (unit in normal cubic meters)	Error %	mpe %
1							
2							
3							
Avg.							

MASTER METER TEST:

Indications in mass

Test No.	Flowrate (mass or vol. unit/time)	Master meter temp. (°C)	Master meter pressure (kPa)	Master meter volume indication (liters)	Master meter K-factor	Vol. ind. master meter corrected for meter error	Calc. mass from master meter indication	Indicated value (mass unit)	Error %	mpe %
1										
2										
3										
Avg.										

Passed: Failed:

Remarks: