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**Compressed gaseous fuel measuring systems for vehicles**

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**Compressed gaseous fuel measuring systems for vehicles**

**Part 3: OIML Report format for type evaluation**

TITRE DU CD (French):

OIML R 139-3

**Ensembles de mesurage de gaz comprimé pour véhicules**

**Partie 3 : OIML format de rapport pour l'évaluation de type**

Original version in english

Version original en anglais

# 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 - reference OIML R 139-3, Edition 201x - was developed by Technical Subcommittee TC8/SC7. It was approved for final publication by the International Committee of Legal Metrology in 201x and will be submitted to the International Conference of Legal Metrology in 201x for formal sanction.

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## OIML R 139-3

### Compressed gaseous fuel measuring systems for vehicles

#### Part 3 - Report format for type evaluation

## 1 Introduction

Implementation of this Report Format is informative with regard to the implementation of OIML Recommendation R 139-1 and -2 in national regulations. However, its implementation is mandatory within the framework of the OIML Certificate System for Measuring Instruments.

Note concerning the references: All references are to the combined publication OIML R 139-1 and -2 (201~~x~~). In this Report Format this publication is referred to as "R 139".

This Report Format applies for any kind of compressed gaseous fuel measuring system for vehicles (independent of its technology). It presents a standardized format for recording the results of the various tests and examinations, described in Part 2 of R 139 (201~~x~~), to which a type of an compressed gaseous fuel measuring system for vehicles shall be submitted with a view to its approval based this OIML Recommendation.

The use of this report format, as is, or translated into a different language is recommended to all metrology services or laboratories evaluating and/or testing types of compressed gaseous fuel measuring system for vehicles according to OIML R 139, or according to national or regional regulations based on this Recommendation. In case of a translation, it is highly recommended to leave the structure and the numbers of the clauses unchanged, thus facilitating the interpretation of most of the contents even for those readers not familiar to this specific other speech.

The available area of entry fields should be adjusted to the space required for the correct entry of the specific record. The complete deletion of an entry field should be omitted.

The Report Format, in the practical application, shall as a minimum contain the 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* (MAA) applicable to Compressed gaseous fuel measuring systems for vehicles in conformity with R 139 (2014), the use of this report format is mandatory. It shall be made available in French and/or in English language(s) and include copies translated in the national languages of the countries issuing such certificates, when appropriate. Concerning the implementation of OIML Recommendation R 139: 201~~x~~) in national regulations this report format is informative.

### 3 Guidance for the application of this 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 example:*

	Yes	No	Meaning
Passed	x		Passed
Passed		x	Failed
Passed	/	/	test is not applicable for this instrument

- Notes:*
- (1) Unless prescribed otherwise, “Date” in the report refers to the date of testing.
  - (2) The name(s) or symbol(s) of the unit(s) used to express the test results shall be specified in each form.
  - (3) Where in a table one or several choices can be made, checkboxes are applied. In such case some or all of the columns Y, N, N/A generally are not applicable and thus presented crosshatched (see the example below)

Clause	Description	Yes	No	Not applicable	Observations
		<input type="checkbox"/>			

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 surge tests on signal lines shorter than 30 m, tests related to AC mains supply in case of an instrument only powered by DC mains supply, or partial testing after modification of a previously tested type).

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

**Pages 1 - 5 of this Test Report format may be replaced by a cover page by the Issuing authority.**

### 4 The Evaluation Report

The format for the Report is presented on the following pages starting with space for the cover page.

**Cover page**  
**by the**  
**Issuing Authority**

in accordance with national custom or legislation

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## Contents of the Evaluation Report

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## **A      References of the authority, responsible for this report**

Name	
Address	
Report number	
Application number	
Period of execution of the tests	
Date of issuing this Report	
Name and signature of the person responsible for the report and stamp(s) (if applicable)	

## B Synopsis of the results of the evaluation

(To be completed by the Issuing Authority)

The evaluated specimen (or specimens) fulfils all the applicable and required criteria stated in OIML R 139-1 (2014)	
<input type="checkbox"/> Yes	<input type="checkbox"/> No
Observations:	

**C Summary of the results of the evaluation (examination and tests)***(To be completed by the Issuing Authority)***C.1 Examinations***(Referring to clauses in of R 139)*

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

Clause(s) in R 139	General requirements	Complies with OIML R 139			details in
		Yes	No	N.A.	
5.1, 6.2	Presentation of the measured result				<a href="#">E.1</a>
5.3	Measuring range				<a href="#">E.2</a>
6.1	Construction				<a href="#">E.3</a>
6.2.9	Printing device				<a href="#">E.4</a>
6.3	Storing of measuring results (memory device; hardware)				<a href="#">E.5</a>
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6.5	Zero-setting device				<a href="#">E.7</a>
6.6	Pre-setting device				<a href="#">E.8</a>
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6.8	Emergency power supply device				<a href="#">E.10</a>
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6.10	Checking facilities				<a href="#">E.12</a>
6.11	Software				<a href="#">E.13</a>
6.12	Self-service arrangement				<a href="#">E.14</a>
6.14	Installation of the measuring system				<a href="#">E.15</a>
7	Markings				<a href="#">D.4</a>
8	Instruction manual				<a href="#">E.16</a>
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15.2	External printers and memory devices				<a href="#">E.22</a>
18.2	Documentation for the type evaluation				<a href="#">E.23</a>



**C.2 Performance tests***(Refer to clauses of OIML R 139-2)*

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

Clause R 139	Performance tests	Complies with R 139			Details in
		Yes	No	N.A.	
17.2.7.1	At variable flow rate				<a href="#">F.1</a>
17.2.7.2	Tests with sequential control				<a href="#">F.2</a>
17.2.7.3	Tests without sequential control				<a href="#">F.3</a>
17.2.7.5	Durability				<a href="#">F.4</a>
17.2.7.6	Gas influence factors				<a href="#">F.5</a>
17.2.7.7a	Zero stability				<a href="#">F.6</a>
17.2.7.7b	Flow disturbances				<a href="#">F.7</a>
18.5.3	Preset function				F.7.1
18.6.a	Use of alternative Fluid				D.11
18.6.b	Use of only one gas				D.11
18.7.1	Initial test				F.8
18.8.2	Influence of static (ambient) temperature				<a href="#">F.8.1</a>
18.8.3	Influence of vibration (random)				<a href="#">F.9</a>
18.8.4	Influence of mains power supply variation				<a href="#">F.10</a>
18.8.5	Influence of battery power supply variation				<a href="#">F.11</a>
18.9.4.1	Immunity to atmospheric disturbances				<a href="#">F.12</a>
18.9.4.2	Immunity to radio frequency EM fields				<a href="#">F.13</a>
18.9.4.3	Immunity to electrostatic discharges				<a href="#">F.14</a>
18.9.4.4	Immunity to surges				<a href="#">F.15</a>
18.9.4.5	Immunity to power source disturbances :				
→	AC mains voltage dips, short interruptions				<a href="#">F.16</a>
→	DC mains voltage dips, short interruptions and voltage variations				<a href="#">F.17</a>
→	Bursts (transients) on AC and DC mains and signal lines				<a href="#">F.18</a>
→	Ripple on DC mains power				<a href="#">F.19</a>

**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)	<input type="checkbox"/> Yes <input type="checkbox"/> No
It is verified that no application for OIML type evaluation for the same type has been made to any other OIML Issuing Authority (see OIML B 3, 3.1.2)	<input type="checkbox"/> Yes <input type="checkbox"/> No
Observations:	

**D.3 Testing laboratories involved in the tests***(This table to be completed for each test laboratory)*

Name		
Address		
Application number		
Tests by this laboratory		
Date/period of tests		
Name(s) of test engineer(s)		
Statement of compliance with the requirement of proven competence for performing the above referred tests within the scope of OIML R 139-1 &-2 (201x) (OIML B3 [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		
Entry area for detailed information in case tests have not been performed on the premises of this laboratory but on a different location.		
Name of the responsible person		
Date of signature		
Stamp (where applicable) and signature of the responsible person		
Observations:		

**D.4 General information concerning the type and the sample(s) supplied for the tests**

(as stated on the instrument / provided by the manufacturer)

<i>R 139-1</i> Clause	Information presented on the instrument			Yes	No	Not applicable	Comments/observations
7.1	Manufacturer's trade mark						
	Type/model designation/number						
	Presented or space for:	Approval marking					
		Year of make					
		Serial number					
7.2	Minimum measured quantity	$MMQ =$ g ; kg					
7.3.a	Flow rate range	$Q_{\min} =$ kg/min					
		$Q_{\max} =$ kg/min					
	Minimum pressure of the gas	$P_{\min} =$ MPa					
	Maximum pressure of the gas	$P_{\max} =$ MPa					
	Maximum storage pressure	$P_{st} =$ MPa					
	Maximum fast-fill pressure	$P_v =$ MPa					
	Types of gas or mixtures of gas						
	Temperature range of the gas	$T_{\min} =$					
		$T_{\max} =$					
	Ambient temperature range	Ambient high ( $T_{ah}$ ) =					
		Ambient low ( $T_{al}$ ) =					
	Environmental classification	Exclusively non industrial					
		Generic (includes industrial)					
7.3.b	Electrical power supply	mains AC voltage V					
		mains DC voltage V					
		Battery voltage V					
7.3.d	Speed of switching between banks	ms					
7.3.c	Identification of software						
	Length of the hose	m					
7.1.e	Modules :name	:type	:serial number				

	Further observations:				
--	-----------------------	--	--	--	--

**D.5 Accessories, supplied by the applicant (if applicable)**

Operating instructions	
.....	
.....	
.....	
.....	
Examples are: Data printer (if applicable); ancillary devices, cabling and other accessories:	

**D.6 Selection of specimens tested**

In case the tests and examinations are valid for more versions, present full details of these versions, according to the listing of parameters and type designation in the way presented in D4:
Justification of the selection of the specimens:

The following specimens have taken part in the examination:

Specimen no.	Model	Serial no.	Year of make	$Q_{\max}$ [kg/min]	$Q_{\min}$ [kg/min]
1					
2					
3					
4					
5					
...					

**D.7 Adjustments and modifications**

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

**D.8 Additional information concerning the type**

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

**D.9 Documentation supplied by the applicant**

Observations:

**D.10 Results of previous tests that were taken into account**

Details:

**D.11 Information concerning the test equipment used for the type evaluation**  
(including details of simulations)

*If applicable, the laboratory is free to provide this information, instead of a complete overview here, in the appropriate chapter F.x in an extra field below the 1<sup>st</sup> table (with "Date & Time" etc.).  
In that case a statement shall be made in this field.*

**E Examinations***(To be completed by the Evaluating Authority)**Where specified not applicable in table C.1 the underneath related tables may be removed from this report.*

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

Clause	Description	Yes	No	Not applicable	Observer Name:
					Date(s):
					Specimen:
					Observations:

<b>E1 (5.1)</b>	<b>Presentation of the measurement result</b>				Applied units: ....
<b>5.1.1</b>	<b>Units of measurement</b>				
	All applied quantity values are expressed in:	SI units: <input type="checkbox"/>			
		other legal units conforming OIML D2 [2007]: <input type="checkbox"/>			
<b>5.1.2</b>	<b>Scale interval</b>				
5.1.2.1	- agrees $1 \times 10^n$ , $2 \times 10^n$ or $5 \times 10^n$ , (n=integer)				
5.1.2.2	- is equal to or smaller than MMQ				
5.1.2.3	Non-significant figures avoided				
5.1.3	Same scale intervals multiple indications (displays and printers)				
6.2.1.1	Size of figures digital display $\geq 10$ mm				
6.2.1.2	No dots or commas applied when grouping numbers in groups of 3 digits				
6.2.5	Presentation of decimal fraction at least one figure to the left of the separator and all figures to the right				

<b>E2 (5.3)</b>	<b>Measuring ranges</b>				
5.3.1.1	$Q_{\min}$ specified limited				
5.3.1.2	$Q_{\max}$ specified limited				
	Flow rate below $Q_{\min}$ prevented				
5.3.1.3	All elements of the system range within $Q_{\min}$ and $Q_{\max}$				
5.3.2	<b>MMQ specified:</b>				
5.2.4	<b><math>R_{MPE}</math></b>				
5.2.4	<b><math>E_{\min}</math> (<math>=2 \cdot R_{MPE} \cdot MMQ</math>)</b>				
5.3.1.4	Applied ratio(s): $Q_{\max}/Q_{\min}$			$Q_{\max}/Q_{\min} \geq 10$ ?	
5.3.2	$Q_{\max} \leq 4$ <input type="checkbox"/>	MMQ =		$MMQ \leq 0,5$ ?	
	$4 < Q_{\max} \leq 12$ <input type="checkbox"/>	MMQ =		$MMQ \leq 1$ ?	
	$12 < Q_{\max} \leq 30$ <input type="checkbox"/>	MMQ =		$MMQ \leq 2$ ?	
	$30 < Q_{\max} \leq 70$ <input type="checkbox"/>	MMQ =		$MMQ \leq 5$ ?	
	$Q_{\max} > 70$ <input type="checkbox"/>	MMQ =		$MMQ \leq 10$ ?	
	MMQ agrees $1 \times 10^n$ , $2 \times 10^n$ or $5 \times 10^n$ , (n=integer)				

Clause	Description	Yes	No	Not applicable	Observer Name:
					Date(s):
					Specimen:
					Observations:

<b>E3</b>	<b>Construction</b>				
6.1	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: <input type="checkbox"/>	remotely: <input type="checkbox"/>		
	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 made 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.				
<b>6.2</b>	<b>Flow direction</b>				
	The direction of the gas flow is:	indicated by a clear indication: <input type="checkbox"/>	determined by the construction of the gas meter <input type="checkbox"/>		
	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: <input type="checkbox"/>	recorded separately: <input type="checkbox"/>		
	Where the meter is not designed for measuring reverse flow:	measures preventing reverse flow are installed: <input type="checkbox"/>	the meter is able to withstand incidental or accidental reverse flow without deterioration of, or change in any forward flow measurement <input type="checkbox"/>		
	The meter is provided with a device preventing the indicating device from functioning in case of reverse flow.				



Clause	Description	Yes	No	Not applicable	Observer Name:
					Date(s):
					Specimen:
					Observations:

<b>E4</b>	<b>Printing device</b>					
6.2.8	Printing device	Internal <input type="checkbox"/>				
		External <input type="checkbox"/>				
6.2.8.1	Printing the current transaction is inhibited during a measurement					
	No change in indicated quantity during printing					
6.2.8.2	Prints identification of applicable system when more than one measuring system is, or can be connected					
6.2.8.3	Marks duplicates when copies can be produced					
6.2.8.6, a	Print permanency: readable at least 3 months					
6.2.8.6, b	Height of digits.... mm	> 2 mm ?				
6.2.8.4	Prints	Price <input type="checkbox"/>				
		Price and unit price <input type="checkbox"/>				
6.2.8.6, c		Name/symbol of units on the right of the value <input type="checkbox"/>				
		Name/symbol of units above column <input type="checkbox"/>				
6.2.8.6, d	A print failure results in	a warning <input type="checkbox"/>				
		inhibiting the measurement <input type="checkbox"/>				
6.2.8.5	Checking facilities of printer					

Clause	Description	Yes	No	Not applicable	Observer Name:
					Date(s):
					Specimen:
					Observations:

<b>E5</b>	<b>Storage</b>					
6.3	Hardware memory device	Internal <input type="checkbox"/>				
		External <input type="checkbox"/>				
6.3.1	Means available to read stored data					
	Sufficient storage capacity					
6.3.2	Permanency of stored data					
6.3.3	Modification of stored data inhibited					
6.3.3	Deletion of data					
6.3.4	Checking facilities of memory device					

Clause	Description	Yes	No	Not applicable	Observer Name:
					Date(s):
					Specimen:
					Observations:

<b>E6</b>	<b>Data transmission interface</b>				
6.4	Equipped with <b>data transmission interface</b>				
	No possibility to inadmissibly influence metrological functions				
	No possibility to falsify measuring results				

<b>E7 (6.5)</b>	<b>Zero-setting device</b>				
6.5.1	Measurement system is equipped with required zero setting device				
6.5.1.1	Only acts on indicated measurement result				
6.5.1.2	Next delivery only possible after finish of and reset to zero of previous delivery				
6.5.1.3	Measuring result during zero setting inhibited				
6.5.1.3	During zero setting no diverging indication of measured value				
6.5.1.4	Zero setting during measurement inhibited				
6.5.2	Equipped with required zero setting of price indication				
6.5.3	Corrects for false registered massflow in case of no flow				

<b>E8</b>	<b>Presetting device</b>				
6.6.1	Presetting device	Available	<input type="checkbox"/>		
6.6.2	Indication of pre-set before start of measurement				
6.6.3	Indication between actual measured and preset is distinguishable				How ?
6.6.4	Indication of preset value	remains unaltered	<input type="checkbox"/>		
		returns progressively to zero	<input type="checkbox"/>		
6.6.6		units according to 5.1.1			
6.6.7		scale interval same as 5.1.2			
6.6.4	Presetting device	special operation involving the preset value to change to zero before the measurement	<input type="checkbox"/>		
6.6.8		Emergency flow stop incorporated	<input type="checkbox"/>		
6.6.9		Price presetting device available	<input type="checkbox"/>		

<b>E9</b>	<b>Calculator</b>				
6.7					
6.7.2	All necessary parameters values are available at the start of the measurement				

Clause	Description	Yes	No	Not applicable	Observer Name:
					Date(s):
					Specimen:
					Observations:

<b>E.10</b> (6.8)	<b>Emergency power supply</b>					
6.8.1	Emergency power supply allows:	a) all measuring functions are safeguarded during a failure of the principal power supply <input type="checkbox"/>				
		b) data contained at the moment of a failure leading to stopping the flow are saved and displayable on an indicating device subject to legal metrology control for sufficient time to permit the conclusion of the current transaction. <input type="checkbox"/>				
6.8.2	A failure leading to stopping the flow causes the operation of the display:	a) to automatically continue for at least 15 min immediately following the failure of the principal electrical supply <input type="checkbox"/>				
		b) for a total time of at least 5 minutes in one or several periods to be controlled manually during one hour immediately following the failure. <input type="checkbox"/>				
	More than 15s power failure leads to a finishing the delivery when the power supply is re-established					

<b>E.11(6.9)</b>	<b>Protection against fraud</b>				
6.9.1a	Adjustment without breaking seals inhibited				
6.9.1d	Risk on successful deliberate influence is minimized				

Clause	Description	Yes	No	Not applicable	Observer Name:
					Date(s):
					Specimen:
					Observations:

<b>E.12/6.10</b>	<b>Checking facilities</b>					
<b>6.10.2</b>	<b>Checking facilities for the measurement transducer</b>					
	Type	<input type="checkbox"/> N / <input type="checkbox"/> I / <input type="checkbox"/> P				
	Function check	a) by disconnecting the transducer, or <input type="checkbox"/> b) by interrupting one of the sensor's pulse generators, or <input type="checkbox"/> c) by interrupting the electrical supply of the transducer <input type="checkbox"/>				
6.10.2.3	Time –out after 120 s					
<b>6.10.3</b>	<b>Checking facilities for the calculator</b>					
	Type	<input type="checkbox"/> N / <input type="checkbox"/> I / <input type="checkbox"/> P				
6.10.3.2	If of type I: Function check	Operates at least every five minutes in the course of a delivery and at least once during a delivery				
6.10.3.3	Validity check	<input type="checkbox"/> N / <input type="checkbox"/> I / <input type="checkbox"/> P				
<b>6.10.4</b>	<b>Checking facilities for the indicating device</b>					
	Type	<input type="checkbox"/> N / <input type="checkbox"/> I / <input type="checkbox"/> P				
6.10.4	If of type I: Function check	a primary indication is provided by some other device of the measuring system or, the indication can be easily determined from other primary indications				Details
6.10.4.2	Function check	automatic verification of the complete indicating device <input type="checkbox"/> Or both: <input type="checkbox"/> - automatically the data transmitted to the indicating device and the electronic circuits used for the indicating device, excluding those to the driving circuits of the display itself, - visual check of the display itself which is of type I (each step to be at least 0,75 seconds)				
<b>6.10.5</b>	<b>Checking facilities for ancillary devices</b>					
	Type	<input type="checkbox"/> N / <input type="checkbox"/> I / <input type="checkbox"/> P				
<b>6.10.6</b>	<b>Checking facilities for the associated measuring instruments</b>					
	Type	<input type="checkbox"/> N / <input type="checkbox"/> I / <input type="checkbox"/> P				
<b>6.10.7</b>	<b>Zero flow response</b>					
	Time-out device incorporated that terminates a single batch delivery should a period of inactivity (no flow) of more than 2 minutes occur during the transaction					

Applicable software evaluation procedures:

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

<b>Abbreviation</b>	<b>Description</b>	<b>Not applicable</b>	<b>Related clause form OIML D 31:2008</b>
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

Clause	Description	Yes	No	Not applicable	Observer Name:
					Date(s): Specimen:
					Observations
<b>E.13</b>	<b>Software</b>				
<b>A.1.1</b>	<b>Software identification</b>				
	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.				
<b>A.1.2</b>	<b>Correctness of algorithms and functions</b>				
	The measuring algorithms and functions are appropriate and functionally correct.				
<b>A.1.3</b>	<b>Software protection (against fraud)</b>				
	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.				
<b>A.2.1</b>	<b>Separation of electronic devices and sub-assemblies</b>				
	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.				
<b>A.2.2</b>	<b>Shared indications</b>				
	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.				
<b>A.2.3</b>	<b>Storage of data, transmission via communication system</b>				
	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.				

Clause	Description	Yes	No	Not applicable	Observer Name:
					Date(s):
					Specimen:
					Observations:

<b>E.14</b>	<b>Self service arrangement</b>					
<b>6.12.1</b>	<b>GENERAL</b>					
6.12.1.2	Individual identification of measuring systems in case of multi-measuring systems					
6.12.1.3	No indications potentially introducing confusion					
6.12.1.4	Indication of status of measuring system					
6.12.1.5	Changing type of payment and/or mode of operation inhibited before end of operation					
6.12.1.6	Indication available for consumer up to end of transaction					
<b>6.12.2</b>	<b>ATTENDED SERVICE MODE</b>					
	Information to customer					
6.12.2.1.1	Attended post payment additional indicating device consists of:	a) a printing device for the issue of a receipt to the customer, or <input type="checkbox"/>				
		b) an indicating device for the benefit of the supplier together with a display for the benefit of the customer. <input type="checkbox"/>				
6.12.2.1.2	Temporary storage incorporates	a) association of the data with the measurement is unambiguous for each measuring system when the results are recalled				
		b) the customer is informed about the identification of his measurement in the sequence of storage of measurements				
6.12.2.1.3	Temporary storage mode is inhibited and the measuring system indicating device remains the primary indication	c) when a primary indication is out of service				
		when an external device providing a mandatory primary indication for the benefit of the customer is disconnected, or when automatically a faulty operation is detected.				
<b>6.12.3</b>	<b>UNATTENDED SERVICE MODE</b>					
<b>6.12.3.1</b>	<b>General</b>					
6.12.3.1.1	Registering by additional primary indication by means of	a) a printer receipt issued for the customer, and				
		b) measurement data registered for the benefit of the supplier by a printing or memory device <input type="checkbox"/>				
6.12.3.1.2	Warning to customer before operation in case of 6.12.3.1.1 a) or b) out of service					
6.12.3.1.3	Individual volume totalizers for each registered customer; visible to the customer (in which case 6.12.3.1.1 and 6.12.3.1.2 do not apply) <input type="checkbox"/>					
6.12.3.1.4	Inhibiting of the process in case of an interference or disturbance					
6.12.3.1.5	Conservation of delivery data during power supply failure (6.8.2 applies)					
<b>6.12.3.2</b>	<b>Delayed-payment</b>					
	Printed and/or memorized indications contain sufficient information for providing proof and include the measured quantity, the price to pay and information to identify the particular transaction (e.g. the measuring system number, location, date, time).					
<b>6.12.3.3</b>	<b>Pre-payment in unattended service mode</b>					
6.12.3.3.1	Pre-paid amount and actual price of the gas delivered is printed and memorized					
	Printed/memorized indications are divided in 2 parts indicated to be related and to contain pre and past delivery information respectively <input type="checkbox"/>					
6.12.3.3.1	Fulfills pre-set requirements (6.6)					



Clause	Description	Yes	No	Not applicable	Observer Name:
					Date(s):
					Specimen:
					Observations:

<b>E.15</b>	<b>Installation of the measuring system</b>				
6.14					
6.14.1	No corruption metrological behaviour by installing additional device				
6.14.2	No means provided for diversion downstream the meter during filling				
6.14.3	Design is such that delivered mass is always within $\frac{1}{2} E_{\min}$				
6.14.4	Flow limiting device is installed (applies only when there is a risk on exceeding $Q_{\max}$ )				
6.14.5	Provision available for fitting and removing a pressure gauge				

<b>E.16</b>	<b>Instruction manual</b>				
8.2.a	Operating instructions				
8.2.b	Rated operating conditions				
8.2.c	Warm up time				
8.2.d	Other relevant conditions				
8.2.e	Specifications power converter				
8.2.f	Compatibility ancillary equipment				
8.2.g	Any specific installation conditions like for instance a limitation of the length of signal, data, and control lines				
8.2.h	Instructions for installation, maintenance, repairs, permissible adjustments (this can be in a separate document, not meant for the user/owner)				
8.2.i	Conditions for compatibility with interfaces, sub-assemblies (modules) or other measuring instruments				
8.2.j	Minimum measured quantity MMQ				
8.2.k	Minimum flowrate, $Q_{\min}$				
8.2.k	Maximum flowrate, $Q_{\max}$				
8.2.l	Maximum pressure of the gas in the refueling station gas storage, $P_{st}$				
8.2.m	Maximum fast fill pressure of the gas-fuelled vehicle, $P_v$				
8.2.n	Minimum pressure of the gas, $P_{\min}$				
8.2.o	Nature and characteristics of the gases to be measured				
8.2.p	Maximum temperature of the gas, $T_{\max}$				
8.2.q	Minimum temperature of the gas, $T_{\min}$				
8.2.r	Restricted environment (not to be used in industrial environment see 5.7.1 and 5.7.2)				
8.2.s	Maximum length of the hose				

Clause	Description	Yes	No	Not applicable	Observer Name:
					Date(s):
					Specimen:
					Observations:

<b>E.17 (9)</b>	<b>Sealing</b>				
<b>9.1</b>	<b>general</b>				
9.1.1	Sealing/ sealing provisions available for:				
9.1.2	Adjustment of essential metrological parameters is inhibited by means of seals				
9.1.3	Hardware seals <input type="checkbox"/>				
	Electronic seals <input type="checkbox"/> (if so sub clauses 9.2 apply)				
9.1.4	Seals are easily accessible				
<b>9.2</b>	<b>Electronic sealing</b>				
9.2.1.1	a) Access is allowed only to authorized persons by using a "password" and, after changing parameters, the measuring system can be put into use "in sealed condition" again without any restriction; <b>or</b> <input type="checkbox"/>				
	b) Access is allowed without restrictions (similar with the classical sealing) but, after changing parameters, the measuring system can only be put into use "in sealed condition" again by authorized persons using a password. <input type="checkbox"/>				
9.2.1.2	Password is changeable				
9.2.1.3	Mechanical sealing in case of direct selling to public				
9.2.1.4	Device does not operate or indicates so when in configuration mode until being put in sealed condition again				
9.2.1.5.a	Event logger record contains: 1) an event counter, 2) the date the parameter was changed, and 3) the new value of the parameter, and 4) an identification of the person that implemented the intervention				
9.2.1.5.b	The trackability of the last intervention is assured				
9.2.1.5.c	The event logger is capable to store at least 999 interventions				
9.2.1.5.d	The event logger applies the first- in first-out (fifo) principle in case insufficient memory capacity is left to store a new record.				
	Measuring system contains parts which may be disconnected by the user and are				
9.2.2	interchangeable <input type="checkbox"/>	The access to parameters that participate in the determination of results of measurements is not possible through disconnected points (unless the provisions in 9.2.1 are fulfilled)			
		The insertion of any device which may influence the accuracy is prevented by means of electronic and data processing securities or by mechanical means.			
9.2.3	not interchangeable <input type="checkbox"/>	The access to parameters that participate in the determination of results of measurements is not possible through disconnected points (unless the provisions in 9.2.1 are fulfilled)			
		The insertion of any device which may influence the accuracy is prevented by means of electronic and data processing securities or by mechanical means.			
		Measuring system is provided with devices which do not allow the system to operate if the various parts are not associated according to the manufacturer's configuration.			

Clause	Description	Yes	No	Not applicable	Observer Name:
					Date(s):
					Specimen:
					Observations:

<b>E.18</b>	<b>Stamping plate</b>				
10	(Provisions for installing) available				
	(Provisions for installing) Sealing available <input type="checkbox"/>				
	Permanently attached on a support of the measuring system <input type="checkbox"/>				
	Combined with identification plate <input type="checkbox"/>				

<b>E.19</b>	<b>Suitability for testing</b>				
11.1	Design permits testing according to OIML R 139-2				
11.2	Identification is possible of modules having been subject to separate type evaluation				
11.3	Design allows for initial and subsequent verification without unreasonably severe efforts				

<b>E.20</b>	<b>Specific requirements for ancillary devices</b>				
13.3	Optional ancillary devices which are not subject to legal control:	do not affect the correct operation of the measuring system and in particular the measuring system when connected or disconnected.			
		show a statement to the user to be out of legal control in case of displaying or printing the measurement result made available to the customer.			

<b>E.21</b>	<b>Transfer point</b>				
14	Maximum number of transfer points foreseen :				
14.1	Transfer points are all downstream				
14.2	Any diversion of gas to other than the intended receiving receptacle(s)	cannot be readily accomplished, or			
		is readily apparent			
14.3	Next delivery is inhibited until the indication is reset to zero				

Clause	Description	Yes	No	Not applicable	Observer Name:
					Date(s):
					Specimen:
					Observations:

<b>E.22 [15]</b>	<b>Additional requirements for specific modules</b>					
<b>15.1</b>	<b>The meter</b>					
15.1.1	Metrological specifications of the meter					
15.1.1.1	Metrological characteristics of the meter: $Q_{min}$ , $Q_{max}$ , $P_{max}$ , $P_{min}$ , $T_{max}$ and $T_{min}$ . are specified					
15.1.1.2	The temperature range of the gas covers at least + 10 °C to + 40 °C.					
	The rated operating conditions of the meter are the same as those for the complete measurement system.					
	The ranges shall suit the conditions of use.					
<b>15.1.2</b>	<b>Additional technical requirements for meters</b>					
15.1.2.1	Reliable connections between the flow sensor and the indicating device					
	Durable connections between the flow sensor and the indicating device					
15.1.2.2	Adjustment device provided permitting modification of the ratio between the indicated mass and the actual mass of gas passing through the meter	by a simple command				
15.1.2.2		in a discontinuous manner, whereby the consecutive values of the do ratio not differ by more than 0.001				
		Adjustment by means of a bypass of the meter is inhibited				
15.1.2.3	a)The meter is equipped with a correction device and b) only the corrected mass values are displayed during normal operation.					
	c) Correction device cannot be applied for creating an offset to zero or d) correcting for a theoretical pre-established value.					
	e) Correction device applies checking facilities					
<b>15.2</b>	<b>Additional technical requirements for external printers and memory devices</b>					
	(Space provided for) Permanent, non-transferable, and easily readable identification plate or label specifying:	a) manufacturer's trade mark/corporate name;				
		b) type designation / model number				
		c) type approval number				
		d) serial number				
		e) identification of the measuring instrument(s) of which the measurement results can be printed				
		f) details of the electrical power: (AC/DC voltage; frequency)				
		g) specific conditions for use (for instance specific ambient conditions);				
		identification of the software (see 6.11)				
17.2.7.7.	Is any flow disturbance expected critical for the measurement result? <input type="checkbox"/> Yes <input type="checkbox"/> No					

Clause	Description	Yes	No	Not applicable	Observer Name:
					Date(s):
					Specimen:
					Observations:

<b>E.23</b>	<b>Documentation for type evaluation</b>				
18.2.1					
a	description of its general principle of measurement;				
b	(mechanical) drawings and/or photographs;				
c	electric/electronic diagrams;				
d	lists of the essential sub-assemblies/modules, components with their essential characteristics;				
e	functional description of the various electronic devices;				
f	a flow diagram of the logic, showing the functions of the electronic devices;				
g	for measuring systems and meters fitted with correction devices: a description of how the correction parameters are determined;				
h	an assembly drawing with identification of different components;				
i	drawing(s) presenting the security sealing plan and the provisions and location for verification marks;				
j	drawing of regulatory markings;				
k	general information on the software required for the measuring instrument.				
l	test in- or outputs, their use, and their relationships to the parameters being measured;				
m	installation requirements;				
n	operating instructions that shall be provided to the user,				
o	the references of the approval certificates of the constituent elements;				
p	an overview of any purely digital elements that are considered to be replaceable (in accordance with 16.2.3.4);				
q	documents or other evidence that supports the assumption that the design and characteristics of the instrument comply with the requirements of this Recommendation.				

## F Performance tests

### F.1 Variable flowrate

<b>R 139-2</b> 17.2.7.1 [unit] <input type="checkbox"/> [g]; <input type="checkbox"/> [kg]; <input type="checkbox"/> [t]	Test conditions				Observer Name:		
	Test fluid (gas, air, water, ..)						
			Start	Stop	Date(s):		
	Time:				Specimen:		
	Environmental temperature		°C	°C	Q <sub>min</sub> [unit/min]		
	Fluid temperature		°C	°C	Q <sub>max</sub> [unit/min]		
<b>Test 0</b>	<b>Fill (t)</b>	<b>I</b>			Repeatability		
	<b>Phase (p)</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>3</b>
Initial pressure	receiver						
	low bank P <sub>stl</sub>						
Quantity [unit]	reference						
	indicated						
Error [unit]							
relative error [%] (E <sub>1,p</sub> )	phase1 (E <sub>11</sub> )						
	phase2 (E <sub>12</sub> )						
	phase3 (E <sub>13</sub> )						
MPE [%]		For meter < 1 For system < 1.5					
(E <sub>1,p</sub> )	Pass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
	Fail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
<b>Test 0</b>	<b>Fill</b>	<b>II</b>					
Initial pressure	Receiver						
	mid. bank P <sub>stm</sub>						
Quantity [unit]	Reference						
	Indicated						
Error [unit]							
relative error [%] (E <sub>2,p</sub> )	phase1 (E <sub>21</sub> )						
	phase2 (E <sub>22</sub> )						
	phase3 (E <sub>23</sub> )						
MPE [%]		For meter < 1 For system < 1.5					
(E <sub>2,p</sub> )	Pass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
	Fail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
<b>Test 0</b>	<b>Fill</b>	<b>III</b>					
Initial pressure	Receiver						
	high bank P <sub>st</sub>						
Quantity [unit]	Reference						
	Indicated						
Error [unit]							
relative error [%] (E <sub>3,p</sub> )	phase1 (E <sub>31</sub> )						
	phase2 (E <sub>32</sub> )						
	phase3 (E <sub>33</sub> )						
MPE [%]		For meter < 1 For system < 1.5					
(E <sub>3,p</sub> )	pass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
	fail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Repeatability [%]							
Repeatability	MPE [%]				For meter < 0.6 For system < 1		
	pass				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	fail				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Notes:**

Reference = Indicated quantity value on reference weighing instrument at end of the filling phase –  
Indicated quantity value on reference weighing instrument at start of the filling phase

Indicated = Indicated quantity value on EUT at end of the filling phase – Indicated quantity value on  
EUT at start of the filling phase.

**Sequence of the test**

Considering test numbering [x,t,p] where x = Test # , and t= testcycle #, p = phase # the test sequence  
is [0,1,1]; [0,1,2]; [0,1,3]; [0,2,1]; [0,2,2]; [0,2,3]; [0,3,1]; [0,3,2]; [0,3,3];

**Observations**

Result		Pass	<input type="checkbox"/>	Fail	<input type="checkbox"/>
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**F.2 Tests with sequential control (involving 3 banks)**

<b>R 139-2</b> 17.2.7.2 [unit] <input type="checkbox"/> [g]; <input type="checkbox"/> [kg]; <input type="checkbox"/> [t]	Test conditions				Observer Name:
	Test fluid (gas, air, water, ..)				
		Start	Stop	Date(s):	
	Time:				Specimen:
	Environmental temperature		°C	°C	$Q_{\min}$ [unit/min]
	Fluid temperature		°C	°C	$Q_{\max}$ [unit/min]
<b>Test 1</b>	<b>Fill</b>	<b>1</b>	<b>2</b>	<b>3</b>	Nominal pressure value
Initial pressure in kPa	Receiver				0
	low bank $P_l$				$P_{st}$
	mid. bank $P_m$				$P_{st}$
	high bank $P_{sth}$				$P_{st}$
Timing	start / stop	/	/	/	
	time period	s	s	s	Minimum quantity to be totalized:
Average flow rate [unit]/min					
Quantity [unit]	Reference				(2 * MMQ [unit])
	Indicated				
Error [unit]					Repeatability
relative error [%]					
MPE [%]		For meter < 1; For system < 1.5			Meter < 0.6; System < 1
	Pass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Fail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Test 2</b>	<b>Fill</b>	<b>1</b>	<b>2</b>	<b>3</b>	Nominal pressure value
Initial pressure	Receiver				$0.5 P_v$
	low bank $P_{stl}$				$0.75 P_v$
	mid. bank $P_{stm}$				$P_v$
	high bank $P_{sth}$				$P_{st}$
Timing	start / stop	/	/	/	
	time period	s	s	s	Minimum quantity to be totalized
Average flow rate [unit]/min					
Quantity [unit]	Reference				(2 * MMQ [unit])
	Indicated				
Error [unit]					Repeatability
relative error [%]					
MPE [%]		For meter < 1; For system < 1.5			Meter < 0.6; System < 1
	Pass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Fail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Test 3</b>	<b>Fill</b>	<b>1</b>	<b>2</b>	<b>3</b>	Nominal pressure value
Initial pressure	Receiver				$0.75 P_v$
	low bank $P_{stl}$				$0.75 P_v$
	mid. bank $P_{stm}$				$P_v$
	high bank $P_{sth}$				$P_{st}$
Timing	start / stop	/	/	/	
	time period	s	s	s	Minimum quantity to be totalized
Average flow rate [unit]/min					
Quantity [unit]	Reference				(1 * MMQ [unit])
	Indicated				
Error [unit]					Repeatability
relative error [%]					
MPE [%]		For meter < 1; For system < 1.5			Meter < 0.6; System < 1
	Pass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Fail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



**F.3 Tests without sequential control (involving only one bank)**

<b>R 139-2</b> 17.2.7.3 [unit] <input type="checkbox"/> [g]; <input type="checkbox"/> [kg]; <input type="checkbox"/> [t]	Test conditions				Observer Name:
	Test fluid (gas, air, water, ..)				
	Pressure in kPa units		Start	Stop	
	Date(s):				
	Time:				Specimen:
	Environmental temperature		°C	°C	$Q_{\min}$ [unit/min]
	Fluid temperature		°C	°C	$Q_{\max}$ [unit/min]
<b>Test 4</b>	<b>Fill</b>	<b>1</b>	<b>2</b>	<b>3</b>	Nominal pressure value
Initial pressure	Receiver				0
	high bank				$P_{st}$
Timing	start / stop	/	/	/	
	time period	s	s	s	Minimum quantity to be totalized:
Average flow rate [unit]/min					
Quantity [unit]	Reference				(2 * MMQ [unit])
	Indicated				
Error [unit]					Repeatability
relative error [%]					
MPE [%]		For meter < 1; For system < 1.5			Meter < 0.6; System < 1
	Pass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Fail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Test 5</b>	<b>Fill</b>	<b>1</b>	<b>2</b>	<b>3</b>	Nominal pressure value
Initial pressure	Receiver				0.5 $P_v$
	high bank				$P_{st}$
Timing	start / stop	/	/	/	
	time period	s	s	s	Minimum quantity to be totalized
Average flow rate [unit]/min					
Quantity [unit]	Reference				(2 * MMQ [unit])
	Indicated				
Error [unit]					Repeatability
relative error [%]					
MPE [%]		For meter < 1; For system < 1.5			Meter < 0.6; System < 1
	Pass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Fail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Test 6</b>	<b>Fill</b>	<b>1</b>	<b>2</b>	<b>3</b>	Nominal pressure value
Initial pressure	Receiver				0.75 $P_v$
	high bank				$P_{st}$
Timing	start / stop	/	/	/	
	time period	s	s	s	Minimum quantity to be totalized
Average flow rate [unit]/min					
Quantity [unit]	Reference				N.A.
	Indicated				
Error [unit]					Repeatability
relative error [%]					
MPE [%]		For meter < 1; For system < 1.5			Meter < 0.6; System < 1
	Pass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Fail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Observations					
Result				Pass	<input type="checkbox"/>
				Fail	<input type="checkbox"/>

<b>R 139-2</b> 17.2.7.3 [unit] <input type="checkbox"/> [g]; <input type="checkbox"/> [kg]; <input type="checkbox"/> [t]	Test conditions			Observer Name:	
	Test fluid (gas, air, water, ..)				
	Pressure in kPa units		Start	Stop	
	Date(s):				
	Time:				Specimen:
	Environmental temperature		°C	°C	$Q_{\min}$ [unit/min]
	Fluid temperature		°C	°C	$Q_{\max}$ [unit/min]
<b>Test 7</b>	<b>Fill</b>	<b>1</b>	<b>2</b>	Nominal pressure value	
Initial pressure	Receiver			0.75 $P_v$	
	high bank			$P_{st}$	
Timing	start / stop	/	/		
	time period	s	s	Minimum quantity to be totalized	
Average flow rate [unit]/min					
Quantity [unit]	Reference			(1 * MMQ [unit])	
	Indicated				
Error [unit]				Repeatability	
relative error [%]					
MPE [%]		For meter < 1; For system < 1.5		Meter < 0.6; System < 1	
	Pass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Fail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Observations					
Result			Pass	<input type="checkbox"/>	Fail
				<input type="checkbox"/>	

**F.4. Durability test**

<b>R 139-2</b> 17.2.7.5 <b>[unit]</b> <input type="checkbox"/> [g]; <input type="checkbox"/> [kg]; <input type="checkbox"/> [t]	Test conditions				Observer Name:	
	Test fluid (gas, air, water, ..)					
			Start	Stop		
	Date(s):					
	Time:				Specimen:	
	Environmental temperature		°C	°C	$Q_{min}$	[unit/min]
	Fluid temperature		°C	°C	$Q_{max}$	[unit/min]
<b>Test #</b> <input type="checkbox"/> 1 / <input type="checkbox"/> 4	<b>Fill</b>	<b>1</b>	<b>2</b>	<b>3</b>	Nominal pressure value	
Initial pressure in kPa	receiver				0	
	low bank $P_l$				<input type="checkbox"/> $P_{st}$ / <input type="checkbox"/> Not applicable	
	mid. bank $P_m$				<input type="checkbox"/> $P_{st}$ / <input type="checkbox"/> Not applicable	
	high bank $P_h$				$P_{st}$	
Timing	start / stop	/	/	/		
	time period	s	s	s	Minimum quantity to be totalized:	
Average flow rate [unit]/min						
Quantity [unit]	reference					
	indicated				(2 * MMQ [unit])	
Error [unit]						
initial intrinsic error (% $E_{ii}$ )						
repeatability (%rep.)		==>				
% $E_{ii}$ average		==>				
MPE		% $E_{ii} < 1$			%rep. < 0.6	
	Pass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Fail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Date(s):		Start	Stop	Observer:	
	Time:					
	Environmental temperature		°C	°C		
	Fluid temperature		°C	°C		
Initial pressure in kPa	receiver					
	low bank $P_l$					
	mid. bank $P_m$					
	high bank $P_h$					
Timing	start / stop	/	/	/		
	time period	s	s	s		
Average flow rate [unit]/min						
Quantity [unit]	reference					
	indicated					
Error [unit]						
intrinsic error (% $E_i$ )						
repeatability (%rep.)		==>				
% $E_i$ average		==>				
% $E_{ii}$ average - % $E_i$ average		==>				
MPE		% $E_i < 1$			%rep. < 0.6	
	Pass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Fail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Observations						
Result				Pass	<input type="checkbox"/>	Fail
					<input type="checkbox"/>	

**F.5 Gas influence factors**

<b>R 139-2</b> 17.2.7.6 <b>[unit]</b> <input type="checkbox"/> [g]; <input type="checkbox"/> [kg]; <input type="checkbox"/> [t]	Test conditions				Observer Name:	
	Test fluid (gas, air, water, ..)					
		Min	Max	Date(s):		
	Fluid density specified					
	Fluid temperature specified		°C	°C	Specimen:	
	Environmental temperature		Start	Stop	Q <sub>min</sub> [unit/min]	
	Time:					
	Environmental temperature		°C	°C	Q <sub>max</sub> [unit/min]	
	Fluid density		±			
Fluid temperature		°C ± °C				
<b>Test #</b> <input type="checkbox"/> 1 / <input type="checkbox"/> 4	Fill	1	2	3	Nominal pressure value	
Initial pressure in kPa	receiver				0	
	low bank P <sub>l</sub>				<input type="checkbox"/> P <sub>st</sub> / <input type="checkbox"/> Not applicable	
	mid. bank P <sub>m</sub>				<input type="checkbox"/> P <sub>st</sub> / <input type="checkbox"/> Not applicable	
	high bank P <sub>h</sub>				P <sub>st</sub>	
Timing	start / stop	/	/	/		
	time period	s	s	s	Minimum quantity to be totalized:	
Average flow rate [unit]/min						
Quantity [unit]	reference					
	indicated				(2 * MMQ [unit])	
Error [unit]						
initial intrinsic error (%E <sub>ii</sub> )						
repeatability (%rep.)		==>				
%E <sub>ii</sub> average		==>				
MPE		%E <sub>ii</sub> < 1			%rep.< 0.6	
	Pass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Fail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Initial pressure in kPa	receiver					
	low bank P <sub>l</sub>					
	mid. bank P <sub>m</sub>					
	high bank P <sub>h</sub>					
Timing	start / stop	/	/	/		
	time period	s	s	s		
Average flow rate [unit]/min						
Quantity [unit]	reference					
	indicated					
Error [unit]						
intrinsic error (%E <sub>i</sub> )						
repeatability (%rep.)		==>				
%E <sub>i</sub> average		==>				
%E <sub>ii</sub> average - %E <sub>i</sub> average		==>				
MPE		%E <sub>i</sub> < 1			%rep.< 0.6	
	Pass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Fail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Observations						
Result		Pass	<input type="checkbox"/>	Fail	<input type="checkbox"/>	

**F.6 Zero stability test (if applicable)**

<b>R 139-2</b> 17.2.7.7a <b>[unit]</b> <input type="checkbox"/> [g]; <input type="checkbox"/> [kg]; <input type="checkbox"/> [t]	Test conditions				Observer Name:		
	Date:		Start	Stop	Specimen:		
	Time:						
	Environmental temperature		°C	°C	$Q_{\min}$	[unit/min]	
					$Q_{\max}$	[unit/min]	
	Measurements	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
	<b>Flowrate Q &lt;</b>						
Temperature	start [°C]						
	stop [°C]						
Relative humidity [%]							
Time	start						
	stop						
Quantity [unit]	reference						
	indicated						
2 <sup>nd</sup> indication (if applicable)							
3 <sup>rd</sup> indication (if applicable)							
Error [unit]							
relative error [%] $E_{ii}$							
MPE [%]		For meter < 1 For system < 1.5					
	Pass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Fail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Observations							
Result				Pass	<input type="checkbox"/>	Fail	<input type="checkbox"/>

**F.7 Flow disturbances (if applicable)**

<b>R 139-2</b> 17.2.7.7b [unit] <input type="checkbox"/> [g]; <input type="checkbox"/> [kg]; <input type="checkbox"/> [t]	Test conditions				Observer Name:		
	Using actual test fluid				Type of fluid:		
	Date:		Start	Stop			
	Time:				Specimen :		
	Environmental temperature		°C	°C	Q <sub>min</sub> [unit/min]		
	Fluid temperature		°C	°C	Q <sub>max</sub> [unit/min]		
Measurements	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	
Flowrate Q							
Type of disturbance							
Temperature	start [°C]						
	stop [°C]						
Relative Hum. [%]							
Initial pressure							
Time	start						
	stop						
Quantity [unit]	reference						
	indicated						
2 <sup>nd</sup> indication (if applicable)							
3 <sup>rd</sup> indication (if applicable)							
Error [unit]							
relative error [%] E <sub>ij</sub>							
MPE [%]		For system < 1.5					
functional performance							
	Pass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Fail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Observations							
Result				Pass	<input type="checkbox"/>	Fail	<input type="checkbox"/>

**F 7.1 Preset function (if applicable)**

<b>R 139-2</b> 18.5.3 [unit] <input type="checkbox"/> [g]; <input type="checkbox"/> [kg]; <input type="checkbox"/> [t]	Test conditions				Observer Name:		
	Flow	<input type="checkbox"/>	Using actual test fluid				
			Type of fluid:				
		<input type="checkbox"/>	Simulating flow				
			using:				
	Date:		Start	Stop	$E_{\min}$ = [unit]		
	Time:				Specimen :		
	Environmental temperature		°C	°C	$Q_{\min}$ [unit/min]		
Fluid temperature		°C	°C	$Q_{\max}$ [unit/min]			
Measurements		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
Flowrate Q							
Type of disturbance							
Temperature	start [°C]						
	stop [°C]						
Relative Hum. [%]							
Initial pressure							
Time	start						
	stop						
Quantity [unit]	preset						
	indicated						
2 <sup>nd</sup> indication (if applicable)							
3 <sup>rd</sup> indication (if applicable)							
Error [unit]							
$E_{\min}$ [unit]							
Error $\leq E_{\min}$	Pass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Error $> E_{\min}$	Fail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Observations							
Result				Pass	<input type="checkbox"/>	Fail	<input type="checkbox"/>

**F.8 Initial test**

<b>R 139-2</b> 18.7 [unit] <input type="checkbox"/> [g]; <input type="checkbox"/> [kg]; <input type="checkbox"/> [t]	Test conditions				Observer Name:		
	Flow	<input type="checkbox"/>	Using actual test fluid				
			Type of fluid:				
		<input type="checkbox"/>	Simulating flow using:				
	Date:		Start	Stop			
	Time:				Specimen :		
	Environmental temperature		°C	°C	Q <sub>min</sub> [unit/min]		
	Fluid temperature		°C	°C	Q <sub>max</sub> [unit/min]		
	Measurements	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
	<b>Flowrate Q</b>						
Temperature	start [°C]						
	stop [°C]						
Relative Hum. [%]							
Initial pressure							
Time	start						
	stop						
Quantity [unit]	reference						
	indicated						
2 <sup>nd</sup> indication (if applicable)							
3 <sup>rd</sup> indication (if applicable)							
Error [unit]							
relative error [%] E <sub>ii</sub>							
MPE [%]		For meter < 1 For system < 1.5					
functional performance							
Pass		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fail		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Observations							
Result					Pass	<input type="checkbox"/>	Fail <input type="checkbox"/>



**F.8.1 Static temperature tests****Reference temperature**

<b>R 139-2</b> 18.8.2 [unit] <input type="checkbox"/> [g]; <input type="checkbox"/> [kg]; <input type="checkbox"/> [t]	Test conditions					Observer Name:	
	Flow	<input type="checkbox"/>	Using actual test fluid				
			Type of fluid:				
	Flow	<input type="checkbox"/>	Simulating flow				
			using:				
	Date:		Start	Stop			
	Time:				Specimen:		
	Environmental temperature		°C	°C	$Q_{\min}$	[unit/min]	
Fluid temperature		°C	°C	$Q_{\max}$	[unit/min]		
Nom. 20 °C	Flowrate code	1	2	3	4	5	6
= Reference:	Flowrate Q =						
Environment temperature	start [°C]						
	stop [°C]						
Relative Hum. [%]							
Initial pressure							
Time	start						
	stop						
Quantity [unit]	reference						
	indicated						
2 <sup>nd</sup> indication (if applicable)							
3 <sup>rd</sup> indication (if applicable)							
Error [unit]							
relative error [%] $E_{ii}$							
MPE [%]		For meter < 1 For system < 1.5					
Functional performance							
	Pass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Fail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
$T_{ah} =$ High limit		1	2	3	4	5	6
	Flowrate Q						
Environment temperature	start [°C]						
	stop [°C]						
Relative Hum. [%]							
Initial pressure							
Time	start						
	stop						
Quantity [unit]	reference						
	indicated						
2 <sup>nd</sup> indication (if applicable)							
3 <sup>rd</sup> indication (if applicable)							
Error [unit]							
relative error [%] $E_{ii}$							
MPE [%]		For meter < 1 For system < 1.5					
Functional performance							
	Pass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Fail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Observations							
Result					Pass	<input type="checkbox"/>	Fail
						<input type="checkbox"/>	

**Static temperature (continued)**

<b>R 139-2</b> 18.8.2 [unit] <input type="checkbox"/> [g]; <input type="checkbox"/> [kg]; <input type="checkbox"/> [t]	Test conditions					Observer Name:	
	Flow	<input type="checkbox"/>	Using actual test fluid				
			Type of fluid:				
		<input type="checkbox"/>	Simulating flow				
			using:				
	Date:		Start	Stop			
	Time:				Specimen : :		
	Environmental temperature		°C	°C	$Q_{\min}$	[unit/min]	
Fluid temperature		°C	°C	$Q_{\max}$	[unit/min]		
$T_{al} =$ = Low limit		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
	<b>Flowrate Q</b>						
Environment temperature	start [°C]						
	stop [°C]						
Relative humidity [%]							
Initial pressure							
Time	start						
	stop						
Quantity [unit]	reference						
	indicated						
2 <sup>nd</sup> indication (if applicable)							
3 <sup>rd</sup> indication (if applicable)							
Error [unit]							
relative error [%] $E_{ii}$							
MPE [%]		For meter < 1 For system < 1.5					
functional performance							
	Pass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Fail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nom. 20 °C = Reference:	Flowrate code	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
	<b>Flowrate Q =</b>						
Environment temperature	start [°C]						
	stop [°C]						
Relative Hum. [%]							
Initial pressure							
Time	start						
	stop						
Quantity [unit]	reference						
	indicated						
2 <sup>nd</sup> indication (if applicable)							
3 <sup>rd</sup> indication (if applicable)							
Error [unit]							
relative error [%] $E_{ii}$							
MPE [%]		For meter < 1 For system < 1.5					
functional performance							
	Pass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Fail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Observations							
Result		Pass	<input type="checkbox"/>	Fail	<input type="checkbox"/>		

**F.9 Vibration (random)**

<b>R 139-2</b> 18.8.3 [unit] <input type="checkbox"/> [g]; <input type="checkbox"/> [kg]; <input type="checkbox"/> [t]	Test conditions					Observer Name:			
	Flow	<input type="checkbox"/>	Using actual test fluid						
			Type of fluid:						
		<input type="checkbox"/>	Simulating flow						
			Date:		Start	Stop			
			Time:				Specimen:		
			Environmental temperature		°C	°C	Q <sub>min</sub> [unit/min]		
			Fluid temperature		°C	°C	Q <sub>max</sub> [unit/min]		
			Relative humidity		%	%			
Vector		<b>Before test</b>	<b>During test</b>	<b>After test</b>	<b>During test</b>	<b>After test</b>	<b>During test</b>	<b>After test</b>	
<b>X-axis</b>	Flowrate		<b>0</b>			<b>0</b>		<b>0</b>	
Time	start								
	stop								
Quantity [unit]	reference								
	indicated								
Error [unit]									
relative error [%] E <sub>ii</sub>			E <sub>i</sub>		E <sub>i</sub>		E <sub>i</sub>		
MPE [%]		For meter < 1 For system < 1.5							
functional performance									
	Pass	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
	Fail	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
<b>Y-axis</b>	Flowrate		<b>0</b>			<b>0</b>		<b>0</b>	
Time	start								
	stop								
Quantity [unit]	reference								
	indicated								
Error [unit]									
relative error [%] E <sub>ii</sub>			E <sub>i</sub>		E <sub>i</sub>		E <sub>i</sub>		
MPE [%]		For meter < 1 For system < 1.5							
functional performance									
	Pass	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
	Fail	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
<b>Z-axis</b>	Flowrate		<b>0</b>			<b>0</b>		<b>0</b>	
Time	start								
	stop								
Quantity [unit]	reference								
	indicated								
Error [unit]									
relative error [%] E <sub>ii</sub>			E <sub>i</sub>		E <sub>i</sub>		E <sub>i</sub>		
MPE [%]		For meter < 1 For system < 1.5							
functional performance									
	Pass	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
	Fail	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
Observations									
Result				Pass	<input type="checkbox"/>	Fail	<input type="checkbox"/>		

**F.10 AC / DC Mains voltage variations**

<b>R 139-2</b> 18.8.4 [unit] <input type="checkbox"/> [g]; <input type="checkbox"/> [kg]; <input type="checkbox"/> [t]	Test conditions				Observer Name:		
	Flow	<input type="checkbox"/>	Using actual test fluid				
			Type of fluid:				
		<input type="checkbox"/>	Simulating flow using:				
	Date:		Start	Stop			
	Time:				Specimen :		
	Environmental temperature		°C	°C	Q <sub>min</sub> [unit/min]		
	Fluid temperature		°C	°C	Q <sub>max</sub> [unit/min]		
	Relative humidity		%	%			
Reference:	Voltage	Nominal	High	Nominal	Low	Nominal	
	Flowrate Q =						
Time	start						
	stop						
Quantity [unit]	reference						
	indicated						
Error [unit]							
relative error [%]							
MPE [%]		For meter < 1 For system < 1.5					
functional performance							
	Pass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Fail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Observations							
Result				Pass	<input type="checkbox"/>	Fail	<input type="checkbox"/>

**F.11 Low voltage of internal battery**

<b>R 139-2</b> 18.8.5 [unit] <input type="checkbox"/> [g]; <input type="checkbox"/> [kg]; <input type="checkbox"/> [t]	Test conditions				Observer Name:		
	Flow	<input type="checkbox"/>	Using actual test fluid				
			Type of fluid:		Nominal battery voltage:		
	Flow	<input type="checkbox"/>	Simulating flow				
			using:				
	Date:		Start	Stop			
	Time:				Specimen :		
	Environmental temperature		°C	°C	$Q_{\min}$	[unit/min]	
Fluid temperature		°C	°C	$Q_{\max}$	[unit/min]		
Relative humidity		%	%				
Reference:	Voltage	Nominal	$U_{\text{bmin}}$	$0.9U_{\text{bmin}}$	Nominal	$U_{\text{bmin}}$	$0.9U_{\text{bmin}}$
	<b>Flowrate Q =</b>						
Time	start						
	stop						
Quantity [unit]	reference						
	indicated						
Error [unit]							
relative error [%]							
MPE [%]		For meter < 1 For system < 1.5					
functional performance							
	Pass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Fail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Observations							
Result					Pass	<input type="checkbox"/>	Fail <input type="checkbox"/>

**F.12 Damp heat, cyclic (condensing)**

<b>R 139-2</b> 18.9.4.1 [unit] <input type="checkbox"/> [g]; <input type="checkbox"/> [kg]; <input type="checkbox"/> [t]	Test conditions			Observer Name:	
	Flow	<input type="checkbox"/>	Using actual test fluid	Reference 25 °C	
		<input type="checkbox"/>	Type of fluid:	$T_{ah} =$ °C	
			Simulating flow	$T_{al} =$ °C	
			using:		
			Start	Stop	Specimen:
	Date:				$Q_{min}$ [unit/min]
Time:				$Q_{max}$ [unit/min]	
<b>First cycle</b>	Cycle phase	<b>initial</b>	<b>rise to <math>T_{ah}</math></b>	<b>stabilize</b>	
	<b>Flowrate <math>Q =</math></b>				
Test temperature	start [°C]				
	stop [°C]				
Relative humidity	start [%]				
	stop [%]				
Fluid temperature	start [°C]				
	stop [°C]				
Time	Start	h	$t_b =$ h	h	
	Stop ( $t_s$ )	h = $t_b$	h	h	
	Required: $t_s =$		$t_b + 3$ h	$t_b + 12$ h	
Quantity [unit]	reference				
	indicated				
2 <sup>nd</sup> indication (if applicable)					
3 <sup>rd</sup> indication (if applicable)					
Error [unit]					
relative error [%] $E_{ii}$					
MPE [%]		For meter < 1 For system < 1.5			
	Pass	<input type="checkbox"/>			
	Fail	<input type="checkbox"/>			
	Cycle phase	<b>Lowering to <math>T_{al}</math></b>	<b>stabilize</b>	<b>after</b>	
	<b>Flowrate <math>Q =</math></b>				
Test temperature	start [°C]				
	stop [°C]				
Relative humidity	start [%]				
	stop [%]				
Fluid temperature	start [°C]				
	stop [°C]				
Time	Start	h	h	h	
	Stop ( $t_s$ )	h	h	h	
	Required: $t_s =$	$t_b + (15 \div 18)$ h	$t_b + 24$ h		
Quantity [unit]	reference				
	indicated				
2 <sup>nd</sup> indication (if applicable)					
3 <sup>rd</sup> indication (if applicable)					
Error [unit]					
relative error [%] $E_{ii}$					
MPE [%]		For meter < 1 For system < 1.5			
Acts on fault	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>	
Observations					
Result		Pass	<input type="checkbox"/>	Fail	<input type="checkbox"/>
<b>R 139-2</b>	Test conditions			Observer Name:	

18.9.4.1 [unit] <input type="checkbox"/> [g]; <input type="checkbox"/> [kg]; <input type="checkbox"/> [t]	Flow	<input type="checkbox"/>	Using actual test fluid		
			Type of fluid:	Reference 25 °C	
		<input type="checkbox"/>	Simulating flow		$T_{ah} =$ °C
			using:		$T_{al} =$ °C
			Start	Stop	Specimen:
	Date:			$Q_{min}$	[unit/min]
	Time:			$Q_{max}$	[unit/min]
Second cycle	Cycle phase	initial	rise to $T_{ah}$	stabilize	
	Flowrate $Q =$				
Test temperature	start [°C]				
	stop [°C]				
Relative humidity	start [%]				
	stop [%]				
Fluid temperature	start [°C]				
	stop [°C]				
Time	Start	h	$t_b =$ h	h	
	Stop ( $t_s$ )	h = $t_b$	h	h	
	Required: $t_s =$		$t_b + 3$ h	$t_b + 12$ h	
Quantity [unit]	reference				
	indicated				
2 <sup>nd</sup> indication (if applicable)					
3 <sup>rd</sup> indication (if applicable)					
Error [unit]					
relative error [%] $E_{ii}$					
MPE [%]		For meter < 1 For system < 1.5			
	Pass	<input type="checkbox"/>			
	Fail	<input type="checkbox"/>			
	Cycle phase	Lowering to $T_{al}$	stabilize	after	
	Flowrate $Q =$				
Test temperature	start [°C]				
	stop [°C]				
Relative humidity	start [%]				
	stop [%]				
Fluid temperature	start [°C]				
	stop [°C]				
Time	Start	h	h	h	
	Stop ( $t_s$ )	h	h	h	
	Required: $t_s =$	$t_b + (15 \div 18)$ h	$t_b + 24$ h		
Quantity [unit]	reference				
	indicated				
2 <sup>nd</sup> indication (if applicable)					
3 <sup>rd</sup> indication (if applicable)					
Error [unit]					
relative error [%] $E_{ii}$					
MPE [%]		For meter < 1 For system < 1.5			
Acts on fault	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>	
Observations					
Result		Pass	<input type="checkbox"/>	Fail	<input type="checkbox"/>

**F.13 RF immunity**

R 139-2 18.9.4.2	Test conditions RF field exposure		Observer Name:
	Flow	<input type="checkbox"/>	Using actual test fluid

[unit] <input type="checkbox"/> [g]; <input type="checkbox"/> [kg]; <input type="checkbox"/> [t]		Type of fluid:			$f_l =$ MHz	
	<input type="checkbox"/>	Simulating flow			$f_h =$ MHz	
		using:			Fieldstrength V/m	
				Dwell time s		
	Date:		Start	Stop	Specimen:	
	Time:				$Q_{min}$ [unit/min]	
	Environmental temperature		°C	°C	$Q_{max}$ [unit/min]	
	Fluid temperature		°C	°C		
Relative humidity		%	%			
Frequency cycle	Cycle phase	Initial		During exposure		After
	Flowrate $Q =$					
Time	Start					
	Stop					
Quantity [unit]	reference					
	indicated					
2 <sup>nd</sup> indication (if applicable)						
3 <sup>rd</sup> indication (if applicable)						
Error [unit]						
relative error [%] $E_{ij}$						
MPE [%]			For meter < 1 For system < 1.5			
	Pass	<input type="checkbox"/>				<input type="checkbox"/>
	Fail	<input type="checkbox"/>				<input type="checkbox"/>
<b>Observed faults during exposure</b>						
Frequency		Fault/Deviation		Significant		Acts on fault
MHz				Yes	No	Yes No
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
Observations						
Result				Pass	<input type="checkbox"/>	Fail <input type="checkbox"/>



<b>R 139-2</b> 18.9.4.2 <b>[unit]</b> <input type="checkbox"/> [g]; <input type="checkbox"/> [kg]; <input type="checkbox"/> [t]	Test conditions RF current injection				Observer Name:	
	Flow	<input type="checkbox"/>	Using actual test fluid		f <sub>i</sub> = MHz	
			Type of fluid:		f <sub>h</sub> = MHz	
		<input type="checkbox"/>	Simulating flow		RF voltage Ve.m.f.	
	using:		Dwell time s			
	Cable exposed				Specimen:	
	Date:		Start	Stop	Q <sub>min</sub> [unit/min]	
	Time:				Q <sub>max</sub> [unit/min]	
	Environmental temperature		°C	°C		
	Fluid temperature		°C	°C		
	Relative humidity		%	%		
Frequency cycle	Cycle phase	Initial	During exposure		After	
	Flowrate Q =					
Time	Start					
	Stop					
Quantity [unit]	reference					
	indicated					
2 <sup>nd</sup> indication (if applicable)						
3 <sup>rd</sup> indication (if applicable)						
Error [unit]						
relative error [%] E <sub>ii</sub>						
MPE [%]		For meter < 1 For system < 1.5				
	Pass	<input type="checkbox"/>			<input type="checkbox"/>	
	Fail	<input type="checkbox"/>			<input type="checkbox"/>	
Observed faults during exposure						
Frequency		Fault/Deviation	Significant		Acts on fault	
MHz			Yes	No	Yes	No
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Observations						
Result			Pass	<input type="checkbox"/>	Fail	<input type="checkbox"/>

**F.14 Electrostatic discharges**

<b>R 139-2</b> 18.9.4.3 [unit] <input type="checkbox"/> [g]; <input type="checkbox"/> [kg]; <input type="checkbox"/> [t]	Test conditions						Observer Name:	
	Flow	<input type="checkbox"/>	Using actual test fluid					
		<input type="checkbox"/>	Type of fluid:				contact 6 kV	
		<input type="checkbox"/>	Simulating flow				air 8 kV	
			using:				RF voltage Ve.m.f.	
							discharges	
	Date:		Start	Stop		Specimen:		
	Time:					Q <sub>min</sub> [unit/min]		
	Environmental temperature		°C	°C		Q <sub>max</sub> [unit/min]		
	Fluid temperature		°C	°C				
	Relative humidity		%	%				
	Cycle phase	Initial		During exposure		After		
	Flowrate Q =							
Time	Start							
	Stop							
Quantity [unit]	reference							
	indicated							
2 <sup>nd</sup> indication (if applicable)								
3 <sup>rd</sup> indication (if applicable)								
Error [unit]								
relative error [%] E <sub>ii</sub>								
MPE [%]		For meter < 1 For system < 1.5						
	Pass	<input type="checkbox"/>				<input type="checkbox"/>		
	Fail	<input type="checkbox"/>				<input type="checkbox"/>		
<b>Observed faults during exposure</b>								
Exposed surface	Discharge type			Fault/ Deviation	Significant		Acts on fault	
	Air	Contact	Level		Yes	No	Yes	No
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Observations								
Result					Pass	<input type="checkbox"/>	Fail	<input type="checkbox"/>

**F.15 Surges**

<b>R 139-2</b> 18.9.4.4 [unit] <input type="checkbox"/> [g]; <input type="checkbox"/> [kg]; <input type="checkbox"/> [t]	Test conditions surges on mains power lines				Observer Name:		
	Flow	<input type="checkbox"/>	Using actual test fluid				
			Type of fluid:		Line to line 1 kV		
	Flow	<input type="checkbox"/>	Simulating flow		Line to earth 2 kV		
			using:				
	Date:		Start	Stop	Specimen:		
	Time:				Q <sub>min</sub> [unit/min]		
	Environmental temperature		°C	°C	Q <sub>max</sub> [unit/min]		
	Fluid temperature		°C	°C			
	Relative humidity		%	%			
	Cycle phase	Initial	During exposure	After			
	Flowrate Q =						
Time	Start						
	Stop						
Quantity [unit]	reference						
	indicated						
2 <sup>nd</sup> indication (if applicable)							
3 <sup>rd</sup> indication (if applicable)							
Error [unit]							
relative error [%] E <sub>ii</sub>							
MPE [%]		For meter < 1 For system < 1.5					
	Pass	<input type="checkbox"/>		<input type="checkbox"/>			
	Fail	<input type="checkbox"/>		<input type="checkbox"/>			
<b>Observed faults after exposure</b>							
Phase angle		Fault/Deviation		Significant		Acts on fault	
0°	90°	180°	270°	Yes	No	Yes	No
Line to line							
3x↑■				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3x↑■			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		3x↑■		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			3x↑■	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3x↓■				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3x↓■			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		3x↓■		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			3x↓■	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Line to earth							
3x↑■				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3x↑■			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		3x↑■		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			3x↑■	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3x↓■				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3x↓■			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		3x↓■		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			3x↓■	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Observations							
Result				Pass	<input type="checkbox"/>	Fail	<input type="checkbox"/>

<b>R 139-2</b> 18.9.4.4 [unit] <input type="checkbox"/> [g]; <input type="checkbox"/> [kg]; <input type="checkbox"/> [t]	Test conditions Surges on signal, data and control lines					Observer Name:			
	Flow	<input type="checkbox"/>	Using actual test fluid						
			Type of fluid:			Line to line 1 kV			
		<input type="checkbox"/>	Simulating flow using:			Line to earth 2 kV			
	Cable:					<input type="checkbox"/> Balanced line			
	Date:			Start	Stop	<input type="checkbox"/> Unbalanced line			
	Time:								
	Environmental temperature			°C	°C	Specimen:			
	Fluid temperature			°C	°C	Q <sub>min</sub> [unit/min]			
	Relative humidity			%	%	Q <sub>max</sub> [unit/min]			
Cycle phase		Initial		During exposure		After			
Flowrate Q =									
Time	Start								
	Stop								
Quantity [unit]	reference								
	indicated								
2 <sup>nd</sup> indication (if applicable)									
3 <sup>rd</sup> indication (if applicable)									
Error [unit]									
relative error [%] E <sub>ii</sub>									
MPE [%]		For meter < 1 For system < 1.5							
Pass		<input type="checkbox"/>				<input type="checkbox"/>			
Fail		<input type="checkbox"/>				<input type="checkbox"/>			
<b>Observed faults after exposure</b>									
Phase angle				Fault/Deviation		Significant		Acts on fault	
0°	90°	180°	270°			Yes	No	Yes	No
Line to line (N/A for balanced)									
3x↑■						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3x↑■					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		3x↑■				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			3x↑■			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3x↓■						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3x↓■					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		3x↓■				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			3x↓■			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Line to earth									
3x↑■						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3x↑■					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		3x↑■				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			3x↑■			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3x↓■						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3x↓■					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		3x↓■				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			3x↓■			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Observations									
Result				Pass	<input type="checkbox"/>	Fail	<input type="checkbox"/>		

**F.16 AC mains voltage dips and short interruptions**

<b>R 139-2</b> 18.9.4.2 <b>[unit]</b> <input type="checkbox"/> [g]; <input type="checkbox"/> [kg]; <input type="checkbox"/> [t]	Test conditions				Observer Name:	
	Flow	<input type="checkbox"/>	Using actual test fluid			
			Type of fluid:		Repetition: 10 times	
		<input type="checkbox"/>	Simulating flow using:			
	Date:		Start	Stop	Specimen:	
	Time:				Q <sub>min</sub> [unit/min]	
	Environmental temperature		°C	°C	Q <sub>max</sub> [unit/min]	
	Fluid temperature		°C	°C		
Relative humidity		%	%			
Frequency cycle	Cycle phase	Initial		During exposure		After
	Flowrate Q =					
Time	Start					
	Stop					
Quantity [unit]	reference					
	indicated					
2 <sup>nd</sup> indication (if applicable)						
3 <sup>rd</sup> indication (if applicable)						
Error [unit]						
relative error [%] E <sub>ii</sub>						
MPE [%]				For meter < 1 For system < 1.5		
Pass		<input type="checkbox"/>				<input type="checkbox"/>
Fail		<input type="checkbox"/>				<input type="checkbox"/>
<b>Observed faults during exposure</b>						
Reduction to [% U <sub>nom</sub> ]	Duration [cycles]	Fault/Deviation		Significant		Acts on fault
				Yes	No	Yes No
0	0.5			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
0	1			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
40	10 / 12			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
70	25 / 30			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
80	250 / 300			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
Observations						
Result				Pass	<input type="checkbox"/>	Fail <input type="checkbox"/>

**F.17 DC mains Voltage dips, short interruptions and voltage variations**

<b>R 139-2</b> 18.9.4.2 [unit] <input type="checkbox"/> [g]; <input type="checkbox"/> [kg]; <input type="checkbox"/> [t]	Test conditions				Observer Name:	
	Flow	<input type="checkbox"/>	Using actual test fluid		Repetition: 10 times	
		Type of fluid:				
	Flow	<input type="checkbox"/>	Simulating flow			
		using:				
	Date:		Start	Stop	Specimen:	
	Time:				$Q_{min}$	[unit/min]
	Environmental temperature		°C	°C	$Q_{max}$	[unit/min]
Fluid temperature		°C	°C			
Relative humidity		%	%			
Frequency cycle	Cycle phase	Initial	During exposure	After		
	Flowrate Q =					
Time	Start					
	Stop					
Quantity [unit]	reference					
	indicated					
2 <sup>nd</sup> indication (if applicable)						
3 <sup>rd</sup> indication (if applicable)						
Error [unit]						
relative error [%] $E_{ii}$						
MPE [%]		For meter < 1 For system < 1.5				
	Pass	<input type="checkbox"/>		<input type="checkbox"/>		
	Fail	<input type="checkbox"/>		<input type="checkbox"/>		
<b>Observed faults during exposure</b>						
Reduction to [ % $U_{nom}$ ]	Duration [s]	Fault/Deviation	Significant		Acts on fault	
			Yes	No	Yes	No
0 (high imp)	0.01		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0 (low imp)	0.01		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40	0.1		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
70	0.1		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
85	10		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
120	10		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Observations						
Result			Pass	<input type="checkbox"/>	Fail	<input type="checkbox"/>

**F.18 Bursts on AC and DC mains and signal lines**

<b>R 139-2</b> 18.9.4.5 [unit] <input type="checkbox"/> [g]; <input type="checkbox"/> [kg]; <input type="checkbox"/> [t]	Test conditions					Observer Name:		
	Flow	<input type="checkbox"/>	Using actual test fluid					
			Type of fluid:					
		<input type="checkbox"/>	Simulating flow			Line	Level [kV]	
			using:			index	<input type="checkbox"/> (2)	<input type="checkbox"/> (3)
	Cable:					mains	1	2
	Date:		Start		Stop	signal	0.5	1
	Time:					Repetition: 5 kHz		
	Environmental temperature		°C			Specimen:		
	Fluid temperature		°C			Q <sub>min</sub> [unit/min]		
Relative humidity		%			Q <sub>max</sub> [unit/min]			
Cycle phase		Initial		During exposure		After		
Flowrate Q =								
Time	Start							
	Stop							
Quantity [unit]	reference							
	indicated							
2 <sup>nd</sup> indication (if applicable)								
3 <sup>rd</sup> indication (if applicable)								
Error [unit]								
relative error [%] E <sub>ii</sub>								
MPE [%]		For meter < 1 For system < 1.5						
Pass		<input type="checkbox"/>				<input type="checkbox"/>		
Fail		<input type="checkbox"/>				<input type="checkbox"/>		
<b>Observed faults during exposure</b>								
		Fault/Deviation		Significant		Acts on fault		
Line	Pol.			Yes	No	Yes	No	
phase	↑ <input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	↓ <input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
neutral	↑ <input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	↓ <input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Protective earth	↑ <input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	↓ <input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Port 1 <sup>(*)</sup>	↑ <input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	↓ <input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Port 2 <sup>(*)</sup>	↑ <input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	↓ <input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Port 3 <sup>(*)</sup>	↑ <input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	↓ <input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Port 4 <sup>(*)</sup>	↑ <input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	↓ <input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
(*) Description of the Ports:		Observations						
Port 1:								
Port 2:								
Port 3:								
Port 4:								
Result				Pass	<input type="checkbox"/>	Fail	<input type="checkbox"/>	

**F.19 Ripple on DC mains power**

<b>R 139-2</b> 18.9.4.5 [unit] <input type="checkbox"/> [g]; <input type="checkbox"/> [kg]; <input type="checkbox"/> [t]	Test conditions				Observer Name:	
	Flow	<input type="checkbox"/>	Using actual test fluid			
			Type of fluid:		DC voltage V	
		<input type="checkbox"/>	Simulating flow		Ripple 2 % (peak peak)	
			using:			
	Date:		Start	Stop	Specimen:	
	Time:				Q <sub>min</sub> [unit/min]	
	Environmental temperature		°C	°C	Q <sub>max</sub> [unit/min]	
	Fluid temperature		°C	°C		
Relative humidity		%	%			
Frequency cycle	Cycle phase	Initial	During exposure	After		
	Flowrate Q =					
Time	Start					
	Stop					
Quantity [unit]	reference					
	indicated					
2 <sup>nd</sup> indication (if applicable)						
3 <sup>rd</sup> indication (if applicable)						
Error [unit]						
relative error [%] E <sub>ii</sub>						
MPE [%]		For meter < 1 For system < 1.5				
	Pass	<input type="checkbox"/>		<input type="checkbox"/>		
	Fail	<input type="checkbox"/>		<input type="checkbox"/>		
<b>Observed faults during exposure</b>						
Test	Duration	Fault/Deviation	Significant		Acts on fault	
			Yes	No	Yes	No
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Observations						
Result			Pass	<input type="checkbox"/>	Fail	<input type="checkbox"/>