



Fifth Committee Draft (5CD)

Date: October 2016

Reference number:
TC9_SC2_P8_N054

Supersedes document:
OIML R 61-2
Automatic gravimetric filling instruments
Edition 2004 (E)

<p>OIML TC 9/TC 2 Automatic weighing instruments</p> <p>p 8 Revision of R 61 <i>Automatic gravimetric filling instruments</i></p> <p>Convener: Mr Morayo Awosola Regulatory Delivery, Department for Business, Innovation and Skills, Teddington, Middlesex, United Kingdom</p> <p>E-mail: morayo.awosola@nmro.gov.uk</p>	<p>Circulated to:</p> <div data-bbox="764 808 828 880"> <input type="checkbox"/> </div> <p>TC 9/SC 2/p 8 members</p> <p>For the following action:</p> <div data-bbox="764 1061 828 1133"> <input type="checkbox"/> </div> <p>Upload comments by 30 November 2016</p> <p style="color: red; text-align: center;">Clean version</p>
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TITLE OF THE CD (English):
OIML R 61 Automatic gravimetric filling Instruments
Part 3: Test report format

TITLE OF THE CD (French):
OIML R 61 Doseuses pondérales à fonctionnement automatique
Partie 3: Format du rapport d'essais

Original version in: English

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EXPLANATORY NOTE

OIML TC 9/SC 2 *Automatic weighing instruments*

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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:

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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 OIML. Thus, they do not necessarily represent the views of the OIML.

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INTRODUCTION

This "test report format" aims at presenting, in a standardized format, the results of the various tests and examinations to which a type of an automatic gravimetric filling instrument (hereafter referred to as "AGFI(s) shall be submitted with a view to its approval.

The test report format consists of two parts, a "checklist" and the "test report format" itself.

The checklist is a summary of the examinations carried out on the instrument. It includes the conclusions of the results of the test performed, and experimental or visual checks based on the requirements of R 61-1. The words or condensed sentences aim at reminding the examiner of the requirements in R 61-1 and R 61-2 without reproducing them.

The test report is a record of the results of the tests carried out on the instrument. The "test report format" forms have been produced based on the tests detailed in R 61-1 and R 61-2.

All metrology services or laboratories evaluating types of automatic gravimetric filling instruments according to OIML R 61 or to national or regional regulations based on this OIML Recommendation are strongly advised to use this test report format, directly or after translation into a language other than English or French. Its direct use in English or in French, or in both languages, is even more strongly recommended whenever test results may be transmitted by the country performing these tests to the approving authorities of another country, under bi- or multilateral cooperation agreements. In the framework of the *OIML Certificate System for measuring instruments*, use of this test report format is mandatory.

The "information concerning the test equipment used for type evaluation" shall cover all test equipment which has been used in determining the test results given in a report. The information may be a short list containing only essential data (name, type, reference number for the purpose of traceability). For example:

- Verification standards (accuracy, or accuracy class, and No)
- Simulator for testing of modules (name, type, traceability and No)
- Climatic test and static temperature chamber (name, type and No)
- Electrical tests, bursts (name of the instrument, type and No)
- Description of the procedure of field calibration for the test of immunity to radiated electromagnetic fields

Note concerning the numbering of the following pages:

In addition to a sequential numbering: "R 61-3 page .." at the bottom of the pages of this publication, a special place is left at the top of each page (starting with the following page) for numbering the pages of reports established following this model; in particular, some tests (e.g. metrological performance tests) shall be repeated several times, each test being reported individually on a separate page following the relevant format; in the same way, a multiple range instrument shall be tested separately for each range and a separate form (including the general information form) shall be filled out for each range. For a given report, it is advisable to complete the sequential numbering of each page by the indication of the total number of pages of the report.

Type Evaluation Report

Explanatory notes

Symbols	Meaning
I	Indication
I_n	n^{th} indication
L	Load
ΔL	Additional load to next changeover point
P	$I + 1/2 d - \Delta L =$ Indication prior to rounding (digital indication)
E	$I - L$ or $P - L =$ Error
F	Mass of fill
F_p	Preset value of fill
MPE	Maximum permissible error
$mpe_{(1)}$	maximum permissible error for influence factor tests for class X(1)
se	preset value error (setting error)
$mpse_{(1)}$	maximum permissible preset value error for class X(1)
md	maximum deviation of each fill from the average
$mpd_{(1)}$	maximum permissible deviation of each fill from the average for class X(1)
$mp\Delta z_{(1)}$	maximum permissible zero change per 5 °C for class X(1)
EUT	Equipment under test
e.m.f	Electromotive force

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

For each test, the “SUMMARY OF TYPE EVALUATION” and the “CHECKLIST” shall be completed according to this example:

when the instrument has passed the test:

when the instrument has failed the test:

when the test is not applicable:

P	F
X	
	X
—	—

P = Passed
F = Failed

The white spaces in boxes in the headings of the report should always be filled according to the following example:

	At start	At end	
Temp.:	20.5	21.1	°C
Rel. h.:			%
Date:	2012-10-29	2012-10-30	yyyy-mm-dd
Time:	16:00:05	16:30:25	hh:mm:ss
Bar pres.:			hPa

“Date” in the test report refers to the date that the test was performed.

In the disturbance tests, faults greater than d are acceptable provided that they are detected and acted upon, or that they result from circumstances such that these faults shall not be considered as significant; an appropriate explanation shall be given in the column “Yes (remarks)”.

Section numbers in brackets refer to the corresponding subclauses of R 61-1 and R 61-2.

Type evaluation report

General information concerning the type

Application No.: Manufacturer:

Type designation: Applicant:
Instrument category:

Testing on:

☐ Complete instrument ☐ Module⁽¹⁾

Reference accuracy class Ref() Accuracy class X()

Minimum capacity ☐ Maximum capacity ☐

T = + ☐ T = - ☐ d = ☐

$U_{\text{nom}}^{(2)} =$ ☐ V $U_{\text{min}} =$ ☐ V $U_{\text{max}} =$ ☐ V $f =$ ☐ Hz Battery, $U =$ ☐ V

Zero-setting device: ☐ Nonautomatic ☐ Semi-automatic ☐ Automatic

Initial zero-setting range ☐ % Temperature range ☐ °C

Printer: ☐ Built-in ☐ Connected ☐ Non present but connectable ☐ No connection

⁽¹⁾ The test equipment (simulator or part of a complete instrument) connected to the module shall be defined in the test form(s) used.

⁽²⁾ The voltage U_{nom} shall be as defined at IEC 1000-4-11 (1994) section 5.

General information concerning the type

Instrument submitted:	Load sensor:	
Identification No.:	Manufacturer:	
Software version:	Type:	
Connected equipment:	Capacity:	
Interfaces (number, nature):	Number:	
Evaluation period:	Classification symbol:	
Date of report:		Yes	No
Observer:	OIML R 60 Certificate of conformity. Please tick and if "Yes" supply Certificate number.		
		Certificate number	

General information concerning the type

Use this space to indicate additional remarks and/or information: other connected equipment, interfaces and load cells, choice of the manufacturer regarding protection against disturbances, etc.

Identification of the instrument

Application No.: Type designation:
 Identification No.: Manufacturer:
 Software version:
 Report date:

Manufacturing documentation

(Record as necessary to identify the equipment under test)

System or module name	Drawing number or software reference	Issue level	Serial No.
.....
.....
.....
.....
.....
.....
.....

Simulated set-up documentation

System or module name	Drawing number or software reference	Issue level	Serial No
.....
.....
.....

Simulated set-up function (summary)

(Simulated set-up description and drawings, block diagram, etc. should be attached to the report if available)

Description or other information pertaining to identification of the instrument:
(attach photograph here if available)

Information concerning the test equipment used for type evaluation

Test equipment

Application No.: _____ Type designation: _____
Report date: _____ Manufacturer: _____

List all test equipment used in this report (including descriptions of the reference vehicles used for testing)

[illegible]

Remarks:

Configuration for test

Application No.: Type designation:
Report date: Manufacturer:

Use this space for additional information relating to equipment configuration, interfaces, data rates, EMC protection options for load cells, etc. for the instrument and / or simulated set-up.

Summary of type evaluation tests

Application No.:

Type
designation:

Report date:

Manufacturer:

R 61-2	R 61-3	Tests	Report page	Passed	Failed	Remarks
10.2.1	1	Warm-up time				
9.2.3	2	Zero-setting				
9.2.4	3	Tare setting				
10.2	4	Influence factors:				
10.2.2	4.1	Temperature with static load				
10.2.3	4.2	Temperature effect at no load (dry heat and cold)				
10.2.4	4.3	Damp heat test:				
10.2.4.1	4.3.1	– Damp heat, steady state (non-condensing)				
10.2.4.2	4.3.2	– Damp heat, cyclic (condensing)				
10.2.5	4.4.1	AC mains voltage variation test				
10.2.6	4.4.2	DC mains voltage variation test				
10.2.7	4.4.3	Low voltage of internal battery, not connected to mains power				
10.2.8	4.4.4	Power from external 12V and 24V road vehicle batteries				
10.2.9	4.5	Tilting				
10.3	5	Disturbance tests:				
10.3.1	5.1	AC mains voltage dips, short interruptions and reductions				
10.3.2	5.2	Bursts (fast transient tests) on mains power lines and on signal and control lines				
10.3.2.1	5.2.1	– AC and DC mains power lines				
10.3.2.2	5.2.2	– Signal, data and control lines				
10.3.3	5.3	Electrostatic discharge test				
10.3.3.1	5.3.1	– Direct application				
10.3.3.2	5.3.2	– Contact discharge (indirect application)				
10.3.4	5.4	Immunity to electromagnetic fields				
10.3.4.1	5.4.1	– Radiated electromagnetic fields				
10.3.4.2	5.4.2	– Conducted electromagnetic fields				

10.3.5	5.5	Electrical surges on AC and DC mains power lines and on signal, data and control lines				
10.3.5.1	5.5.1	– Surges on AC and DC mains power lines				
10.3.5.2	5.5.2	– Surges on any other kind of power supply				
10.3.5.3	5.5.3	– Surges on signal, data and control lines				
10.3.6	5.6	Electrical transient conduction for instruments powered from 12 V and 24 V road vehicle batteries				
10.3.6.1	5.6.1	– Conduction along supply lines of external voltage supply				
10.3.6.2	5.6.2	– Conduction via lines other supply lines, for external voltage supply				
10.3.7	5.7	Ripple on DC mains power				
10.3.8	5.8	Battery voltage variations during start-up of a vehicle engine				
10.3.9	5.9	Load dump test				
10.3.10	5.10	DC mains voltage dips, short interruptions and reductions				
11	6	Span stability test				
12.2.1	8	Load indicator performance test				

Summary of type evaluation

Use this page to detail remarks from the summary of type evaluation.

1 Warm-up time (R 61-1, 6.8, R 61-2, 10.2.1)

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Control scale interval, d :	Time:			hh:mm:ss
Resolution during test: (smaller than d)	Bar. pres.:			hPa

Duration of disconnection before test: hrs

Automatic zero-setting and zero-tracking device is:

☐ Non-existent ☐ Not in operation ☐ Out of working ☐ In operation³

$$E = I + \frac{1}{2} d - \Delta L - L$$

E_0 = error calculated at zero or near zero (unloaded)

E_L = error calculated at load (loaded)

	Time (*) (min)	Load	Indication I	Add. load ΔL	Error	$E_L - E_0$	mpe =
Unloaded	0 – 5						
Loaded							
Unloaded							
Loaded							
Unloaded							
Loaded							
Unloaded							
Loaded							
Unloaded							
Loaded							

³ In operation only if zero operates as part of every automatic weighing cycle

	Time (*) (min)	Load	Indication I	Add. load ΔL	Error	$E_L - E_0$	mpe =
Unloaded	5 – 15						
Loaded							
Unloaded							
Loaded							
Unloaded							
Loaded							
Unloaded							
Loaded							
Unloaded							
Loaded							

	Time (*) (min)	Load	Indication I	Add. load ΔL	Error	$E_L - E_0$	mpe =
Unloaded	15 – 30						
Loaded							
Unloaded							
Loaded							
Unloaded							
Loaded							

(*) Counted from the moment an indication has first appeared.

Check if $|E_L - E_0| \leq |mpe|$

Initial zero-setting error	E_{0I}	
Maximum value of error unloaded	E_0	
Maximum value of error loaded	$E_L - E_0$	

☐

Passed

☐

Failed

Remarks:

2 Zero-setting (R 61-1, 5.8, R 61-2, 9.2.3)

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Control scale interval, d :	Time:			hh:mm:ss
Resolution during test: (smaller than d)	Bar. pres.:			hPa

Accuracy of zero-setting

Zero-setting mode		
ΔL	$E = 0.5 d - \Delta L$	E/d

Remarks:

Accuracy of zero-setting

Zero-setting mode		
ΔL	$E = 0.5 d - \Delta L$	E/d

Remarks:

Accuracy of zero-setting

Zero-setting mode		
ΔL	$E = 0.5 d - \Delta L$	E/d

☐ Passed ☐ Failed

Remarks:

3 Tare setting (R 61-1, 5.8, R 61-2, 9.3.4)

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Control scale interval, d :	Time:			hh:mm:ss
Resolution during test: (smaller than d)	Bar. pres.:			hPa

Accuracy of tare setting

Tare setting mode	
Tare load		
ΔL	$E = 0.5 d - \Delta L$	E/d

☐ Passed ☐ Failed

Remarks:

Accuracy of tare setting

Tare setting mode	
Tare load		
ΔL	$E = 0.5 d - \Delta L$	E/d

☐ Passed ☐ Failed

Remarks:

Accuracy of tare setting

Tare setting mode	
Tare load		
ΔL	$E = 0.5 d - \Delta L$	E/d

☐ Passed ☐ Failed

Remarks:

4 Influence factors (R 61-1, 4.8)

4.1 Static temperatures (R 61-1, 4.8.2, R 61-2, 10.2.2)

4.1.1 Temperature with static load (20 °C)

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Control scale interval, d :	Time:			hh:mm:ss
Resolution during test: (smaller than d)	Bar. Pres.:			hPa

Automatic zero-setting and zero-tracking device is:

☐ Non-existent ☐ Not in operation ☐ Out of working ☐ In operation

$$E = I + \frac{1}{2} d \cdot \Delta L - L$$

$E_C = E - E_0$ with E_0 = error calculated at or near zero (*)

Load L	Indication I		Add. load ΔL		Error E		Corrected error E_C		$mpe_{(1)}$	$\frac{E_C(**)}{mpe_{(1)}}$
	↓	↑	↓	↑	↓	↑	↓	↑		
(*)					(*)					

(**) Use largest value of E_C in each case.

Remarks:

Maximum value of $\frac{E_C}{mpe_{(1)}}$ (largest value in right hand column)	
--	--

Note: This value is to be inserted in the checklist

$mpe_{(1)}$ = the maximum permissible error for influence factor tests for class X(1)

4.1.2 Temperature with static load (specified high = °C)

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Control scale interval, d :	Time:			hh:mm:ss
Resolution during test: (smaller than d)	Bar. pres.:			hPa

Automatic zero-setting and zero-tracking device is:

☐ Non-existent ☐ Not in operation ☐ Out of working ☐ In operation

$$E = I + \frac{1}{2} d \cdot \Delta L - L$$

 $E_C = E - E_0$ with E_0 = error calculated at or near zero (*)

Load L	Indication I		Add. load ΔL		Error E		Corrected error E_C		$mpe_{(1)}$	$\frac{E_C(**)}{mpe_{(1)}}$
	↓	↑	↓	↑	↓	↑	↓	↑		
(*)					(*)					

(**) Use largest value of E_C in each case.

Remarks:

Maximum value of $\frac{E_C}{mpe_{(1)}}$ (largest value in right hand column)	
--	--

Note: This value is to be inserted in the checklist

 $mpe_{(1)}$ = the maximum permissible error for influence factor tests for class X(1)

4.1.3 Temperature with static load (specified low = °C)

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Control scale interval, d :	Time:			hh:mm:ss
Resolution during test: (smaller than d)	Bar. pres.:			hPa

Automatic zero-setting and zero-tracking device is:

<input type="checkbox"/> Non-existent	<input type="checkbox"/> Not in operation	<input type="checkbox"/> Out of working	<input type="checkbox"/> In operation
---------------------------------------	---	---	---------------------------------------

$$E = I + \frac{1}{2} d - \Delta L - L$$

 $E_C = E - E_0$ with E_0 = error calculated at or near zero (*)

Load L	Indication I		Add. load ΔL		Error E		Corrected error E_C		$mpe_{(1)}$	$\frac{E_C(**)}{mpe_{(1)}}$
	↓	↑	↓	↑	↓	↑	↓	↑		
(*)					(*)					

(**) Use largest value of E_C in each case.

Remarks:

Maximum value of $\frac{E_C}{mpe_{(1)}}$ (largest value in right hand column)	
--	--

Note: This value is to be inserted in the checklist

 $mpe_{(1)}$ = the maximum permissible error for influence factor tests for class X(1)

4.1.4 Temperature with static load (5 °C if the specified low temperature is ≤ 0 °C)

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Control scale interval, d :	Time:			hh:mm:ss
Resolution during test: (smaller than d)	Bar. pres.:			hPa

Automatic zero-setting and zero-tracking device is:

☐ Non-existent
☐ Not in operation
☐ Out of working
☐ In operation

$$E = I + \frac{1}{2} d - \Delta L - L$$

 $E_C = E - E_0$ with E_0 = error calculated at or near zero (*)

Load L	Indication I		Add. load ΔL		Error E		Corrected error E_C		$mpe_{(1)}$	$\frac{E_C(**)}{mpe_{(1)}}$
	↓	↑	↓	↑	↓	↑	↓	↑		
(*)					(*)					

(**) Use largest value of E_C in each case.

Remarks:

Maximum value of $\frac{E_C}{mpe_{(1)}}$ (largest value in right hand column)	
--	--

Note: This value is to be inserted in the checklist

 $mpe_{(1)}$ = the maximum permissible error for influence factor tests for class X(1)

4.1.5 Temperature with static load (20 °C)

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Control scale interval, d :	Time:			hh:mm:ss
Resolution during test: (smaller than d)	Bar. pres.:			hPa

Automatic zero-setting and zero-tracking device is:

☐

Non-existent

☐

Not in operation

☐

Out of working

☐

In operation

$$E = I + \frac{1}{2} d - \Delta L - L$$

 $E_C = E - E_0$ with E_0 = error calculated at or near zero (*)

Load L	Indication I		Add. load ΔL		Error E		Corrected error E_C		$mpe_{(1)}$	$\frac{E_C(**)}{mpe_{(1)}}$
	↓	↑	↓	↑	↓	↑	↓	↑		
(*)					(*)					

(**) Use largest value of E_C in each case.

Remarks:

Maximum value of $\frac{E_C}{mpe_{(1)}}$

(largest value in right hand column)

Note: This value is to be inserted in the checklist

 $mpe_{(1)}$ = the maximum permissible error for influence factor tests for class X(1)

4.2 Temperature effect on no-load indication (dry heat and cold) (R 61-1, 4.8.2.3, R 61-2, 10.2.3)

Application No.:

Type designation:

Observer:

Scale interval, d :

Resolution during test
(smaller than d):

Automatic zero-setting and zero-tracking device is:

☐ Non-existent

☐ Not in operation

☐ Out of working

☐ In operation

$$P = 1 + \frac{1}{2} d \Delta L$$

Report page ⁽⁴⁾	Date	Time	Temp (°C)	Zero indication I	Add. load	P	ΔP	ΔTem p	Zero- change per 5 °C Δz	$\frac{\Delta z}{mp \Delta z_{(1)}}$

Remarks:

Maximum value of $\frac{E_c}{mpe_{(1)}}$ (largest value in right hand column)	
--	--

Note: This value is to be inserted in the checklist

$mpe_{(1)}$ = the maximum permissible error for influence factor tests for class X(1)

Maximum permissible zero change per 5 °C, $mp\Delta z_{(1)}$ for the rated minimum fill.

 ΔP = difference of P for two consecutive tests at different temperatures
$$\Delta \text{Temp} = \text{difference of Temp for two consecutive tests at different temperatures}$$

⁽⁴⁾ Give the report page of the relevant weighing test where weighing tests and temperature effect on no-load indication test are conducted together.

4.3 Damp heat tests (R 61-1, 4.8.1, R 61-2, 10.2.4)

Damp heat tests are performed alternatively in accordance with R 61-1, 4.8.1, the option chosen recorded in 4.3.1 or 4.3.2 below accordingly.

4.3.1 Damp heat, steady state (non-condensing) (R 61-2, 10.2.4.1)

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Control scale interval, d :	Time:			hh:mm:ss
Resolution during test: (smaller than d)	Bar. pres.:			hPa

Automatic zero-setting and zero-tracking device is:

☐ Non-existent
 ☐ Not in operation
 ☐ Out of working
 ☐ In operation

$$E = I + \frac{1}{2} d - \Delta L - L$$

$$E_C = E - E_0 \text{ with } E_0 = \text{error calculated at or near zero (*)}$$

4.3.1.1 Initial test at reference temperature of 20 °C and relative humidity of 50 %

Load L	Indication I		Add. load ΔL		Error E		Corrected error E_C		$mpe_{(1)}$	$\frac{E_C(**)}{mpe_{(1)}}$
	↓	↑	↓	↑	↓	↑	↓	↑		
(*)					(*)					

(**) Use largest value of E_C in each case.

Remarks:

Maximum value of $\frac{E_C}{mpe_{(1)}}$ (largest value in right hand column)	
--	--

Note: This value is to be inserted in the checklist

$mpe_{(1)}$ = the maximum permissible error for influence factor tests for class X(1)

4.3.1.2 Test at specified high temperature (°C), relative humidity 85 %

	At start	At max	At end	
Temp.:				°C
Rel. h.:				%
Date:				yyyy-mm-dd
Time:				hh:mm:ss
Bar. Pres.:				hPa

Load L	Indication I		Add. load ΔL		Error E		Corrected error E_C		$mpe_{(1)}$	$\frac{E_C^{(**)}}{mpe_{(1)}}$
	↓	↑	↓	↑	↓	↑	↓	↑		
(*)					(*)					

(**) Use largest value of E_C in each case.

Remarks:

Maximum value of $\frac{E_C}{mpe_{(1)}}$ (largest value in right hand column)	
--	--

Note: This value is to be inserted in the checklist

 $mpe_{(1)}$ = the maximum permissible error for influence factor tests for class X(1)

4.3.1.3 Final test at reference temperature 20 °C, relative humidity 50 %

	At start	At max	At end	
Temp.:				°C
Rel. h.:				%
Date:				yyyy-mm-dd
Time:				hh:mm:ss
Bar. Pres.:				hPa

Load L	Indication I		Add. load ΔL		Error E		Corrected error E_c		$mpe_{(1)}$	$\frac{E_c^{(**)}}{mpe_{(1)}}$
	↓	↑	↓	↑	↓	↑	↓	↑		
(*)					(*)					

(**) Use largest value of E_c in each case.

Remarks:

Maximum value of $\frac{E_c}{mpe_{(1)}}$ (largest value in right hand column)	
--	--

Note: This value is to be inserted in the checklist

 $mpe_{(1)}$ = the maximum permissible error for influence factor tests for class X(1)

4.3.2.2 Damp heat, cyclic (condensing)

	At start	At max	At end	
Temp.:				°C
Rel. h.:				%
Date:				yyyy-mm-dd
Time:				hh:mm:ss
Bar. Pres.:				hPa

Upper temperature

Load L	Indication I		Add. load ΔL		Error E		Corrected error E_c		$mpe_{(1)}$	$\frac{E_c^{(**)}}{mpe_{(1)}}$
	↓	↑	↓	↑	↓	↑	↓	↑		
(*)					(*)					

Remarks:

Maximum value of $\frac{E_c}{mpe_{(1)}}$ (largest value in right hand column)	
--	--

Note: This value is to be inserted in the checklist

 $mpe_{(1)}$ = the maximum permissible error for influence factor tests for class X(1)

4.3.2.3 Damp heat, cyclic (condensing)

	At start	At max	At end	
Temp.:				°C
Rel. h.:				%
Date:				yyyy-mm-dd
Time:				hh:mm:ss
Bar. Pres.:				hPa

Lower temperature

Load L	Indication I		Add. load ΔL		Error E		Corrected error E_c		$mpe_{(1)}$	$\frac{E_c(**)}{mpe_{(1)}}$
	↓	↑	↓	↑	↓	↑	↓	↑		
(*)					(*)					

Remarks:

Maximum value of $\frac{E_c}{mpe_{(1)}}$ (largest value in right hand column)	
--	--

Note: This value is to be inserted in the checklist

 $mpe_{(1)}$ = the maximum permissible error for influence factor tests for class X(1)

4.4 Voltage variation tests (R 61-1, 4.8.3)

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Control scale interval, d :	Time:			hh:mm:ss
Resolution during test: (smaller than d)	Bar. Pres.:			hPa

- ☐ AC mains voltage, R 61-2, 10.2.5
☐ DC mains voltage, R 61-2, 10.2.6
☐ Battery variation, not connected to the mains (DC), R 61-2, 10.2.7
☐ Power from external 12V and 24V road vehicle batteries, R 61-2, 10.2.8

Voltage: = V U_{\min} = V U_{\max} = V frequency Hz

Automatic zero-setting and zero-tracking device is:

☐ Non-existent ☐ Not in operation ☐ Out of working ☐ In operation

$$E = I + \frac{1}{2} d - \Delta L - L$$

$$E_c = E - E_0 \text{ with } E_0 = \text{error calculated at or near zero (*)}$$

mpe ₍₁₎	<input type="text"/>
--------------------	----------------------

4.4.1 AC mains voltage variation test (R 61-2, 10.2.5)

Voltage ⁽⁵⁾	U (V)	Load L	Indication I	Add. load ΔL	Error E	Corrected error E_c	$\frac{E_c}{mpe_{(1)}}$
Reference value					(*)		
Lower limit							
Upper limit							

Remarks:

Maximum value of $\frac{E_c}{mpe_{(1)}}$ (largest value in right hand column)	<input type="text"/>
--	----------------------

Note: This value is to be inserted in the checklist.

mpe₍₁₎ = the maximum permissible error for influence factor tests for class X(1)

⁽⁵⁾ The reference voltage shall be as defined in IEC 1000-4-11 (1994) section 5.

4.4.2 DC mains voltage variation test (R 61-2, 10.2.6)

Voltage ⁽⁶⁾	U (V)	Load L	Indication I	Add. load ΔL	Error E	Corrected error E_c	$\frac{E_c}{mpe_{(1)}}$
Reference value					(*)		
Lower limit							
Upper limit							

Remarks:

Maximum value of $\frac{E_c}{mpe_{(1)}}$ (largest value in right hand column)	
--	--

Note: This value is to be inserted in the checklist

4.4.3 Low voltage of internal battery, not connected to the mains power (R 61-2, 10.2.7)

Voltage	U (V)	Load L	Indication I	Add. load ΔL	Error E	Corrected error E_c	$\frac{E_c}{mpe_{(1)}}$
Reference value					(*)		
Lower limit							
Upper limit							

Remarks:

Maximum value of $\frac{E_c}{mpe_{(1)}}$ (largest value in right hand column)	
--	--

Note: This value is to be inserted in the checklist

⁽⁶⁾ The reference voltage shall be as defined in IEC 1000-4-11 (1994) section 5.

4.4.4 Power from external 12V and 24V road vehicle batteries (R 61-2, 10.2.8)

Voltage ⁽⁷⁾	U (V)	Load L	Indication I	Add. load ΔL	Error E	Corrected error E_c	$\frac{E_c}{mpe_{(1)}}$
Reference value					(*)		
Lower limit							
Upper limit							

Remarks:

Maximum value of $\frac{E_c}{mpe_{(1)}}$ (largest value in right hand column)	
--	--

Note: This value is to be inserted in the checklist

⁽⁷⁾ The reference voltage shall be as defined in IEC 1000-4-11 (1994) section 5.

4.5 Tilting (R 61-1, 4.8.4, R 61-2, 10.2.9)

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Scale interval, d:	Time:			hh:mm:ss
Control indicating device		Bar. pres.:			hPa

Automatic zero-setting and zero-tracking device is:

☐ Non-existent ☐ Not in operation ☐ Out of working ☐ In operation

- ☐ Tilting at no-load, R 61-2, 10.2.9.1.1
- ☐ Tilting when loaded, R 61-2, 10.2.9.1.2
- ☐ Tilting 5 % not required for fixed installation, R 61-2, 10.2.9.2
- ☐ Tilting 5 % not required, can be adjusted to 1 % or less, R 61-2, 10.2.9.2
- ☐ Tilting 10 % installation in road vehicles

Load L	
Maximum permissible error for class X(1) mpe ₍₁₎	

$$E = I + \frac{1}{2} \alpha \cdot \Delta L - L$$

$$E_C = E - E_0 \text{ with } E_0 = \text{error calculated at or near zero (*)}$$

Tilt	Indication I	Add. load ΔL	Error E	Corrected error E_C	$\frac{E_C}{mpe_{(1)}}$
Reference			(*)		
Tilt limit→					
Tilt limit←					
5% →					
5% ←					
5% ↑					
5% ↓					
10%					
Reference					

Remarks:

Maximum value of $\frac{E_C}{mpe_{(1)}}$ (largest value in right hand column)	
--	--

Note: This value is to be inserted in the checklist

5 Disturbance tests (R 61-1, 6.2, R 61-2, 10.3)

5.1 AC mains voltage dips, short interruptions and reductions (R 61-2, 10.3.2)

Application No.:	_____	Temp.:	At start	At end	°C
Type designation:	_____	Rel. h.:			%
Observer:	_____	Date:			yyyy-mm-dd
Control scale interval, d :	_____	Time:			hh:mm:ss
Resolution during test: (smaller than d)	_____	Bar. Pres.:			hPa

Automatic zero-setting and zero-tracking device is:

☐ Non-existent ☐ Not in operation ☐ Out of working ☐ In operation
Marked nominal voltage (U_{nom}) or voltage⁽⁸⁾ range⁹: VLoad, L :

Disturbance				Result		
Amplitude (% U_{nom})	Duration (cycles)	Number of disturbanc es	Repetition interval (s)	Indication /	Significant fault (> d) or detection and reaction	
					No	Yes (remarks)
without disturbance						
0	0.5 / 0.6 (*)	10				
0	1	10				
40	10 / 12 (*)	10				
70	25 / 30 (*)	10				
80	250 / 300 (*)	10				
0	250 / 300 (*)	10				

(*) These values are for 50 Hz / 60 Hz respectively

☐ Passed ☐ Failed

Note: If significant faults are detected and acted upon, or if the EUT fails, the test point at which this occurs shall be recorded.

⁽⁸⁾ The reference voltage shall be as defined in IEC 1000-4-11 (1994) section 5.

Remarks:

5.2 Burst/fast transients on mains power lines and on signal, data and control lines (R 61-2, 10.3.3)

5.2.1 AC and DC mains power lines

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Control scale interval, d :	Time:			hh:mm:ss
Resolution during test: (smaller than d)	Bar.			hPa
		Pres.:			

Automatic zero-setting and zero-tracking device is:

☐ Non-existent
 ☐ Not in operation
 ☐ Out of working
 ☐ In operation

Load, L :

Voltage supply lines: test voltage 2.0 kV (peak value), duration of the test > 1 minute at each polarity

Disturbance		Result		
Disturbance	Polarity	Indication, I	Significant fault ($> d$) or detection and reaction	
			No	Yes (remarks)
without disturbance				
line ↓ ground	positive			
	negative			
without disturbance				
neutral ↓ ground	positive			
	negative			
without disturbance				
protective earth ↓ ground	positive			
	negative			

☐ Passed
 ☐ Failed

Note: If significant faults are detected and acted upon, or if the EUT fails, the test point at which this occurs shall be recorded.

Remarks:

5.2 Burst/fast transients on mains power lines and on signal, data and control lines**5.2.2 Bursts (transients) on signal, data and control lines**

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Control scale interval, d :	Time:			hh:mm:ss
Resolution during test: (smaller than d)	Bar.			hPa
		Pres.:			

Automatic zero-setting and zero-tracking device is:

☐ Non-existent ☐ Not in operation ☐ Out of working ☐ In operation
Load, L :

Signal, data and control lines: test voltage 1.0 kV, duration of the test > 1 minute at each polarity

Disturbance		Result		
Bursts (transients) on cable / interface (Type, nature)	Polarity	Indication, <i>I</i>	Significant fault (> <i>d</i>) or detection and reaction	
			No	Yes (remarks)
without disturbance				
	positive			
	negative			
without disturbance				
	positive			
	negative			
without disturbance				
	positive			
	negative			
without disturbance				
	positive			
	negative			
without disturbance				
	positive			
	negative			
without disturbance				
	positive			
	negative			

☐ Passed ☐ Failed

Remarks:

5.2 Burst/fast transients on signal, data and control lines (continued)

Explain or make a sketch indicating where the clamp is located on the cable; if necessary, add additional page.

☐ Passed ☐ Failed

Note: If significant faults are detected and acted upon, or if the EUT fails, the test point at which this occurs shall be recorded.

Remarks:

5.3 Electrostatic discharge test (R 61-2, 10.3.4)

5.3.1 Direct Application

Application No.:	_____	Temp.:	At start	At end	°C
Type designation:	_____	Rel. h.:			%
Observer:	_____	Date:			yyyy-mm-dd
Control scale interval, <i>d</i> :	_____	Time:			hh:mm:ss
Resolution during test: (smaller than <i>d</i>)	_____	Bar. Pres.:			hPa

<input type="checkbox"/> Contact discharges	<input type="checkbox"/> Paint penetration
<input type="checkbox"/> Air discharges	Polarity ¹⁰ : <input type="checkbox"/> Positive <input type="checkbox"/> negative

Automatic zero-setting and zero-tracking device is:

<input type="checkbox"/> Non-existent	<input type="checkbox"/> Not in operation	<input type="checkbox"/> Out of working	<input type="checkbox"/> In operation
---------------------------------------	---	---	---------------------------------------

Load, *L*:

Discharges			Result		
Test voltage ¹¹ (kV)	Number of discharges ≥ 10	Repetition interval (s)	Indication, /	Significant fault (> d) or detection and reaction	
				No	Yes (remarks, test points, etc.)
without disturbance					
2					
4					
6					
8 (air discharges)					

<input type="checkbox"/> Passed	<input type="checkbox"/> Failed
---------------------------------	---------------------------------

Note: If significant faults are detected and acted upon, or if the EUT fails, the test point at which this occurs shall be recorded.

Remarks:

¹⁰ IEC 61000-4-2 specifies that the test shall be conducted with the most sensitive polarity

¹¹ Tests shall be performed at the specified lower levels, starting with 2 kV and proceeding with 2 kV steps up to and including the level specified above in accordance with IEC 61000-4-2

5.3 Electrostatic discharge

5.3.2 Contact Discharge (indirect application)

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Control scale interval, d :	Time:			hh:mm:ss
Resolution during test: (smaller than d)	Bar. Pres.:			hPa

Automatic zero-setting and zero-tracking device is:

☐ Non-existent
 ☐ Not in operation
 ☐ Out of working
 ☐ In operation

Load, L :

Polarity: positive negative

Horizontal coupling plane:

Discharges			Result		
Test voltage (kV)	Number of discharges ≥ 10	Repetition interval (s)	Indication, /	Significant fault ($> d$) or detection and reaction	
				No	Yes (remarks)
without disturbance					
2					
4					
6					

Vertical coupling plane:

Discharges			Result		
Test voltage (kV)	Number of discharges ≥ 10	Repetition interval (s)	Indication, /	Significant fault ($> d$) or detection and reaction	
				No	Yes (remarks)
without disturbance					
2					
4					
6					

☐ Passed
 ☐ Failed

Note: If significant faults are detected and acted upon, or if the EUT fails, the test point at which this occurs shall be recorded.

Remarks:

5.3 **Electrostatic discharge**

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

a) Direct application

Contact discharges:

Air discharges:

b) Indirect application

5.4 Immunity to electromagnetic fields (R 61-2, 10.3.5)**5.4.1 Radiated electromagnetic fields (R 61-2, 10.3.5.1)**

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Control scale interval, <i>d</i> :	Time:			hh:mm:ss
Resolution during test: (smaller than <i>d</i>)	Bar. Pres.:			hPa

Rate of sweep:

Load:

Material load:

Disturbance				Result		
Antenna	Frequency range (MHz)	Polarization	Facing EUT	Indication /		Significant fault (> σ) or detection and reaction
					No	Yes (remarks)
without disturbance						
		Vertical	Front			
			Right			
			Left			
			Rear			
		Horizontal	Front			
			Right			
			Left			
			Rear			
		Vertical	Front			
			Right			
			Left			
			Rear			
		Horizontal	Front			
			Right			
			Left			
			Rear			

Frequency range: 80 MHz¹² to 3000 MHz

RF amplitude (50 ohms): 10 V/m

Modulation: 80 % AM, 1 kHz, sine wave

Note: If EUT fails, the frequency and field strength at which this occurs must be recorded.☐

Passed

☐

Failed

Remarks

¹² Lower limit is 26 MHz if the test according to R 61-2, 10.3.4.2 cannot be applied due to lack of mains or I/O ports.

5.4.2 Conducted electromagnetic fields (R 61-2, 10.3.5.2)

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Control scale interval, <i>d</i> :	Time:			hh:mm:ss
Resolution during test: (smaller than <i>d</i>)	Bar.			hPa
		Pres.:			

Rate of sweep: Load: Material load:

Disturbance			Result		
Frequency range (MHz)	Cable / interface	Level (Volts RMS)	Indication, /	Significant fault (> d)	
				No	Yes (remarks)
without disturbance					
without disturbance					
without disturbance					
without disturbance					
without disturbance					
without disturbance					

Test severity:

Frequency range: 0.15 MHz – 80 MHz

RF amplitude (50 ohms): 10 V (e.m.f.)

Modulation: 80 % AM, 1 kHz, sine wave

Note: If EUT fails, the frequency and field strength at which this occurs must be recorded.

☐ Passed ☐ Failed

Remarks:

5.4 Immunity to electromagnetic fields

Include a description of the set-up of EUT, e.g. by photos or sketches.

Note: If EUT fails, the frequency and field strength at which this occurs must be recorded.

5.5 Surges on AC and DC mains power lines and on signal, data and control lines (R 61-2, 10.3.6)

5.5.1 AC and DC mains power supply lines¹³

	At start	At end	
Application No.:	Temp.:		°C
Type designation:	Rel. h.:		%
Observer:	Date:		yyyy-mm-dd
Control scale interval, d :	Time:		hh:mm:ss
Resolution during test:	Bar.		hPa
(smaller than d)	Pres.:		

Automatic zero-setting and zero-tracking device is:

☐ Non-existent
 ☐ Not in operation
 ☐ Out of working
 ☐ In operation

Load, L :

¹³ Test voltage 1.0 kV (line to line) and 2.0 kV (line to earth) for 1 minute at each amplitude and polarity

Disturbance						Result		
3 positive and 3 negative surges synchronously with AC supply voltage						Indication I	Significant fault (> d) or detection and reaction	
Amplitude/ apply on	angle				Polarity		No	Yes (remarks)
	0°	90°	180°	270°				
1.0 kV line ↓ neutral	without disturbance							
	X				positive			
					negative			
		X			positive			
					negative			
			X		positive			
					negative			
				X	positive			
					negative			
2.0 kV line ↓ protective earth	without disturbance							
	X				positive			
					negative			
		X			positive			
					negative			
			X		positive			
					negative			
				X	positive			
					negative			
2.0 kV neutral ↓ protective earth	without disturbance							
	X				positive			
					negative			
		X			positive			
					negative			
			X		positive			
					negative			
				X	positive			
					negative			

☐ Passed ☐ Failed

Remarks:

5.5.2 Any other kind of power supply¹⁴

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Control scale interval, d :	Time:			hh:mm:ss
Resolution during test: (smaller than d)	Bar.			hPa
		Pres.:			

Kind or type of power supply: DC ☐ Other form ☐ Voltage ☐ V

Automatic zero-setting and zero-tracking device is:

☐ Non-existent
 ☐ Not in operation
 ☐ Out of working
 ☐ In operation
Load, L :

Disturbance		Result		
3 positive and 3 negative surges		Indication, /	Significant fault ($> d$) or detection and reaction	
Amplitude / apply on	Polarity		No	Yes (remarks)
without disturbance				
1.0 kV line ↓ neutral	positive			
	negative			
without disturbance				
2.0 kV line ↓ protective earth	positive			
	negative			
without disturbance				
2.0 kV neutral ↓ protective earth	positive			
	negative			

Use another page for additional test set-up information.

☐ Passed
 ☐ Failed

Note: If significant faults are detected and acted upon, or if the EUT fails, the test point at which this occurs shall be recorded.

Remarks:

¹⁴ Test voltage 1.0 kV (line to line) and 2.0 kV (line to earth) for 1 minute at each amplitude and polarity

5.5.3 Surges on signal, data and control lines

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Control scale interval, d :	Time:			hh:mm:ss
Resolution during test: (smaller than d)	Bar. Pres.:			hPa

Automatic zero-setting and zero-tracking device is:

☐ Non-existent ☐ Not in operation ☐ Out of working ☐ In operation

Cable/interface	Polarity	Result			
		Load	Indication, /	Significant fault (>1 σ)	
				No	Yes (remarks)
without disturbance					
C/1,1	positive				
	negative				
without disturbance					
C/1,2	positive				
	negative				
without disturbance					
C/1,3	positive				
	negative				
without disturbance					
C/1,4	positive				
	negative				
without disturbance					
C/1,5	positive				
	negative				
without disturbance					
C/1,6	positive				
	negative				

Note: Explain or make a sketch indicating where the clamp is located on the cable; if necessary, add additional page.

☐ Passed ☐ Failed

Remarks:

5.6 Electrical transient conduction for instruments powered from 12 V and 24 V road vehicle batteries (R 61-2, 10.3.7)

5.6.1 Conduction along supply lines of external voltage supply (R 61-2, 10.3.7.1)

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Control scale interval, d :	Time:			hh:mm:ss
Resolution during test: (smaller than d)	Bar. Pres.:			hPa

Load:

Marked nominal voltage (U_{nom}) or V

☐ 12 V battery voltage ☐ 24 V battery voltage ☐ Other voltage supply

Disturbance				Result		
Voltage condition s U_{nom}	Test pulse	Pulse voltage U_s	Number of pulses applied / duration	Indication I	Significant fault (> d) or detection and reaction	
					No	Yes (remarks) ¹⁵
without disturbance						
12 V	2a	+ 50				
	2b ¹⁶	+10				
	3a	-150				
	3b	+100				
24 V	2a	+50				
	2b ¹⁴	+20				
	3a	-200				
	3b	+200				
Other voltage supply						
without disturbance						

☐ Passed ☐ Failed

Note: If EUT fails, the frequency at which this occurs shall be recorded

Remarks:

¹⁵ Functional status of the instrument during and after exposure to test pulses

¹⁶ Test pulse 2b is only applicable if the instrument is connected to the battery via the main (ignition) switch of the car, i.e. if the manufacturer has not specified that the instrument is to be connected directly (or by its own main switch) to the battery.

5.6.2 Conduction via lines other supply lines, for external voltage supply (R 61-2, 10.3.7.2)

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Control scale interval, d :	Time:			hh:mm:ss
Resolution during test: (smaller than d)	Bar.			hPa
		Pres.:			

Load:

Marked nominal voltage (U_{nom}) or V

☐ 12 V battery voltage ☐ 24 V battery voltage ☐ Other voltage supply

Disturbance				Result		
Voltage conditions U_{nom}	Test pulse	Pulse voltage U_s	Number of pulses applied / duration	Indication I	Significant fault (> d) or detection and reaction	
					No	Yes (remarks) ¹⁷
without disturbance						
12 V	a	-60 V				
	b	+40 V				
24 V	a	-80 V				
	b	+80 V				
Other voltage supply						
without disturbance						

☐ Passed ☐ Failed

Note: If EUT fails, the frequency at which this occurs shall be recorded

Remarks:

¹⁷ Functional status of the instrument during and after exposure to test pulses

5.7 Ripple on DC mains power (R 61-2, 10.3.8)

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Control scale interval, d :	Time:			hh:mm:ss
Resolution during test: (smaller than d)	Bar. Pres.:			hPa

Load: Voltage (U_{nom}): = V U_{min} = V U_{max} = VLoad, L :

Disturbance			Result	
Test Condition		Indication I	Significant fault (> d) or detection and reaction	
Test	Duration		No	Yes (remarks) ¹⁸
without disturbance				
without disturbance				

☐ Passed ☐ Failed

Note: If significant faults are detected and acted upon, or if the EUT fails, the test point at which this occurs shall be recorded.

Remarks:

¹⁸ Functional status of the instrument during and after exposure to test pulses

5.8 Battery voltage variations during start-up of a vehicle engine (R 61-1, 4.8.3, R 61-2, 10.3.9)

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Control scale interval, d :	Time:			hh:mm:ss
Resolution during test: (smaller than d)	Bar.			hPa
		Pres.:			

☐ Power from external 12 V and 24 V road vehicle batteries, R 61-2, 10.2.8

Voltage (U_{nom}): = V U_{min} = V U_{max} = V f Hz

Load, L :

Disturbance			Result	
Test Condition		Indication I	Significant fault (> d) or detection and reaction	
Voltage ⁽¹⁹⁾	Level		No	Yes (remarks) ²⁰
without disturbance				
Reference				
Lower limit				
Upper limit				
Reference				
without disturbance				

☐ Passed ☐ Failed

Note: If significant faults are detected and acted upon, or if the EUT fails, the test point at which this occurs shall be recorded.

Remarks:

⁽¹⁹⁾ The reference voltage shall be as defined in IEC 1000-4-11 (1994) section 5.

²⁰ Functional status of the instrument during and after exposure to test pulses

5.9 Load dump test (R 61-2, 10.3.10)

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Control scale interval, d :	Time:			hh:mm:ss
Resolution during test: (smaller than d)	Bar. Pres.:			hPa

☐ Power from external 12 V and 24 V road vehicle batteries, R 61-2, 10.2.8

Voltage (U_{nom}): = V U_{min} = V U_{max} = V f Hz

Load, L :

Disturbance			Result	
Test Condition		Indication I	Significant fault (> d) or detection and reaction	
Test pulse shape ²¹	Level		No	Yes (remarks) ²²
without disturbance				
Reference				
U _s (V)				
R _i (Ω)				
Reference				
without disturbance				

☐ Passed ☐ Failed

Note: If significant faults are detected and acted upon, or if the EUT fails, the test point at which this occurs shall be recorded.

Remarks:

²¹Specified by the manufacturer, see applicable test levels in R 61 -2, Table 15.

²² Functional status of the instrument during and after exposure to test pulses

5.10 DC mains voltage dips, short interruptions and (short term) variations (R 61-2, 10.3.11)

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Control scale interval, d :	Time:			hh:mm:ss
Resolution during test: (smaller than d)	Bar. Pres.:			hPa

Automatic zero-setting and zero-tracking device is:

☐ Non-existent
 ☐ Not in operation
 ☐ Out of working
 ☐ In operation

Marked nominal voltage (U_{nom}) or voltage⁽²³⁾ range²⁴: V

Load, L :

Disturbance				Result		
Amplitude (% U_{nom})	Duration (s)	Number of disturbances	Repetition interval (s)	Indication I	Significant fault ($> d$) or detection and reaction	
					No	Yes (remarks)
without disturbance						
0 (high imp)	0.01	3	10			
0 (low imp)	0.01	3	10			
40	0.1	3	10			
70	0.1	3	10			
85	10	3	10			
120	10	3	10			

☐ Passed
 ☐ Failed

Note: If significant faults are detected and acted upon, or if the EUT fails, the test point at which this occurs shall be recorded.

Remarks:

⁽²³⁾ The reference voltage shall be as defined in IEC 1000-4-11 (1994) section 5.

6 Span stability (R 61-1, 7.3, R 61-2, 11)

Application No.: _____
 Type designation: _____
 Control scale interval, d : _____
 Resolution during test: _____
 (smaller than d)

Automatic zero-setting and zero-tracking device is:

☐ Non-existent ☐ Not in operation ☐ Out of working range

Zero load = Test load =

Measurement No. 1: Initial measurement

	At start	At end	
Application No.: _____	Temp.: <input type="text"/>	<input type="text"/>	°C
Type designation: _____	Rel. h.: <input type="text"/>	<input type="text"/>	%
Observer: _____	Date: <input type="text"/>	<input type="text"/>	yyyy-mm-
Conditions of the measurement _____	Time: <input type="text"/>	<input type="text"/>	hh:mm:ss
	Bar. pres.: <input type="text"/>	<input type="text"/>	hPa

$$E_0 = I_0 + \frac{1}{2} d - \Delta L_0 - L_0 \quad E_L = I_L + \frac{1}{2} d - \Delta L - L$$

No.	Indication of zero, I_0	Add. load, ΔL_0	E_0	Indication of load, I_L	Add. load, ΔL	E_L	$E_L - E_0$	Corrected value ²⁵
1								
2								
3								
4								
5								

Average error = average $(E_L - E_0)$

$(E_L - E_0)_{\max} - (E_L - E_0)_{\min} =$

0.1 $d =$

If $|(E_L - E_0)_{\max} - (E_L - E_0)_{\min}| \leq 0.1 d$, the loading and reading will be sufficient for each of the subsequent measurements.

Remarks:

²⁵ When applicable, necessary corrections resulting from variations of temperature, pressure, etc. See remarks.

6 Span stability (R 61-1, 7.3, R 61-2, 11)**Subsequent measurements**

For each of the subsequent measurements (at least 7), indicate on the "conditions of the measurement", as appropriate, if the measurement has been performed after:

<input type="checkbox"/>	the temperature test, the EUT having been stabilized for at least 16 h
<input type="checkbox"/>	the damp heat test, the EUT having been stabilized for at least 16 h
<input type="checkbox"/>	the EUT has been disconnected from the mains for at least 8 h and then stabilized for at least 5 h
<input type="checkbox"/>	any change in the test location
<input type="checkbox"/>	any other specific condition:

Measurement No. 2

		At start	At end	
Application No.:	Temp.:		°C
Type designation:	Rel. h.:		%
Observer:	Date:		yyyy-mm-dd
Conditions of the measurement	Time:		hh:mm:ss
		Bar. pres.:		hPa

$$E_0 = I_0 + \frac{1}{2} d - \Delta L_0 - L_0 \quad E_L = I_L + \frac{1}{2} d - \Delta L - L$$

No.	Indication of zero, I_0	Add. load, ΔL_0	E_0	Indication of load, I_L	Add. load, ΔL	E_L	$E_L - E_0$	Corrected value ²⁶
1								
2								
3								
4								
5								

If five loadings and readings have been performed:

Average error = average ($E_L - E_0$)

--

Remarks:

²⁶ When applicable, necessary corrections resulting from variations of temperature, pressure, etc. See remarks.

6 Span stability (R 61-1, 7.3, R 61-2, 11)**Measurement No. 3**

Application No.:

Type designation:

Observer:

Conditions of the
measurement

	At start	At end	
Temp.:			°C
Rel. h.:			%
Date:			yyyy-mm-dd
Time:			hh:mm:ss
Bar. pres.:			hPa

$$E_0 = I_0 + \frac{1}{2} d - \Delta L_0 - L_0 \quad E_L = I_L + \frac{1}{2} d - \Delta L - L$$

No.	Indication of zero, I_0	Add. load, ΔL_0	E_0	Indication of load, I_L	Add. load, ΔL	E_L	$E_L - E_0$	Corrected value ²⁷
1								
2								
3								
4								
5								

If five loadings and readings have been
performed:

Average error = average ($E_L - E_0$)

--

Remarks:

²⁷ When applicable, necessary corrections resulting from variations of temperature, pressure, etc. See remarks.

Measurement No. 4

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Conditions of the measurement	Time:			hh:mm:ss
		Bar. pres.:			hPa

$$E_0 = I_0 + \frac{1}{2} d - \Delta L_0 - L_0 \quad E_L = I_L + \frac{1}{2} d - \Delta L - L$$

No.	Indication of zero, I_0	Add. load, ΔL_0	E_0	Indication of load, I_L	Add. load, ΔL	E_L	$E_L - E_0$	Corrected value ²⁸
1								
2								
3								
4								
5								

If five loadings and readings have been performed:

Average error = average ($E_L - E_0$)

--

Remarks:

²⁸ When applicable, necessary corrections resulting from variations of temperature, pressure, etc. See remarks.

6 Span stability (R 61-1, 7.3, R 61-2, 11)**Measurement No. 5**

Application No.:

Type designation:

Observer:

Conditions of the
measurement

	At start	At end	
Temp.:			°C
Rel. h.:			%
Date:			yyyy-mm-dd
Time:			hh:mm:ss
Bar. pres.:			hPa

$$E_0 = I_0 + \frac{1}{2} d - \Delta L_0 - L_0 \quad E_L = I_L + \frac{1}{2} d - \Delta L - L$$

No.	Indication of zero, I_0	Add. load, ΔL_0	E_0	Indication of load, I_L	Add. load, ΔL	E_L	$E_L - E_0$	Corrected value ²⁹
1								
2								
3								
4								
5								

If five loadings and readings have been
performed:

Average error = average ($E_L - E_0$)

Remarks:

²⁹ When applicable, necessary corrections resulting from variations of temperature, pressure, etc. See remarks.

6 Span stability (R 61-1, 7.3, R 61-2, 11)**Measurement No. 6**

Application No.:

Type designation:

Observer:

Conditions of the measurement:

	At start	At end	
Temp.:			°C
Rel. h.:			%
Date:			yyyy-mm-dd
Time:			hh:mm:ss
Bar. pres.:			hPa

$$E_0 = I_0 + \frac{1}{2} d - \Delta L_0 - L_0 \quad E_L = I_L + \frac{1}{2} d - \Delta L - L$$

No.	Indication of zero, I_0	Add. load, ΔL_0	E_0	Indication of load, I_L	Add. load, ΔL	E_L	$E_L - E_0$	Corrected value ³⁰
1								
2								
3								
4								
5								

If five loadings and readings have been performed:

Average error = average ($E_L - E_0$)

--

Remarks:

³⁰ When applicable, necessary corrections resulting from variations of temperature, pressure, etc. See remarks.

6 Span stability (R 61-1, 7.3, R 61-2, 11)**Measurement No. 7**

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Conditions of the measurement	Time:			hh:mm:ss
		Bar. pres.:			hPa

$$E_0 = l_0 + \frac{1}{2} d - \Delta L_0 - L_0 \quad E_L = l_L + \frac{1}{2} d - \Delta L - L$$

No.	Indication of zero, l_0	Add. load, ΔL_0	E_0	Indication of load, l_L	Add. load, ΔL	E_L	$E_L - E_0$	Corrected value ³¹
1								
2								
3								
4								
5								

If five loadings and readings have been performed:

Average error = average ($E_L - E_0$)

--

Remarks:

³¹ When applicable, necessary corrections resulting from variations of temperature, pressure, etc. See remarks.

6 Span stability (R 61-1, 7. 3, R 61-2, 11)**Measurement No. 8**

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Conditions of the measurement	Time:			hh:mm:ss
		Bar. pres.:			hPa

$$E_0 = I_0 + \frac{1}{2} d - \Delta L_0 - L_0 \quad E_L = I_L + \frac{1}{2} d - \Delta L - L$$

No.	Indication of zero, I_0	Add. load, ΔL_0	E_0	Indication of load, I_L	Add. load, ΔL	E_L	$E_L - E_0$	Corrected value ³²
1								
2								
3								
4								
5								

If five loadings and readings have been performed:

Average error = average ($E_L - E_0$)

--

Remarks:

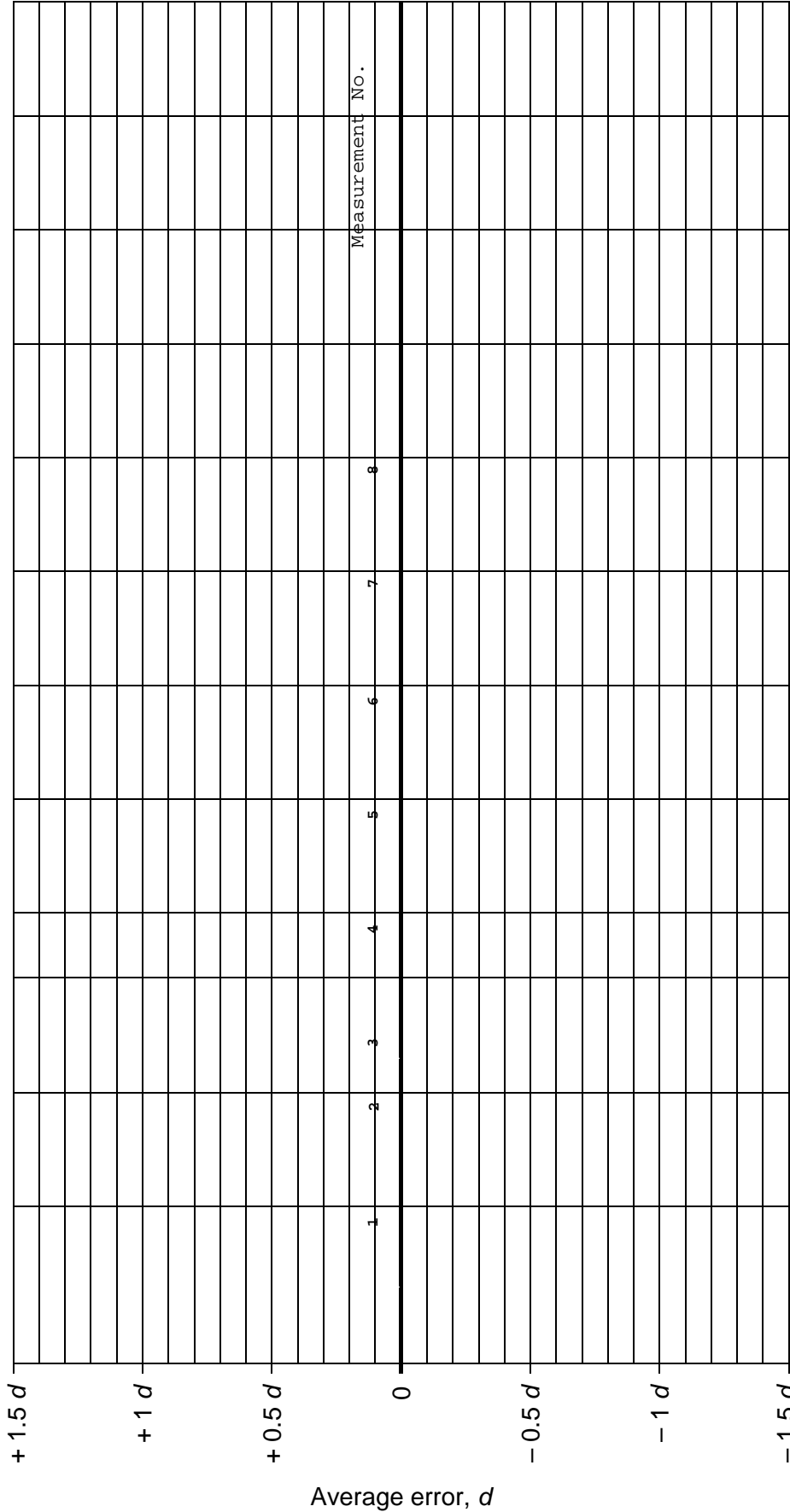
³² When applicable, necessary corrections resulting from variations of temperature, pressure, etc. See remarks.

6 Span stability (R 61-2, 11)

Application No.:

Type designation:

Plot on the diagram the indication of temperature test, **T**, damp heat test, **D**, and disconnections from the mains voltage supply, **P**



Maximum allowable variation

☐ Passed

☐ Failed

7 Material testing (R 61, 8.2.3.1, R 61-2, 9.2 and 12)**7.1 Separate verification method** (R 61-2, 12.2.2)**7.1.1 Test 1 (load value close to maximum capacity)** (R 61-1, 9.2.2 a)

		At start	At end	
Application No.:	Temp.:		°C
Type designation:	Rel. h.:		%
Observer:	Date:		yyyy-mm-dd
Scale interval, <i>d</i>	Time:		hh:mm:ss
Control indicating device test:	Bar. pres.:		hPa

Material:
Condition of material:
Nominal load:

Correction devices	
Type	Settings

Number of loads per fill	
--------------------------	--

Preset value of fill F_P	
----------------------------	--

	Indication of control instrument I	Additional load ΔL	Mass of fill F	Deviation from average
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

	Indication of control instrument I	Additional load ΔL	Mass of fill F	Deviation from average
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48				
49				
50				
51				
52				
53				
54				
55				
56				
57				
58				
59				
60				

Results of material test 1 - Load value close to maximum capacity

Preset value of fill F_p		Maximum deviation from average md	
Average mass of fill $\frac{\sum F}{n}$		Maximum permissible deviation from average for class X(1) $mpd_{(1)}$	
Preset value error $se = \frac{\sum F}{n} - F_p$		$\frac{md}{mpd_{(1)}}$	
Maximum permissible preset value error for class X(1) $mpse_{(1)}$			
$\frac{se}{mpse_{(1)}}$			

$mpe_{(1)}$ = the maximum permissible error for influence factor tests for class X(1)

$mpse_{(1)}$ = maximum permissible preset value error for class X(1)

$mpd_{(1)}$ = maximum permissible deviation of each fill from the average for class X(1)

7 Material testing

7.1. Separate verification method

7.1.2 Test 2 (load value close to rated minimum fill) (R 61-1, 9.2.2a)

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Scale interval, d	Time:			hh:mm:ss
Control indicating device test:	Bar. pres.:			hPa

Material
Condition of material
Nominal load

Correction devices	
Type	Settings

Number of loads per fill	
--------------------------	--

Preset value of fill F_P	
----------------------------	--

	Indication of control instrument I	Additional load ΔL	Mass of fill F	Deviation from average
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

	Indication of control instrument I	Additional load ΔL	Mass of fill F	Deviation from average
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48				
49				
50				
51				
52				
53				
54				
55				
56				
57				
58				
59				
60				

Results of material test 2 - Load value close to rated minimum fill

Preset value of fill F_p		Maximum deviation from average md	
Average mass of fill $\frac{\sum F}{n}$		Maximum permissible deviation from average for class X(1) $mpd_{(1)}$	
Preset value error $se = \frac{\sum F}{n} - F_p$		$\frac{md}{mpd_{(1)}}$	
Maximum permissible preset value error for class X(1) $mpse_{(1)}$			
$\frac{se}{mpse_{(1)}}$			

$mpe_{(1)}$ = the maximum permissible error for influence factor tests for class X(1)

$mpse_{(1)}$ = maximum permissible preset value error for class X(1)

$mpd_{(1)}$ = maximum permissible deviation of each fill from the average for class X(1)

Remarks:

7 Material testing

7.1 Separate verification method

7.1.3 Test 3 (Mid-range critical load value) (R 61-1, 9.2.1 c)

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Scale interval, d	Time:			hh:mm:ss
Control indicating device test:	Bar. pres.:			hPa

Material:
Condition of material:
Nominal load:

Correction devices	
Type	Settings

Number of loads per fill	
--------------------------	--

Preset value of fill F_P	
----------------------------	--

	Indication of control instrument I	Additional load ΔL	Mass of fill F	Deviation from average
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

	Indication of control instrument I	Additional load ΔL	Mass of fill F	Deviation from average
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48				
49				
50				
51				
52				
53				
54				
55				
56				
57				
58				
59				
60				

Results of material test 3 - Mid-range critical load value

Preset value of fill F_p		Maximum deviation from average md	
Average mass of fill $\frac{\sum F}{n}$		Maximum permissible deviation from average for class X(1) $mpd_{(1)}$	
Preset value error $se = \frac{\sum F}{n} - F_p$		$\frac{md}{mpd_{(1)}}$	
Maximum permissible preset value error for class X(1) $mpse_{(1)}$			
$\frac{se}{mpse_{(1)}}$			

$mpe_{(1)}$ = the maximum permissible error for influence factor tests for class X(1)

$mpse_{(1)}$ = maximum permissible preset value error for class X(1)

$mpd_{(1)}$ = maximum permissible deviation of each fill from the average for class X(1)

Remarks:

7 Material testing

7.2 Integral verification method (R 61-1, 9.5.2, R 61-2, 12.2.2)

7.2.1 Test 1 (load value close to maximum capacity) (R 61-1, 9.2.2a)

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Scale interval, d	Time:			hh:mm:ss
Control indicating device test:	Bar. pres.:			hPa

Material
Condition of material
Nominal load

Correction devices	
Type	Settings

Number of loads per fill	
--------------------------	--

Preset value of fill F_p	
----------------------------	--

		Indication of control instrument I	Add. load ΔL	Mass of load L	Mass of fill F	Deviation from average
1	Full					
	Empty					
2	Full					
	Empty					
3	Full					
	Empty					
4	Full					
	Empty					
5	Full					
	Empty					
6	Full					
	Empty					
7	Full					
	Empty					
8	Full					
	Empty					
9	Full					
	Empty					
10	Full					
	Empty					
11	Full					
	Empty					
12	Full					
	Empty					
13	Full					
	Empty					

		Indication of control instrument I	Add. load ΔL	Mass of load L	Mass of fill F	Deviation from average
14	Full					
	Empty					
15	Full					
	Empty					
16	Full					
	Empty					
17	Full					
	Empty					
18	Full					
	Empty					
19	Full					
	Empty					
20	Full					
	Empty					
21	Full					
	Empty					
22	Full					
	Empty					
23	Full					
	Empty					
24	Full					
	Empty					
25	Full					
	Empty					
26	Full					
	Empty					
27	Full					
	Empty					

		Indication of control instrument I	Add. load ΔL	Mass of load L	Mass of fill F	Deviation from average
28	Full					
	Empty					
29	Full					
	Empty					
30	Full					
	Empty					
31	Full					
	Empty					
32	Full					
	Empty					
33	Full					
	Empty					
34	Full					
	Empty					
35	Full					
	Empty					
36	Full					
	Empty					
37	Full					
	Empty					
38	Full					
	Empty					
39	Full					
	Empty					
40	Full					
	Empty					
41	Full					
	Empty					

		Indication of control instrument I	Add. load ΔL	Mass of load L	Mass of fill F	Deviation from average
42	Full					
	Empty					
43	Full					
	Empty					
44	Full					
	Empty					
45	Full					
	Empty					
46	Full					
	Empty					
47	Full					
	Empty					
48	Full					
	Empty					
49	Full					
	Empty					
50	Full					
	Empty					
51	Full					
	Empty					
52	Full					
	Empty					
53	Full					
	Empty					
54	Full					
	Empty					
55	Full					
	Empty					

		Indication of control instrument I	Add. load ΔL	Mass of load L	Mass of fill F	Deviation from average
56	Full					
	Empty					
57	Full					
	Empty					
58	Full					
	Empty					
59	Full					
	Empty					
60	Full					
	Empty					

Results of material test 1 - Load value close to maximum capacity

Preset value of fill F_p		Maximum deviation from average md	
Average mass of fill $\frac{\sum F}{n}$		Maximum permissible deviation from average for class X(1) $mpd_{(1)}$	
Preset value error $se = \frac{\sum F}{n} - F_p$		$\frac{md}{mpd_{(1)}}$	
Maximum permissible preset value error for class X(1) $mpse_{(1)}$			
$\frac{se}{mpse_{(1)}}$			

$mpse_{(1)}$ = maximum permissible preset value error for class X(1)

$mpd_{(1)}$ = maximum permissible deviation of each fill from the average for class X(1)

Remarks:

7 Material testing

7.2 Integral verification method (R 61-1, 9.5.2, R 61-2, 12.2.2)

7.2.2 Test 2 (load value close to rated minimum fill) (R 61-1, 9.2.2a)

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Scale interval, <i>d</i>	Time:			hh:mm:ss
Control indicating device test:	Bar. pres.:			hPa

Material
Condition of material
Nominal load

Correction devices	
Type	Settings

Number of loads per fill	
--------------------------	--

Preset value of fill F_P	
----------------------------	--

		Indication of control instrument I	Add. load ΔL	Mass of load L	Mass of fill F	Deviation from average
1	Full					
	Empty					
2	Full					
	Empty					
3	Full					
	Empty					
4	Full					
	Empty					
5	Full					
	Empty					
6	Full					
	Empty					
7	Full					
	Empty					
8	Full					
	Empty					
9	Full					
	Empty					
10	Full					
	Empty					
11	Full					
	Empty					
12	Full					
	Empty					
13	Full					
	Empty					

		Indication of control instrument I	Add. load ΔL	Mass of load L	Mass of fill F	Deviation from average
14	Full					
	Empty					
15	Full					
	Empty					
16	Full					
	Empty					
17	Full					
	Empty					
18	Full					
	Empty					
19	Full					
	Empty					
20	Full					
	Empty					
21	Full					
	Empty					
22	Full					
	Empty					
23	Full					
	Empty					
24	Full					
	Empty					
25	Full					
	Empty					
26	Full					
	Empty					
27	Full					
	Empty					

		Indication of control instrument I	Add. load ΔL	Mass of load L	Mass of fill F	Deviation from average
28	Full					
	Empty					
29	Full					
	Empty					
30	Full					
	Empty					
31	Full					
	Empty					
32	Full					
	Empty					
33	Full					
	Empty					
34	Full					
	Empty					
35	Full					
	Empty					
36	Full					
	Empty					
37	Full					
	Empty					
38	Full					
	Empty					
39	Full					
	Empty					
40	Full					
	Empty					
41	Full					
	Empty					

		Indication of control instrument I	Add. load ΔL	Mass of load L	Mass of fill F	Deviation from average
42	Full					
	Empty					
43	Full					
	Empty					
44	Full					
	Empty					
45	Full					
	Empty					
46	Full					
	Empty					
47	Full					
	Empty					
48	Full					
	Empty					
49	Full					
	Empty					
50	Full					
	Empty					
51	Full					
	Empty					
52	Full					
	Empty					
53	Full					
	Empty					
54	Full					
	Empty					
55	Full					
	Empty					

		Indication of control instrument I	Add. load ΔL	Mass of load L	Mass of fill F	Deviation from average
56	Full					
	Empty					
57	Full					
	Empty					
58	Full					
	Empty					
59	Full					
	Empty					
60	Full					
	Empty					

Results of material test 1 - Load value close to maximum capacity

Preset value of fill F_p		Maximum deviation from average md	
Average mass of fill $\frac{\sum F}{n}$		Maximum permissible deviation from average for class X(1) $mpd_{(1)}$	
Preset value error $se = \frac{\sum F}{n} - F_p$		$\frac{md}{mpd_{(1)}}$	
Maximum permissible preset value error for class X(1) $mpse_{(1)}$			
$\frac{se}{mpse_{(1)}}$			

$mpse_{(1)}$ = maximum permissible preset value error for class X(1)

$mpd_{(1)}$ = maximum permissible deviation of each fill from the average for class X(1)

Remarks:

7 Material testing

7.2 Integral verification method

7.2.3 Test 3 (Mid-range critical load value) (R 61-1, 9.2.2c)

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Scale interval, <i>d</i>	Time:			hh:mm:ss
Control indicating device test:	Bar. pres.:			hPa

Material
Condition of material
Nominal load

Correction devices	
Type	Settings

Number of loads per fill	
--------------------------	--

Preset value of fill F_P	
----------------------------	--

		Indication of control instrument I	Add. load ΔL	Mass of load L	Mass of fill F	Deviation from average
1	Full					
	Empty					
2	Full					
	Empty					
3	Full					
	Empty					
4	Full					
	Empty					
5	Full					
	Empty					
6	Full					
	Empty					
7	Full					
	Empty					
8	Full					
	Empty					
9	Full					
	Empty					
10	Full					
	Empty					
11	Full					
	Empty					
12	Full					
	Empty					
13	Full					
	Empty					

		Indication of control instrument I	Add. load ΔL	Mass of load L	Mass of fill F	Deviation from average
14	Full					
	Empty					
15	Full					
	Empty					
16	Full					
	Empty					
17	Full					
	Empty					
18	Full					
	Empty					
19	Full					
	Empty					
20	Full					
	Empty					
21	Full					
	Empty					
22	Full					
	Empty					
23	Full					
	Empty					
24	Full					
	Empty					
25	Full					
	Empty					
26	Full					
	Empty					
27	Full					
	Empty					

		Indication of control instrument I	Add. load ΔL	Mass of load L	Mass of fill F	Deviation from average
28	Full					
	Empty					
29	Full					
	Empty					
30	Full					
	Empty					
31	Full					
	Empty					
32	Full					
	Empty					
33	Full					
	Empty					
34	Full					
	Empty					
35	Full					
	Empty					
36	Full					
	Empty					
37	Full					
	Empty					
38	Full					
	Empty					
39	Full					
	Empty					
40	Full					
	Empty					
41	Full					
	Empty					

		Indication of control instrument I	Add. load ΔL	Mass of load L	Mass of fill F	Deviation from average
42	Full					
	Empty					
43	Full					
	Empty					
44	Full					
	Empty					
45	Full					
	Empty					
46	Full					
	Empty					
47	Full					
	Empty					
48	Full					
	Empty					
49	Full					
	Empty					
50	Full					
	Empty					
51	Full					
	Empty					
52	Full					
	Empty					
53	Full					
	Empty					
54	Full					
	Empty					
55	Full					
	Empty					

		Indication of control instrument I	Add. load ΔL	Mass of load L	Mass of fill F	Deviation from average
56	Full					
	Empty					
57	Full					
	Empty					
58	Full					
	Empty					
59	Full					
	Empty					
60	Full					
	Empty					

Results of material test 1 - Load value close to maximum capacity

Preset value of fill F_p		Maximum deviation from average md	
Average mass of fill $\frac{\sum F}{n}$		Maximum permissible deviation from average for class X(1) $mpd_{(1)}$	
Preset value error $se = \frac{\sum F}{n} - F_p$		$\frac{md}{mpd_{(1)}}$	
Maximum permissible preset value error for class X(1) $mpse_{(1)}$			
$\frac{se}{mpse_{(1)}}$			

$mpse_{(1)}$ = maximum permissible preset value error for class X(1)

$mpd_{(1)}$ = maximum permissible deviation of each fill from the average for class X(1)

Remarks:

8 Load indicator performance (R 61-1, 9.5.2, R 61-2, 12.2.2)

This form may be used to record static weighing performance of the load indicator if necessary for the integral verification method for material tests.

Application No.:	Temp.:	At start	At end	°C
Type designation:	Rel. h.:			%
Observer:	Date:			yyyy-mm-dd
Scale interval, <i>d</i>	Time:			hh:mm:ss
Control indicating device test:	Bar. pres.:			hPa

Material
Condition of material
Nominal load

Automatic zero-setting and zero-tracking device is:

☐ Non-existent ☐ Not in operation ☐ Out of working ☐ In operation

$$E = I + \frac{1}{2} d - \Delta L - L$$

Load L	Indication I		Add. load ΔL		Error E	
	↓	↑	↓	↑	↓	↑
(*)					(*)	

(*) At or near zero

Remarks

9 Checklist

Application No.: _____ Type designation: _____
 Report date: _____ Manufacturer: _____

References		Automatic gravimetric filling instruments		Enter value	Remarks
R 61-1	Test procedure R 61-2				
4.2	12.2.4	Static test and reference value for accuracy class Maximum value of $[\text{error}/\text{mpe}_{(1)}]$ for influence factor tests:			
4.8.1	10.2.2	Temperatures test with static load: Maximum value of $\frac{E_c}{\text{mpe}_{(1)}}$	ref.		
			High		
			Low		
			+ 5 °C		
			ref.		
4.8.2	10.2.3	Temperature effect on no-load indication $(\text{mp}\Delta z_{(1)} = \text{mpe}_{(1)} \text{ for rated minimum fill})$ Maximum value of $\frac{\Delta z}{\text{mp} \Delta z_{(1)}}$			
4.8.1	10.2.4.1	Damp heat, steady state (non-condensing): Maximum value of $\frac{E_c}{\text{mpe}_{(1)}}$	ref.		
			high + 85 % RH		
			ref.		
4.8.1	10.2.4.2	Damp heat, cyclic test (condensing): Maximum value of $\frac{E_c}{\text{mpe}_{(1)}}$	ref.		
			high + 95 % RH		
			low + 95 % RH		
			high + 93 % RH		

$\text{mpe}_{(1)}$ = the maximum permissible error for influence factor tests for class X(1)

$\text{mp}\Delta z(1)$ = maximum permissible zero change per 5°C for class X(1)

References		Automatic gravimetric filling instruments		Enter value	Remarks
R 61-1	Test procedure R 61-2				
4.8.3	10.2.5	AC mains voltage variation:	- 15 %		
		Maximum value of $\frac{E_c}{mpe_{(1)}}$	+ 10 %		
	10.2.6	DC power voltage variation:	Lower limit		
		Maximum value of $\frac{E_c}{mpe_{(1)}}$	Upper limit		
	10.2.7	Low voltage of internal battery, not connected to the mains power	Lower limit		
		Maximum value of $\frac{E_c}{mpe_{(1)}}$	Upper limit		
	10.2.8	Power from external 12V and 24V road vehicle batteries	Lower limit		
		Maximum value of $\frac{E_c}{mpe_{(1)}}$	Upper limit		
4.8.4	10.2.9	Tilting: Maximum value of $\frac{E_c}{mpe_{(1)}}$			
		or level indicator enables tilt of 1 % or less		Note in Remarks	
8.2.4	9.4	Maximum value of Error/ $mpe_{(1)}$ [Error/ $mpe_{(1)}$] _{max}			
8.2.4		Reference accuracy class Ref(X)			
3.5.2.7	A.1	Significant fault			

$mpe_{(1)}$ = the maximum permissible error for influence factor tests for class X(1)

Note: The above portion of the checklist enables the reference value for the accuracy class and the value of the significant fault to be determined. The results column should indicate the maximum value from the report for each test (it is not sufficient just to tick the box).

R 61-1	Test procedure R 61-2	Automatic gravimetric filling instruments	Passed	Failed	Remarks
4	Metrological requirements				
4.1	Observe	Units of measurement: <ul style="list-style-type: none"> ▪ milligram (mg) ▪ gram (g) ▪ kilogram (kg) ▪ tonne (t) 	Note in remarks		
4.2	9.4	Accuracy classes The manufacturer shall specify the accuracy class, X(x) and reference value for accuracy class	Note in remarks		
4.3		Error limitation:			
4.3.1		Maximum permissible deviation of each fill	Note in remarks		
4.3.2		Static testing only, maximum permissible error for influence factor tests	Note in remarks Ref(x)		
4.3.2		Maximum permissible error for static loads	Note in remarks		
4.3.3		Maximum permissible preset value error	Note in remarks		
4.3.4		Fault limit value is determined in accordance with R 61-2, 4.3.4	Note in remarks		
4.4		Product reference quantity correction	Note in remarks		
4.5	6.2	Error limits for multi-load AGFIs Effects on the fill shall not be greater than the significant fault value specified in R 61-1, 4.3.4 and the MPE specified in R 61-1, 4.3.2			
4.6		Minimum capacity (Min) The Min shall marked on the instrument in accordance with the descriptive markings in R 61-1, 5.12			
4.7		Rated minimum fill (Minfill) The Minfill shall be specified by the manufacturer			
4.8	10.2	Influence factors			
4.8.1	10.2.1	Humidity The AGFI shall maintain its metrological and technical characteristics at a relative humidity of either 85 % (non condensing) or 93 % (condensing) at the upper limit of the temperature range of the instrument.			

R 61-1	Test procedure R 61-2	Automatic gravimetric filling instruments	Passed	Failed	Remarks
4.8.2 4.8.2.3 4.8.3 4.8.4	7.2	Temperature:			
	10.2.2	Prescribed temperature limits comply with metrological requirements from -10° to +40° C			
	6.2	Special temperature limits shall not be less than 30° and shall be specified in the descriptive markings.			
	10.2.3	Temperature effect on no-load indication			
	7.1	Supply Voltage:			
	10.2.5	AC mains power voltage variations			
	10.2.6	DC mains power voltage variations			
	10.2.7	Low voltage of internal battery, not connected to the mains (DC)			
	10.2.8	Power from external 12 V and 24 V road vehicle batteries			
	10.2.9	Tilting:			
	10.2.9.1	AGFIs not permanently installed in a fixed position and without a levelling device and a level indicator shall comply with the appropriate metrological and technical requirements when tilted (longitudinally and transversely) by up to 5 %			
		Where a levelling device and a level indicator are present the limiting value of tilting shall be defined by a marking. The limiting value of the level indicator shall be obvious, so that tilting is easily noticed. The level indicator shall be fixed firmly on the AGFI in a location clearly visible to the user for the tilt sensitive part.			
		If the AGFI is fitted with a tilt sensor the limiting value of tilting is defined by the manufacturer.			
		The tilt sensor shall release a display switch-off or other appropriate alarm signal (e.g. error signal) and shall inhibit the printout and data transmission if the limiting value of tilting has been exceeded.			
	10.2.9.2	AGFIs not fitted with a levelling device and a level indicator, or an automatic tilt sensor	Note in Remarks		
		AGFIs used in vehicles the tilting is up to 10 % or if higher – referring to the manufacturer's specification.	Note in Remarks		
		AGFIs fulfills the requirement of R 61-1, 4.8.4a and are limited to 1% or less.	Note in Remarks		

5		Technical requirements		
5.1 5.2 5.2.1 5.2.2 5.2.3 5.2.2 5.2.3 5.2.4 5.3	5.4	Suitability for use		
		Instrument suits method of operation and products for which it is intended		
		Robust construction		
		Security of operation:		
		Fraudulent use		
		AGFIs shall have no characteristics likely to facilitate their fraudulent use		
		Accidental maladjustment		
		Effect of accidental breakdown or maladjustment is evident		
		Security		
		Means shall be provided for securing components, interfaces, software devices and pre-set controls of the AGFI, to which unauthorised access is prohibited or is detected and made evident by an audit trail or similar.		
		Print-out is for information purposes only (except preset values and number of weighings)		
		Ancillary devices do not affect correct functioning		
		All scale intervals are the same		
		Indication of weighing results		
		Quality of reading shall be reliable, bright and easy under conditions of use		
		Scales, numbering and printing shall permit the figures that form the results to be read by simple juxtaposition.		

R 61-1	Test procedure R 61-2	Automatic gravimetric filling instruments	Passed	Failed	Remarks
5.3	5.4	Indication of weighing results:			
		Quality of reading: Reading of the results shall be reliable, bright and easy under conditions of normal use.			
		The scales, numbering and printing shall permit the figures that form the results to be read by simple juxtaposition.			
5.3.2		Form of the indication			
		Weighing results shall contain the names or symbols of the units of mass in which they are expressed			
		For any one indication of weight, only one unit of mass may be used.			
		All indicating, printing and tare weighing devices of AGFIs shall, within any one weighing range, have the same scale interval for any given load			
		Digital indication shall display at least one figure beginning at the extreme right			
5.3.3		Use of a printer:			
		Printing shall be clear and permanent for the intended use. Printed figures shall be at least 2 mm high			
		If printing takes place, the name or the symbol of the unit of measurement shall be either to the right of the value or above a column of values			
5.3.4		Scale interval (d):			
		Scale intervals of all indicating devices associated with a weighing module shall be the same.			
		The scale interval for a measured value shall be in the form 1×10^n , 2×10^n , or 5×10^n , where n is any integer or zero.			
5.4	5.4	Fill setting device:			
		If fill setting is by means of a scale, it shall be graduated in units of mass			
		If fill setting is by means of weights, they shall be either weights in accordance with OIML R 111 [5] requirements or purpose-designed of any nominal value, distinguishable by shape and identified with the AGFI.			

R 61-1	Test procedure R 61-2	Automatic gravimetric filling instruments	Passed	Failed	Remarks
5.5	5.4	Final feed cut-off device:			
		Clearly differentiated			
		Direction of movement is shown			
5.6		Feeding device:			
		Sufficient and regular flowrate(s)			
		Indication of the direction of movement resulting from adjustment			
5.7		Load receptor			
		Load receptor, feed and discharge devices are designed to ensure negligible retention of residual material			
		Has facilities for test weights up to max capacity			
		Manual discharge is not possible during automatic operation			
5.8		Zero-setting and tare devices are:			
		Manual, or			
		Semi-automatic, or			
		Automatic			
		For combined zero-setting and tare devices, the same key operates the semi-automatic zero-setting device and the semi-automatic tare device. In these cases, the accuracy requirements specified in R 61-1, 5.8.2 and in 5.8.4 apply at any load			
5.8.1		Range of adjustment:			
		The effect of any zero-setting device shall not alter the maximum weighing capacity of the AGFI.			
		The range of adjustment of zero-setting devices shall not exceed 4 %, and of the initial zero-setting device not more than 20 %, of the Max of the AGFI.			

R 61-1	Test procedure R 61-2	Automatic gravimetric filling instruments	Passed	Failed	Remarks
5.8.2	9.2.3.1	Accuracy of zero-setting:			
		Capable of setting to less than or equal to 0.25 of the maximum permissible deviation for in-service			
		After zero setting the effect of zero deviation on the result of the weighing shall be not more than $\pm 0.25 d$			
5.8.3		Control of the zero-setting and tare devices			
		Non-automatic and semi-automatic devices			
5.8.3.1		Non-automatic or semi-automatic zero-setting and tare devices must be locked during automatic operation.			
		The weighing module shall be in stable equilibrium when the zero-setting and tare devices are operating.			
5.8.3.2, 5.8.5.3	9.2	Automatic zero-setting device:			
		An automatic zero-setting device may operate at the start of automatic operation, as a part of either (A) every automatic weighing cycle, or (B) an arbitrary cycle with after a programmable time interval.			
		A description of the operation of the automatic zero-setting device shall be included in the type approval certificate.			
		Operates sufficiently often to ensure that zero is maintained within twice the given MPE in R 61-1, 5.8.2			
		Where the automatic zero-setting device operates as a part of (A) every automatic weighing cycle, it shall not be possible to disable this device			
		Where the automatic zero-setting device operates after a programmable time interval, this time interval shall not be greater than the value calculated according to the method in Annex A, or shall be reduced depending on prevailing operating conditions.			
		The maximum programmable time interval for automatic zero-setting required above and specified in Annex A may start again after taring or zero setting has taken place.			
		The automatic zero-setting device shall generate suitable information to draw attention to overdue zero setting.			

R 61-1	Test procedure R 61-2	Automatic gravimetric filling instruments	Passed	Failed	Remarks
5.8.4	9.2.3.2	Zero-tracking device shall operate only when the:			
		– indication is at zero, or at a negative net value equivalent to gross zero, and			
		– corrections are not more than 0.5 d/s.			
5.8.5		When zero is indicated after a tare operation, the zero-tracking device may operate within a range of 4 % of Max of the AGFI around the actual indicated zero value.			
		Tare device is:			
		Manual, or			
		Semi-automatic, or			
		Automatic			
5.8.5.1		Accuracy of tare devices: Capable of setting to less than or equal to 0.25 of the maximum permissible deviation for in-service			
		Control of tare devices:			
		Non-automatic or semi-automatic zero-setting and tare devices must be locked during automatic operation.			
		Weighing module shall be in stable equilibrium when the zero-setting and tare devices are operating.			
5.8.5.2		Subtractive tare device: When the use of a subtractive tare device does not allow the value of the residual weighing range to be known, a device shall prevent the use of the AGFI above its maximum capacity or indicate that this capacity has been reached			
5.8.5.3		Automatic tare device:			
		May operate at the start of automatic operation as a part of (A) every automatic weighing cycle, or (B) an arbitrary cycle with a programmable time interval.			
		Operate sufficiently often to ensure that tare is properly taken into account along the production of a batch.			
		Where the automatic tare device operates as a part of (A) every automatic weighing cycle, it shall not be possible to disable this device			

R 61-1	Test procedure R 61-2	Automatic gravimetric filling instruments	Passed	Failed	Remarks
5.8.6		Preset tare device:			
5.8.6.1		The scale interval of a preset tare device shall be equal or automatically rounded to the scale interval of the AGFI			
5.8.6.2		Modes of operation:			
		Preset tare device may be operated together with one or more tare devices provided that a preset tare operation cannot be modified or cancelled as long as any tare device operated after the preset tare operation is still in use			
		Preset tare devices may operate automatically only if the preset tare value is clearly identified with the load to be measured (e.g. by bar code identification on the container).			
5.9	5.4	Data storage:			
		Stored in internal memory or on external storage for subsequent use;			
		Stored data is adequately protected against intentional and unintentional changes during the data transmission and/or storage process;			
		Contains all relevant information necessary to reconstruct an earlier measurement;			
		Data storage sealing measures;			
		meets the appropriate requirements of R 61-1, 5.2.3 for securing;			
		Exchangeable storage media for storing measurement data need not be sealed provided that the stored data is secured by a specific checksum or key code;			
		When storage capacity is exhausted, new data may replace the oldest data provided that overwriting the old data is authorized and/or after and/or after this data has been archived			
		Additional requirements in R 61-1, Annex B apply			

R 61-1	Test procedure R 61-2	Automatic gravimetric filling instruments	Passed	Failed	Remarks
5.10	5.4	Software:			
		– legally relevant software of the AGFI is identified by the manufacturer			
		– sufficient information on software controlled instruments is available			
		– Security of legally relevant software:			
		– legally relevant software is adequately protected against accidental or intentional changes.			
		– software is assigned with appropriate software identification which is adapted in the case of every software change that may affect the functions and accuracy of the AGFI.			
		– functions performed or initiated via connected interfaces, i.e., transmission of legally relevant software, shall comply with the securing requirements for interfaces in 6.9 (R61-1)			

R 61-1	Test procedure R 61-2	Automatic gravimetric filling instruments	Passed	Failed	Remarks
5.10.1	A.1.1	Software documentation:			
		– description of the legally relevant software;			
		– description of the accuracy of the measuring algorithms;			
		– description of the user interface, menus and dialogues;			
		– the unambiguous software identification;			
		– description of the embedded software;			
		– overview of the system hardware, e.g. block diagram, type of computer(s), software source code, etc, if not described in the operating manual;			
		– means of securing software;			
		– operating manual			
		Security of legally relevant software:			
		– legally relevant software shall be adequately protected against accidental or intentional changes			
		– the software shall be assigned with appropriate software identification. This software identification shall be adapted in the case of every software change that may affect the functions and accuracy of the instrument;			
		– functions performed or initiated via connected interfaces, i.e. transmission of legally relevant software, shall comply with the securing requirements for interfaces (R 61-1, 6.9)			
5.10.2					
5.11		Equilibrium:			
		equilibrium mechanism may be provided with detachable masses which shall be either weights in accordance with OIML R 111, R 61-1 [4] requirements or purpose designed masses of any nominal value, distinguishable by shape and identified with the AGFI.			

R 61-1	Test procedure R 61-2	Automatic gravimetric filling instruments	Passed	Failed	Remarks
5.12	5.3	Descriptive markings:			
		– name or identification mark of the manufacturer			
		– name or identification mark of the importer			
		– serial number and type designation of the instrument			
		– temperature range – °C – °C			
		– supply voltage V			
		– voltage supply frequency Hz			
		– working fluid pressure kPa			
		– product(s) designation			
		– average number of loads/fill			
		– rated minimum fill			
		– maximum rate of operation (loads per minute)			
		– type approval marking			
		– reference accuracy class Ref(x)			
		– class of accuracy X(x)			
		– scale interval			
		– maximum capacity			
		– minimum capacity			
		– maximum additive tare +			
		– maximum subtractive tare -			
5.12.1		Supplementary markings:			
		Marking shall be such that the alternative classes or operating parameters are clearly associated with the appropriate material designation.			

R 61-1	Test procedure R 61-2	Automatic gravimetric filling instruments	Passed	Failed	Remarks
5.12.4		Presentation of descriptive markings:			
		–indelible			
		–size, shape and clarity enables legibility			
		–grouped together in clearly visible place			
		–possible to seal the plate bearing the markings			
		If programmable display is used for markings, instrument has:			
		–means for any access to be recorded			
		–markings on plate			
		– type and designation			
		– name or mark of manufacturer			
		– type approval number			
		Descriptive markings may be shown on a display which is controlled by software provided that:			
		–at least max, minfill, Ref(x) and d shall be displayed as long as the AFGI is switched on;			
		–the other marking may be shown on manual commend;			
		–it must be described in the type approval (OIML) certificate; and			
		–the markings are considered as device-specific parameters; and shall comply with the requirements for securing in R 61-1, 5.2.3 and . 5.10.2.			
		–when a display controlled by software is used, the plate of the instrument shall bear at least the following markings:			
		–type approval sign in accordance with national requirements,			
		–name or identification mark of the manufacturer,			
		–serial number;			
		–type approval number;			
		–supply voltage,			
		– AC mains frequency, (if applicable)			

R 61-1	Test procedure R 61-2	Automatic gravimetric filling instruments	Passed	Failed	Remarks
5.13	10.3	Verification marks			
5.13.1		Position:			
5.13.2		– the part on which verification marks are located cannot be removed without damaging the marks			
		– allows easy application of the mark			
		– visible without instrument having to be moved when in service			
		Mounting:			
6		– verification mark support ensures conservation of the marks			
		– correct construction			
		REQUIREMENTS FOR ELECTRONIC INSTRUMENTS			
6.1		Performance under rated operating conditions maximum permissible errors not exceeded			
6.2		Disturbance tests:			
6.3		– Significant faults do not occur, i.e. the difference between the weight indication due to the disturbance and the indication without the disturbance (intrinsic error) shall not exceed the significant fault R 61-1, 3.5.2.7			
		– Significant faults are detected and acted upon.			
		Acting upon a significant fault:			
		a) either the instrument is made inoperative automatically, or			
6.4, 8.1	b) a visual or audible indication is provided automatically and continues until the user takes action or the fault disappears				
	Durability The requirements in R 61-1, 6.1, 6.2 and 6.5 shall be met durably in accordance with the intended use of the instrument.				
6.6	10	Influence factors The AGFIs shall comply with the influence factors requirements of R 61-1, 4.8.			
6.7	5.5	Indicator display test Upon switch-on (of the indication), a special software procedure shall start that takes care of showing all relevant figure and sign elements of the indicator in their active and non-active state for a time period sufficiently long to be checked by the operator. This is not applicable for displays on which failure will become evident.			

R 61-1	Test procedure R 61-2	Automatic gravimetric filling instruments	Passed	Failed	Remarks
6.8	5.5, 10.2.1	Warm-up time:			
		– no indication/transmission of results and automatic operation is inhibited			
		– during first 30 minutes of operation:			
		– zero error complies with the specified requirements			
		– span error complies with the specified requirements			
6.9	5.5	Interfaces:			
		– functions correctly and its metrological functions shall not be influenced by the attached external equipment or software devices or by disturbances acting on the interface.			
		– functions that are performed or initiated via an interface shall meet the relevant requirements and conditions of R 61-1, 5.			
		– it shall not be possible to introduce into the AGFI, through an interface, functions, program modules or data structures intended or suitable to: <ul style="list-style-type: none"> ▪ display unclear data, ▪ falsify displayed, processed or stored weighing results, ▪ unauthorised adjustment of the AGFI. 			
		– other interfaces shall be secured in accordance with R 61-1, 5.2.3.			
		– interfaces intended to be connected to a peripheral device to which the requirements of OIML R 61 apply, shall transmit data relating to primary indications in such a manner that the peripheral device can meet the requirements.			

R 61-1	Test procedure R 61-2	Automatic gravimetric filling instruments	Passed	Failed	Remarks
7.1	6	Examination and tests			
		General appraisal of design and construction			
7..2	10	Performance tests:			
		Instrument meets the requirements of the following tests:			
	10.2.1	Warm-up time			
	10.2.2	Temperature with static load			
	10.2.3	Temperature effect on no-load indication (dry heat and cold)			
	10.2.4	Damp heat test			
	10.2.5	AC mains voltage variation			
	10.2.6	DC mains voltage variation			
	10.2.7	Low voltage of internal battery (not connected to the mains power)			
	10.2.8	Power from external 12 V and 24 V road vehicle batteries			
	10.2.9	Tilting			
	10.3.1	AC mains voltage dips, short interruptions and reductions			
	10.3.2	Bursts (fast transient tests) on mains power lines and on signal, data and control lines			
	10.3.3	Electrostatic discharge			
	10.3.4	Immunity to electromagnetic fields			
	10.3.5	Surges on AC and DC mains power lines and on signal, data and control lines			
	10.3.6	Electrical transient conduction for instruments powered by 12V and 24V batteries			
	10.3.7	Ripple on DC mains power			
	10.3.8	Battery voltage variations during starting up a vehicle engine			
	10.3.9	Load dump test			
	10.3.10	DC mains voltage dips, short interruptions and (short term) variations			
7.10.3	11	Span stability test:			
		the absolute value of the difference between the errors obtained for any two measurements shall not exceed half the maximum permissible error for influence factor tests for a near maximum capacity load			

R 61-1	Test procedure R 61-2	Automatic gravimetric filling instruments	Passed	Failed	Remarks	
8	Annex C	METROLOGICAL CONTROLS				
		If metrological control is imposed for conformity, this control may comprise: a) type evaluation, b) initial verification, c) subsequent verification, d) in-service inspection				
		Measures to ensure durability which are subject to national regulations shall be taken, which shall include assessments under items (a) to (d) above.				
	8.2	8.1	Type evaluation: The application for type approval shall include the following information:			
	8.2.1	5.1, 5.2	Documentation:			
		– general description of the AGFI, description of the function, intended purpose of use, kind of instrument.				
		– general characteristics (manufacturer; Max, Min, X(x), Ref(x), temperature range, voltage, etc.).				
		– list of descriptions and characteristic data of all devices and modules of the AGFI.				
		– drawings of general arrangement and details of metrological interest including details of any interlocks, safeguards, restrictions, limits, etc.				
		– drawing or photo of the AGFI showing the principle and the location of verification and securing marks are to be applied, which is necessary to be included in the OIML Certificate or Test Report.				
		– securing components, adjustment devices, controls, etc. protected access to set-up and adjustment operations.				
		– location for application of control marks, securing elements, descriptive markings, identification, conformity and/or approval marks				
		– devices of the AGFI.				
		– auxiliary, or extended indicating devices				

R 61-1	Test procedure R 61-2	Automatic gravimetric filling instruments	Passed	Failed	Remarks
8.2.1	5.1, 5.2	Documentation:			
		– multiple use of indicating devices			
		– printing devices (only for special purposes)			
		– data storage devices			
		– zero-setting, zero-tracking devices			
		– tare devices and preset tare devices			
		– leveling device and level indicator, tilt sensor, upper limit of tilting			
		– locking devices and auxiliary verification devices.			
		– load receptors, connection of different load receptors			
		– interfaces (types, intended use, immunity to external influences instructions			
		– peripheral devices, e.g. printers, secondary displays, for including in the type approval certificate and for connection for the disturbance tests			
		– other devices or functions, e.g. for purposes other than determination of mass (not subject to conformity assessment).			
		– detailed description of the stable equilibrium function of the AGFI.			
		– information concerning special cases.			
		– subdivision of the AGFI in modules - e.g. load cells, mechanical system, indicator, display - indicating the functions of each module and the fractions p_i . For modules that have already been approved, reference to test certificates or type approval certificates (R 61-1, 8.2.4), reference to evaluation to R 60 for load cells.			
		– special operating conditions			
		– reaction of the AGFI to significant faults			
		– functioning of the display after switch-on			
		– technical description, drawings and plans of devices, sub-assemblies, etc. particularly those in R 61-1, 5.12 and 5.13.			
		– a description of the operation of the automatic tare device (e.g. the maximum programmable time interval).			

R 61-1	Test procedure R 61-2	Automatic gravimetric filling instruments	Passed	Failed	Remarks
8.2.1	5.1, 5.2	Documentation:			
		– load cells, if not presented as modules.			
		– electrical connection elements, e.g. for connecting load cells to the indicator, including length of signal lines.			
		– indicator: block diagram, schematic diagrams, internal processing and data exchange via interface, keyboard with function assigned to any key.			
		– declarations of the manufacturer, e.g. for interfaces (R 61-1, 5.10.1, 6.9), for protected access to set-up and adjustment (R 61-1, 5.2.2, 5.2.3), for other software based operations.			
		– samples of all intended printouts.			
		– results of tests performed by the manufacturer or from other laboratories, on protocols from OIML R 61-3, including proof of competence.			
		– certificates of other type approvals or separate tests, relating to modules or other parts mentioned in the documentation, together with test protocols.			
		– for software controlled AGFIs or modules, additional documents according to R 61-1, 5.10 and Annex B.			
		8.2.2	5, 8.1	Type evaluation:	
General requirements:					
– Type evaluation shall be carried out on one or more and normally not more than three AGFIs that represent the definitive type.					
– At least one of the AGFIs shall be submitted in a form suitable for simulation testing in a laboratory and shall include the whole of the electronics which affect the weighing result except in the case of a selective combination weigher where only one representative weighing module may be included					
The evaluation shall consist of the following tests and the submitted documents shall be examined and tests carried out to verify that the AGFI comply with the:					
8.2.3		– requirement specified for static tests in R 61-1, clause 4,			
		– technical requirements in R 61-1, clause 5,			
		– requirement in R 61-1, clause 7			

R 61-1	Test procedure R 61-2	Automatic gravimetric filling instruments	Passed	Failed	Remarks
8.2.3.1	12	– Tests are conducted without unnecessary commitment of resources			
		– Metrological authority permits the results of these tests to be assessed for initial verification			
		Tests for type evaluation shall be conducted:			
		– in accordance with the appropriate parts of clause 4			
		– under the normal conditions of use for which the AGFI is intended, and			
	12.2	– in accordance with the material test methods given in R 61-2, 8 and 12.1, using material that is representative of a product for which the AGFI is designed to assess compliance with the technical requirements in 5.			
	10	For software-controlled AGFIs, the additional requirements in R 61-1, 5.10 and in Annex B apply.			
		Influence factor tests: Influence factors shall be applied to the AGFI or simulator during simulation tests in a manner that will reveal a corruption of the weighing result of any weighing process to which the AGFI could be applied, in accordance with 4.8 and 7.			
		Modules Subject to agreement with the approving authority, the manufacturer may define and submit modules to be examined separately. where:			
		– testing the instrument as a whole is difficult or impossible;			
8.2.3.2	10	– modules are manufactured and/or placed on the market as separate units to be incorporated in a complete instrument; or			
		– the applicant wants to have a variety of modules included in the approved type			
		Apportioning of errors: When parts of instrument are examined separately in process of type approval, errors apportioned as detailed in R 61-1, 8.2.3.3			
5.10, Annex B	8.2.3.3.1	10.1.1			

R 61-1	Test procedure R 61-2	Automatic gravimetric filling instruments	Passed	Failed	Remarks
8.2.3.3.2		Tests:			
		As far as applicable the same tests shall be performed as for complete instruments in accordance with:			
		– the applicable tests for indicators and analogue data processing devices are given in OIML R76 Annex C			
		– the applicable tests for digital data processing devices, terminals and digital displays are given in OIML R76 Annex D, and			
		– the applicable tests for weighing modules are given in OIML R76 Annex E. Test procedures for load cells are provided in OIML R 60.			
		Compatibility of modules The compatibility of modules shall be established and declared by the manufacturer in accordance with:			
		– OIML R76 Annex F for indicators and load cells			
		– OIML R76 Annex F.5 for modules with digital output, compatibility includes the correct communication and data transfer via the digital interface(s), see.			
		As far as applicable, e.g. replace “e” with “d” for the AGFI			
		8.2.3.4	9.4	Type approval certificate and accuracy classes	
– certificate shall state the reference value for the accuracy class determined by the static tests and,					
– shall state that the actual class (equal to or greater than the reference value) shall be determined by compliance with the metrological requirements at initial verification					
8.3					
Initial verification: AGFIs shall be examined for conformity with the approved type and:					
if applicable, be tested for compliance with clauses 4 and 5 for the intended products and corresponding accuracy classes and when operated under normal conditions of use.					
tests shall be carried out, in-situ, with the AGFI fully assembled and fixed in the position in which it is intended to be used.					
installation of the AGFI shall be so designed that an automatic weighing operation will be the same whether for the purposes of testing or for use for a transaction.					
in accordance with R 61-1, 4.8.4 if the AGFI is liable to be tilted, or is not fitted with a levelling device and a level indicator.					

R 61-1	Test procedure R 61-2	Automatic gravimetric filling instruments	Passed	Failed	Remarks
8.3.2	8, 12	Material tests at initial verification :			
		–conducted in compliance with R 61-2, 8			
8.3.3	8	–under the normal conditions and with the products for which the AGFI is intended.			
		Conduction of the tests:			
		the appropriate metrological authority:			
		–shall conduct the tests in a manner which prevents an unnecessary commitment to resources,			
		–may, where appropriate and to avoid duplicating test previously done for type evaluation under R 61, 8.2, use the results from type evaluation for initial verification			
8.3.4		Determination of accuracy class X(x)			
		For class X(x) AGFIs the metrological authority shall:			
		–determine the accuracy class for the materials used in the tests in accordance with 8.2.4 by reference to the material test results (OIML R 61-2, 12) and the limits of error specified in 4.3.1 and 4.3.3 for initial verification,			
		–verify that accuracy classes marked in accordance with 5.12 are equal to or greater than the accuracy classes determined as above.			

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