

Working draft (WD) – Tracked version

Title: OIML R51-3 Automatic catchweighing instruments

Part 3: Test report format

Supersedes document: R 51 (2006)

Project Group: TC 9/SC 2/ **p10**

☒ **Comments by: 26 April 2019**

EXPLANATORY NOTE

The 53rd CIML approved as a new project, under the responsibility of TC 9/SC / p10 and under the joint convenorship of the UK (Morayo Awosola), and India (B.N Dixit.) the revision of OIML R51 "Automatic Catchweighing Instruments 2009 E". This working draft has been

restructured from two parts into three separate parts:

Part 1: Metrological and Technical Requirements;

Part 2: Testing procedures;

Part 3: Report Format for Type Evaluation.

To align with other D11, some additional tests for disturbance:

1) Battery voltage variations during starting up a vehicle engine

2) "Load dump" test

3) Ripple on DC mains power

No other changes/comments have been implanted in this first working draft.

TC 9/SC 2/p 10 Revision of R51:2006 Automatic catchweighing instruments Proposal phase: Project Approved: project group forming - 2018-10-14		
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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 two main categories of OIML publications are:

- 1) **International Recommendations (OIML R)**, which are model regulations that establish the metrological characteristics required of certain measuring instruments and which specify methods and equipment for checking their conformity; the OIML Member States shall implement these Recommendations to the greatest possible extent;
- 2) **International Documents (OIML D)**, which are informative in nature and intended to improve the work of the metrological services.

OIML Draft Recommendations and Documents are developed by technical committees or subcommittees which are formed by the Member States. Certain international and regional institutions also participate on a consultation basis.

Cooperative agreements are established between OIML and certain institutions, such as ISO and IEC, with the objective of avoiding contradictory requirements; consequently, manufacturers and users of measuring instruments, test laboratories, etc. may apply simultaneously OIML publications and those of other institutions.

International Recommendations and International Documents are published in French (F) and English (E) and are subject to periodic revision.

OIML publications may be obtained from the Organization's headquarters:

Bureau International de Métrologie Légale
11, rue Turgot - 75009 Paris - France
Telephone: 33 (0)1 48 78 12 82 and 42 85 27 11
Fax: 33 (0)1 42 82 17 27
E-mail: biml@oiml.org
Internet: <http://www.oiml.org>

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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 catchweighing instrument shall be submitted with a view to its approval.

The test report format consists of two parts, a "checklist" and the "test report" 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, experimental or visual checks based on the requirements of Part 1. The words or condensed sentences aim at reminding the examiner of the requirements in R 51-1 without reproducing them.

The test report is a record of the results of the tests carried out on the instrument. The "test report" forms have been produced based on the tests detailed in R 51-1.

All metrology services or laboratories evaluating types of automatic catchweighing instruments accordingly to R 51 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 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 51-2 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.

AUTOMATIC CATCHWEIGHING INSTRUMENTS

TYPE EVALUATION REPORT

EXPLANATORY NOTES

Abbreviations and symbols

I	Indication
I_n	n th indication
L	Load
ΔL	Additional load to next changeover point
P	$I + 1/2 e - \Delta L$ = Indication prior to rounding (digital indication)
E	$I - L$ or $P - L$ = Error
E_0	Error at zero load
P_i	Fraction of the MPE applicable to a module of the instrument which is examined separately.
\bar{X}	Mean of indicated readings
$\bar{X} - L$	Mean error
d_T	Preset tare Scale interval
Temp	Temperature
Rel. h	Relative humidity
MPE	Maximum permissible error
MPME	Maximum permissible mean (systematic) error for automatic operation
MPSD	Maximum permissible standard deviation of the error for automatic operation
EUT	Equipment under test
sf	significant fault
Max	maximum capacity of the weighing instrument
Min	minimum capacity of the weighing instrument
Max ₁ , Max _i , Max _r	maximum capacity of the weighing instrument, rules for indices
U_{nom}	the nominal voltage value marked on the instrument
U_{max}	the highest value of a voltage range marked on the instrument
U_{min}	the lowest value of a voltage range marked on the instrument
DC	direct current
AC	alternating current

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:	2002-01-29	2002-01-30	yyyy-mm-dd
Time:	16:00:05	16:30:25	hh:mm:ss

"Date" in the test reports refers to the date that the test was performed.

In the disturbance tests, faults greater than e 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 51-1.

GENERAL INFORMATION CONCERNING THE TYPE

Application N°: Manufacturer:
 Type designation: Applicant:
 Instrument category:

☐ Complete instrument ☐ Module ¹

In automatic operation, instrument weighs : ☐ dynamically ☐ statically

☐

Accuracy class ☐ X()

☐ Y(I) ☐ Y(II) ☐ Y(a) ☐ Y(b)

Min =

e = Max = d = n =

e₁ = Max₁ = d₁ = n₁ =

e₂ = Max₂ = d₂ = n₂ =

e₃ = Max₃ = d₃ = n₃ =

T = + T = -

U_{nom}² = V U_{min} = V U_{max} = V f = Hz Battery, U = V

Zero-setting device:

☐ Nonautomatic

☐ Semi-automatic

☐ Automatic zero-setting

☐ Initial zero-setting

☐ Zero-tracking

Tare device:

☐ Tare balancing

☐ Tare weighing

☐ Preset tare

☐ Subtractive tare

☐ Additive tare

☐ Combined zero/tare device

Initial zero-setting range %

Temperature range °C

Printer: ☐ Built in ☐ Connected ☐ Not 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 U_{nom} is the nominal voltage marked on the instrument, or the average of a voltage range, marked on the instrument.

GENERAL INFORMATION CONCERNING THE TYPE (continued)

Instrument submitted:	Load sensor:
Identification N°:	Manufacturer:
Software version:	Type:
Connected equipment:	Capacity:
	Number:
Interfaces(number, nature):	Classification symbol:
	Remarks:
Evaluation period:
Date of report:
Observer:

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 N°: Manufacturer:
Software version:
Report date:

(Record as necessary to identify the equipment under test)

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

Simulator documentation

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

Simulator function (summary)

Simulator description and drawings, block diagram etc should be attached to the report if available.

IDENTIFICATION OF THE INSTRUMENT (continued)

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)

Equipment name	Manufacturer	Type No	Serial No	Used for (test references)
.....
.....
.....
.....
.....
.....
.....

CONFIGURATION FOR TEST

Application No: Type designation:
Report date: Manufacturer:

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

SUMMARY OF TYPE EVALUATION

Application No: Type designation:
 Report date:

	TESTS	Report page	Passed	Failed	Remarks
1	Warm-up time test				
2	Dynamic setting				
3	Zero-setting				
4	Tare				
5	Eccentric loading				
6	Alternative operating speed				
7	Stability of equilibrium				
8	Influence factors				
8.1	Pre-test for instruments that weigh statically				
8.2	<u>Prescribed temperatures test (dry heat and cold)</u> Static temperatures				
8.3	<u>Temperature effect on no-load indication</u>				
	<u>Damp heat tests</u>				
8.4	<u>Damp heat, steady-state (non condensing)</u>				
	<u>Damp heat, cyclic test (condensing)</u>				
8.5	<u>AC mains voltage variation</u>				
8.6	<u>DC mains voltage variation</u>				
8.7	<u>Low voltage of internal battery (not connected to the mains supply)</u>				
8.8	<u>Power from external 12V and 24V road vehicle batteries</u>				
8.9	<u>Tilting</u>				
9	Disturbances				
9.1	<u>AC mains voltage dips, short interruptions and reductions</u>				
9.2	<u>Electrical bursts (fast transient tests) on AC and DC mains and on signal, data and control lines</u>				
9.2.1	<u>Electrical bursts (fast transient tests) on AC and DC mains</u>				
9.3.2.2	<u>Electrical bursts (fast transient tests) on signal, data and control lines</u>				
9.3	<u>Electrical surges on AC and DC mains and on signal, data and control lines</u>				

<u>9.43.1</u>	<u>Electrical surges on AC and DC mains power lines</u>				
<u>9.53.2</u>	<u>Electrical surges on signal, data and control lines</u>				
<u>9.4</u>	<u>Immunity to radiated (RF) electromagnetic fields</u>				
<u>9.64.1</u>	<u>Immunity to radiated (RF) electromagnetic and to conducted fields</u>				
<u>6.3.69.4.2</u>	<u>Immunity to conducted electromagnetic fields</u>				
<u>6.3.79.5</u>	<u>Electrostatic discharge tests</u>				
<u>9.6</u>	<u>Electrical transient conduction</u>				
<u>6.3.89.6.1</u>	<u>Electrical transient conduction along supply lines for 12 V or 24 V road vehicle batteries</u>				
<u>6.3.99.6.2</u>	<u>Electrical transient conduction via lines other than supply lines for 12 V or 24 V road vehicle batteries</u>				
<u>6.3.109.7</u>	<u>Battery voltage variations during starting up of a vehicle engine</u>				
<u>499.8</u>	<u>Ripple on DC mains power</u>				
<u>9.9</u>	<u>Load "dump" test</u>				
	<u>EXAMINATIONS</u>				
11	Examination of the construction				
12	Checklist				

Note: "Sample test report" sheets for including weight indication for each pass of load (up to 60 passes) are included at the end of this document. These sheets are not included in each section as they are not required for all instrument types.

SUMMARY OF TYPE EVALUATION (continued)

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

1 WARM-UP TIME (4.2.3R 51-1, 7.2.3, A.5.2R 51-2, 5.2)

Application No:	Temp: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> °C	At start	At end		
At start	At end				
Type designation:	Rel. h: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> %	At start	At end		
At start	At end				
Observer:	Date: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> yyyy-mm-dd	At start	At end		
At start	At end				
Verification scale interval e:	Time: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> hh:mm:ss	At start	At end		
At start	At end				
Resolution during test:	Bar. pres: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> hPa	At start	At end		
At start	At end				

(smaller than e): (only class XI or Y(I))

Duration of disconnection before test: hrs

Automatic zero-setting device is:

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

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

 E_0 = error calculated prior to each measurement at zero or near zero (unloaded) E_L = error calculated at load (loaded)

time (*)	Load L	Indication I	Add load ΔL	Error	$E_L - E_0$
-------------	-----------	-----------------	------------------------	-------	-------------

Unloaded	0 min				$E_{0i} =$
Loaded					$E_L =$

Unloaded	5 min				$E_0 =$
Loaded					$E_L =$

Unloaded	15 min				$E_0 =$
Loaded					$E_L =$

Unloaded	30 min				$E_0 =$
Loaded					$E_L =$

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

Error ⁴	MPE
Initial zero-setting error	$E_{0i} \leq 0.25 e$
Maximum value of error unloaded	$E_0 \leq 0.5 e$
Maximum value of zero variation	$ E_0 - E_{0i} \leq 0.25 e \cdot p$
Maximum value of error loaded	$E_L - E_0 \leq MPE \cdot p_i$

☐ Passed ☐ Failed

Remarks:

³In operation only if zero operates as part of every automatic weighing cycle⁴Check that the error is \leq the MPE

2 RANGE OF DYNAMIC SETTING (3-2-3R 51-1, 6.2.3, A-5-3R 51-2, 5.3)

Application No:	Temp: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td></td><td></td></tr></table> °C	At start	At end		
At start	At end				
Type designation:	Rel. h: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td></td><td></td></tr></table> %	At start	At end		
At start	At end				
Observer:	Date: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td></td><td></td></tr></table> yyyy-mm-dd	At start	At end		
At start	At end				
Verification scale interval e:	Time: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td></td><td></td></tr></table> hh:mm:ss	At start	At end		
At start	At end				
Resolution during test:	Bar. pres: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td></td><td></td></tr></table> hPa	At start	At end		
At start	At end				
(smaller than e):	(only class XI or Y(I))				

Inside set rangeClass X

	Load L	Mean of indicated readings (X)	Mean error (X - L)	MPME	Standard deviation (s)	MPSD
Close to Min						
Close to Max						

Class Y

	Load L	Number of weighings	Maximum error	MPE
Close to Min				
Close to Max				

Outside set rangeClass X or Y

	Load L	Operation inhibited	Printing inhibited
Close to Min			
Close to Max			

☐ Passed ☐ Failed

Remarks:

3 ZERO-SETTING (3.5R 51-1, 6.5, A.5.4R 51-2, 5.4)

Application No:	Temp: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>At start</td><td>At end</td></tr><tr><td> </td><td> </td></tr></table> °C	At start	At end		
At start	At end				
Type designation:	Rel. h: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> %				
Observer:	Date: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> yyyy-mm-dd				
Verification scale interval e:	Time: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> hh:mm:ss				
Resolution during test:	Bar. pres: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> hPa				
(smaller than e):	(only class XI or Y(I))				

3.1 Modes of zero-setting (R 51-1, 6.5.4, A.5.4R 51-2, 5.4.1)

Modes of zero-setting	Present	Range tested	Accuracy tested
Non-automatic			
Semi-automatic			
Auto zero at start of automatic operation			
Auto-zero as part of every weighing cycle			
Auto-zero after programmable interval			

3.2 Range of zero-setting (3.5R 51-1, 6.5.1, A.5.4R 51-2, 5.4.2)**3.2.1 Initial zero-setting range (A.5.4R 51-2, 5.4.2.1)**

Positive range L_p		Negative range L_n		Zero setting range $L_p + L_n$	% of Max load
Weight added	Zero Yes/no	Weight added	Zero Yes/no		

3.2.2 Automatic zero-setting range (A.5.2.3)

Weight added	Zero Yes/No	Zero setting range	% of Max load

☐ Passed

☐ Failed

Remarks:

3 ZERO-SETTING (continued)

3.3 Accuracy of zero-setting (3.5R 51-1, 6.5.2)

3.3.1 Static test method (A.6-4R 51-2, 5.4.3)

$E = I + \frac{1}{2} d - \Delta L$
 $E = I - L$ or $P - L = \text{Error}$

Zero-setting mode:	Add. Load ΔL	$E = I + \frac{1}{2} d - \Delta L$	$MPE_{(zero)}$

☐ Passed

☐ Failed

Remarks:

3 ZERO-SETTING (continued)

3.4 Stability of zero and frequency of automatic zero-setting (3.5R 51-1, 6.5.4, A.5.4R 51-2, 5.4)

Maximum programmable time interval between automatic zero-setting

Static test method (A.5.4R 51-2, 5.4.3)

$E = I + \frac{1}{2} d - \Delta L$
 $E = I - L$ or $P - L = \text{Error}$

Zero-setting mode:	Add. Load ΔL	$E = I + \frac{1}{2} d - \Delta L$	$MPE_{(zero)}$

☐ Passed

☐ Failed

Remarks:

4 TARE DEVICE (Weighing test) (3.6R 51-1, 6.6, A.5.6.1R 51-2, 5.6)**4.1 Automatic operation (A.5.6.1R 51-2, 5.6.1)**

Application No:	Temp:	At start	At end	°C
Type designation:	Rel. h:			%
Observer:	Date:			yyyy-mm-dd
Verification scale interval e:	Time:			hh:mm:ss
Resolution during test:	Bar. pres:			hPa
(smaller than e):	(only class XI or Y(I))			

Automatic zero-setting and zero-tracking device is:

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

First tare value

Second tare value

Tare: Tare: Tare indication: Tare indication:

Rate of operation (max):

Class X

Tare	Load	Mean of indicated readings (\bar{X})	Mean error ($\bar{X} - L$)	MPME	Standard deviation (s)	MPSD
First value						
First value						
Second value						
Second value						

Class Y

Tare	Load	Number of weighings	Maximum error	MPE
First value				
First value				
Second value				
Second value				

☐ Passed ☐ Failed

Remarks:

4.2 Nonautomatic (static) operation (continued)

Second tare value

Tare indication:

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

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

[illegible]

Remarks:

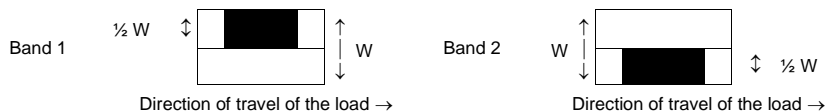
5 ECCENTRIC LOADING (2-8-1R 51-1, 5.7.1, A-5-7R 51-2, 5.7)

5.1 Eccentric test for instruments that weigh dynamically (R 51-1, 9.4.46.4.4, A-5-7R 51-2, 5.7.1)

Application No:	Temp: <table border="1" style="display: inline-table;"><tr><td>At start</td><td>At end</td></tr><tr><td></td><td></td></tr></table> °C	At start	At end		
At start	At end				
Type designation:	Rel. h: <table border="1" style="display: inline-table;"><tr><td></td><td></td></tr></table> %				
Observer:	Date: <table border="1" style="display: inline-table;"><tr><td></td><td></td></tr></table> yyyy-mm-dd				
Verification scale interval e:	Time: <table border="1" style="display: inline-table;"><tr><td></td><td></td></tr></table> hh:mm:ss				
Resolution during test:	Bar. pres: <table border="1" style="display: inline-table;"><tr><td></td><td></td></tr></table> hPa				
(smaller than e):	(only class XI or Y(I))				

Load ($\frac{1}{3}$ Max):

Location of test loads for instruments that weigh dynamically:



Rate of operation (max):

Automatic zero-setting and zero-tracking device is:

☐ Non-existent ☐ Out of working range ☐ In operation

Class X

Position	Mean of indicated readings (X)	Mean error (X - L)	MPME	Standard deviation (s)	MPSD
Band 1					
Band 2					

Class Y

Position	Number of weighings	Maximum error	MPE
Band 1			
Band 2			

☐ Passed ☐ Failed

Remarks:

5 ECCENTRIC LOADING (continued)**5.2 Eccentric test for instruments that weigh statically (6.4.4R 51-1, 9.4.4, A.5.7R 51-2, 5.7.2)**

Application No:	Temp: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> °C	At start	At end		
At start	At end				
Type designation:	Rel. h: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> %	At start	At end		
At start	At end				
Observer:	Date: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> yyyy-mm-dd	At start	At end		
At start	At end				
Verification scale interval e:	Time: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> hh:mm:ss	At start	At end		
At start	At end				
Resolution during test:	Bar. pres: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> hPa	At start	At end		
At start	At end				

(smaller than e): (only class XI or Y(I))

Load ($\frac{1}{3}$ Max)

Location of test loads for instruments that weigh statically

b	c
e	d

Automatic zero-setting and zero-tracking device is:

☐ Non-existent ☐ Not in operation ☐ Out of working range
Class X or Y

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

 $E_c = E - E_0$ with E_0 = error calculated prior to each measurement at or near zero (*)

Load L	Location	Indication I	Add load ΔL	Error	Corrected error E_c	MPE
(*)				(*)		

☐ Passed ☐ Failed

Remarks:

6 ALTERNATIVE OPERATING SPEEDS (6.1.4R 51-1.9.1.4, A-5.8R 51-2.5.8)

Application No:	Temp:	At start	At end	°C
Type designation:	Rel. h:			%
Observer:	Date:			yyyy-mm-dd
Verification scale interval e:	Time:			hh:mm:ss
Resolution during test:	Bar. pres:			hPa

(smaller than e):

Max load transport speed:

Alternative speed: ⁵

Load close to Max:

Load close to Min:

Automatic zero-setting device is:

☐ Non-existent ☐ Not in operation ☐ Out of working range ☐ In operation
Class X

Load transport speed	Load	Mean of indicated readings (X)	Mean error (X - L)	MPME	Standard deviation (s)	MPSD
Max	Max					
Max	Min					
Alternative	Max					
Alternative	Min					
Preset ⁶	Alternative					
Preset	Alternative					

Class Y

Load transport speed	Load	Number of weighings	Maximum error	MPE
Max	Max			
Max	Min			
Alternative	Max			
Alternative	Min			
Preset	Alternative			
Preset	Alternative			

☐ Passed ☐ Failed

Remarks:

⁵ Set as specified in R51-1, 69.1.4.⁶ Preset speed(s) should only be tested where applicable

7 STABILITY OF EQUILIBRIUM (3.4.1R 51-1, 6.4.1, A.5.9R 51-2, 5.9)

Application No:	Temp: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> °C	At start	At end		
At start	At end				
Type designation:	Rel. h: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> %	At start	At end		
At start	At end				
Observer:	Date: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> yyyy-mm-dd	At start	At end		
At start	At end				
Verification scale interval e:	Time: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> hh:mm:ss	At start	At end		
At start	At end				
Resolution during test:	Bar. pres: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> hPa	At start	At end		
At start	At end				

(smaller than e):

In the case of printing or data storage

Load =

Number	First printed or stored value after disturbance and command	Reading during 5 seconds after print-out or storage	
		Minimum	Maximum
1			
2			
3			
4			
5			

Check separately for each of the 5 tests if only two adjacent figures appear, one being the printed value

In the case of zero-setting or tare setting

 $E = I + \frac{1}{2} e - \Delta L - L$ $L = \text{zero or near zero}$

Number	Load L	Indication I	Add. load ΔL	Error E
Zero-setting				
1				
2				
3				
4				
5				
Tare setting				
1				
2				
3				
4				
5				

Check the accuracy according to A.5.4R 51-2, 5.4.5 for zero-setting and to A.5.6.2 for tare-setting

☐ Passed ☐ Failed

Remarks:

8 INFLUENCE FACTORS (2.9R 51-1, 5.8 and 7.1.2, and 6.4.5)**8.1 Pre-test for instruments that weigh statically (6.4.5.2, A.3.4)****8.1.1 Test 1: Maximum speed, load close to Max**

Application No:	Temp: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> °C	At start	At end		
At start	At end				
Type designation:	Rel. h: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> %				
Observer:	Date: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> yyyy-mm-dd				
Verification scale interval e:	Time: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> hh:mm:ss				
Resolution during test:	Bar. pres: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> hPa				

(smaller than e):

Load: (see 6.1.3) Speed:

Automatic zero-setting device is:

☐ Non-existent ☐ Not in operation ☐ Out of working range ☐ In operation
CLASS Y

Test	Indication	Error	Test	Indication	Error	Test	Indication	Error
1			21			41		
2			22			42		
3			23			43		
4			24			44		
5			25			45		
6			26			46		
7			27			47		
8			28			48		
9			29			49		
10			30			50		
11			31			51		
12			32			52		
13			33			53		
14			34			54		
15			35			55		
16			36			56		
17			37			57		
18			38			58		
19			39			59		
20			40			60		

Maximum error =

Maximum permissible error =

☐ Passed ☐ Failed

Remarks:

8.1.1 Test 1: Maximum speed, load close to Max (continued)

Class X

Mean of indicated readings (\bar{x})	Mean error (\bar{x} - L)	MPME	Standard deviation (s)	MPSD

☐ Passed ☐ Failed

Remarks:

8.1 Pre-test for instruments that weigh statically (continued)**8.1.2 Test 2: Maximum speed, load close to Min**

Application No:	Temp: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> °C	At start	At end		
At start	At end				
Type designation:	Rel. h: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> %	At start	At end		
At start	At end				
Observer:	Date: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> yyyy-mm-dd	At start	At end		
At start	At end				
Verification scale interval e:	Time: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> hh:mm:ss	At start	At end		
At start	At end				
Resolution during test:	Bar. pres: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> hPa	At start	At end		
At start	At end				

(smaller than e):

Load: (see 6.1.3) Speed:

Automatic zero-setting device is:

☐ Non-existent ☐ Not in operation ☐ Out of working range ☐ In operation
CLASS Y

Test	Indication	Error	Test	Indication	Error	Test	Indication	Error
1			21			41		
2			22			42		
3			23			43		
4			24			44		
5			25			45		
6			26			46		
7			27			47		
8			28			48		
9			29			49		
10			30			50		
11			31			51		
12			32			52		
13			33			53		
14			34			54		
15			35			55		
16			36			56		
17			37			57		
18			38			58		
19			39			59		
20			40			60		

Maximum error =

Maximum permissible error =

☐ Passed ☐ Failed

Remarks:

8.1.2 Test 2: Maximum speed, load close to Min (continued)

Class X

Mean of indicated readings (\bar{X})	Mean error ($\bar{X} - L$)	MPME	Standard deviation (s)	MPSD

☐ Passed ☐ Failed

Remarks:

8.1 Pre-test for instruments that weigh statically (continued)**8.1.3 Test 3: Alternative speed, load close to Max**

Application No:	Temp: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>At start</td><td>At end</td></tr><tr><td> </td><td> </td></tr></table> °C	At start	At end		
At start	At end				
Type designation:	Rel. h: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> %				
Observer:	Date: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> yyyy-mm-dd				
Verification scale interval e:	Time: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> hh:mm:ss				
Resolution during test:	Bar. pres: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> hPa				

(smaller than e):

Load: (see 6.1.3) Speed:

Automatic zero-setting device is:

☐ Non-existent ☐ Not in operation ☐ Out of working range ☐ In operation
CLASS Y

Test	Indication	Error	Test	Indication	Error	Test	Indication	Error
1			21			41		
2			22			42		
3			23			43		
4			24			44		
5			25			45		
6			26			46		
7			27			47		
8			28			48		
9			29			49		
10			30			50		
11			31			51		
12			32			52		
13			33			53		
14			34			54		
15			35			55		
16			36			56		
17			37			57		
18			38			58		
19			39			59		
20			40			60		

Maximum error =

Maximum permissible error =

☐ Passed ☐ Failed

Remarks:

8.1.3 Test 3: Alternative speed, load close to Max (continued)

CLASS X

Mean of indicated readings (\bar{x})	Mean error ($\bar{x} - L$)	MPME	Standard deviation (s)	MPSD

☐ Passed ☐ Failed

Remarks:

8.1 Pre-test for instruments that weigh statically (continued)**8.1.4 Test 4: Alternative speed, load close to Min**

	At start	At end	
Application No:	Temp:		°C
Type designation:	Rel. h:		%
Observer:	Date:		yyyy-mm-dd
Verification scale interval e:	Time:		hh:mm:ss
Resolution during test:	Bar. pres:		hPa

(smaller than e):

Load: (see 6.1.3) Speed:

Automatic zero-setting device is:

☐ Non-existent ☐ Not in operation ☐ Out of working range ☐ In operation
CLASS Y

Test	Indication	Error	Test	Indication	Error	Test	Indication	Error
1			21			41		
2			22			42		
3			23			43		
4			24			44		
5			25			45		
6			26			46		
7			27			47		
8			28			48		
9			29			49		
10			30			50		
11			31			51		
12			32			52		
13			33			53		
14			34			54		
15			35			55		
16			36			56		
17			37			57		
18			38			58		
19			39			59		
20			40			60		

Maximum error =

Maximum permissible error =

☐ Passed ☐ Failed

Remarks:

8.1.4 Test 4: Alternative speed, load close to Min (continued)CLASS X

Mean of indicated readings (\bar{x})	Mean error ($\bar{x} - L$)	MPME	Standard deviation (s)	MPSD

☐ Passed ☐ Failed

Remarks:

8.2 Static temperatures (2.9R 51-1, 5.8.1, A.6.2-R 51-2, 6.21)

8.2.1 Automatic operation (6.1)

8.2.1.1 Static temperature, reference (20°C)

Application No:	Temp: <table><tr><th>At start</th><th>At end</th></tr><tr><td></td><td></td></tr></table> °C	At start	At end		
At start	At end				
Type designation:	Rel. h: <table><tr><th>At start</th><th>At end</th></tr><tr><td></td><td></td></tr></table> %	At start	At end		
At start	At end				
Observer:	Date: <table><tr><th>At start</th><th>At end</th></tr><tr><td></td><td></td></tr></table> yyyy-mm-dd	At start	At end		
At start	At end				
Verification scale interval e:	Time: <table><tr><th>At start</th><th>At end</th></tr><tr><td></td><td></td></tr></table> hh:mm:ss	At start	At end		
At start	At end				
Resolution during test:	Bar. pres: <table><tr><th>At start</th><th>At end</th></tr><tr><td></td><td></td></tr></table> hPa	At start	At end		
At start	At end				
(smaller than e):	(only class XI or Y(I))				

Automatic zero-setting device is:

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

Initial zero-setting > 20 % of Max: ☐ Yes ☐ No (see R51-1, A.5.1.3R 51: 5.1.3)

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Rate of operation (max):

CLASS X

This table shall be used to summarise the test results for automatic operation, with the result sheet at Annex A used to record the individual weight readings.

	Load L	Mean of indicated readings \bar{x}	Mean error ($\bar{x} - L$)	MPME	Standard deviation (s)	MPSD
Close to Min						
Critical point 1 ⁷						
Critical point 2						
Close to Max						

CLASS Y

This table shall be used to summarise the test results for automatic operation, with the result sheet at Annex B used to record the individual errors.

	Load L	Number of weighings	Maximum error	MPE
Close to Min				
Critical point 1				
Critical point 2				
Close to Max				

☐ Passed ☐ Failed

Remarks

⁷Load values at which the maximum permissible error changes (R51-1, 6.1.1.)

8.2.1 Automatic operation (continued)**8.2.1.2 Static temperature, specified high (°C)**

Application No:	Temp: <table border="1" style="display: inline-table;"><tr><th>At start</th><th>At end</th></tr><tr><td></td><td></td></tr></table> °C	At start	At end		
At start	At end				
Type designation:	Rel. h: <table border="1" style="display: inline-table;"><tr><th>At start</th><th>At end</th></tr><tr><td></td><td></td></tr></table> %	At start	At end		
At start	At end				
Observer:	Date: <table border="1" style="display: inline-table;"><tr><th>At start</th><th>At end</th></tr><tr><td></td><td></td></tr></table> yyyy-mm-dd	At start	At end		
At start	At end				
Verification scale interval e:	Time: <table border="1" style="display: inline-table;"><tr><th>At start</th><th>At end</th></tr><tr><td></td><td></td></tr></table> hh:mm:ss	At start	At end		
At start	At end				
Resolution during test:	Bar. pres: <table border="1" style="display: inline-table;"><tr><th>At start</th><th>At end</th></tr><tr><td></td><td></td></tr></table> hPa	At start	At end		
At start	At end				

(smaller than e): (only class XI or Y(I))

Automatic zero-setting device is:

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

Initial zero-setting > 20 % of Max:

☐ Yes☐ No(see [R51-1, A.5.1.3R 51: 5.1.3](#))

Rate of operation (max):

CLASS X

This table shall be used to summarise the test results for automatic operation, with the result sheet at Annex A used to record the individual weight readings.

	Load L	Mean of indicated readings \bar{X}	Mean error ($\bar{X} - L$)	MPME	Standard deviation (s)	MPSD
Close to Min						
Critical point 1						
Critical point 2						
Close to Max						

CLASS Y

This table shall be used to summarise the test results for automatic operation, with the result sheet at Annex B used to record the individual errors.

	Load L	Number of weighings	Maximum error	MPE
Close to Min				
Critical point 1				
Critical point 2				
Close to Max				

☐ Passed ☐ Failed

Remarks

8.2.1 Automatic operation (continued)**8.2.1.3 Static temperature, specified low (°C)**

Application No:	Temp: <table border="1" style="display: inline-table;"><tr><td>At start</td><td>At end</td></tr><tr><td></td><td></td></tr></table> °C	At start	At end		
At start	At end				
Type designation:	Rel. h: <table border="1" style="display: inline-table;"><tr><td></td><td></td></tr></table> %				
Observer:	Date: <table border="1" style="display: inline-table;"><tr><td></td><td></td></tr></table> yyyy-mm-dd				
Verification scale interval e:	Time: <table border="1" style="display: inline-table;"><tr><td></td><td></td></tr></table> hh:mm:ss				
Resolution during test:	Bar. pres: <table border="1" style="display: inline-table;"><tr><td></td><td></td></tr></table> hPa				
(smaller than e):	(only class XI or Y(I))				

Automatic zero-setting device is:

☐ Non-existent ☐ Not in operation ☐ Out of working range ☐ In operation
Initial zero-setting > 20 % of Max: ☐ Yes ☐ No (see [R 51-2, 5.1.3](#))

Rate of operation (max):

CLASS X

This table shall be used to summarise the test results for automatic operation, with the result sheet at Annex A used to record the individual weight readings.

	Load L	Mean of indicated readings \bar{x}	Mean error ($\bar{x} - L$)	MPME	Standard deviation (s)	MPSD
Close to Min						
Critical point 1						
Critical point 2						
Close to Max						

CLASS Y

This table shall be used to summarise the test results for automatic operation, with the result sheet at Annex B used to record the individual errors.

	Load L	Number of weighings	Maximum error	MPE
Close to Min				
Critical point 1				
Critical point 2				
Close to Max				

☐ Passed ☐ Failed

Remarks

8.2.1 Automatic operation (continued)

8.2.1.4 Static temperature (5°C if within the specified range)

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

(only class XI or Y(I))

Automatic zero-setting device is:

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

Initial zero-setting > 20 % of Max: ☐ Yes ☐ No (see ~~R51-1, A.5.1.3~~ R 51: 5.1.3)

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Rate of operation (max):

CLASS X

This table shall be used to summarise the test results for automatic operation, with the result sheet at Annex A used to record the individual weight readings.

	Load L	Mean of indicated readings \bar{x}	Mean error ($\bar{x} - L$)	MPME	Standard deviation (s)	MPSD
Close to Min						
Critical point 1						
Critical point 2						
Close to Max						

CLASS Y

This table shall be used to summarise the test results for automatic operation, with the result sheet at Annex B used to record the individual errors.

	Load L	Number of weighings	Maximum error	MPE
Close to Min				
Critical point 1				
Critical point 2				
Close to Max				

☐ Passed ☐ Failed

Remarks

8.2.1 Automatic operation (continued)

8.2.1.5 Static temperature (reference 20°C)

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

(only class XI or Y(I))

Automatic zero-setting device is:

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

Initial zero-setting > 20 % of Max: ☐ Yes ☐ No (see R51-1, A.5.1.3R 51: 5.1.3)

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Rate of operation (max):

CLASS X

This table shall be used to summarise the test results for automatic operation, with the result sheet at Annex A used to record the individual weight readings.

	Load L	Mean of indicated readings \bar{x}	Mean error ($\bar{x} - L$)	MPME	Standard deviation (s)	MPSD
Close to Min						
Critical point 1						
Critical point 2						
Close to Max						

CLASS Y

This table shall be used to summarise the test results for automatic operation, with the result sheet at Annex B used to record the individual errors.

	Load L	Number of weighings	Maximum error	MPE
Close to Min				
Critical point 1				
Critical point 2				
Close to Max				

☐ Passed ☐ Failed

Remarks

8.2.2.2 Static temperature (specified high °C)

Automatic zero-setting device is:

Initial zero-setting > 20 % of Max:

CLASS X or Y

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

$E_c = E - E_o$ with E_o = error calculated at or near zero (*)

[illegible]Remarks

8.2.2 Nonautomatic (static) operation (continued)

8.2.2.3 Static temperature (specified low °C)

Application No:	Temp:	At start	At end	°C
Type designation:	Rel. h:			%
Observer:	Date:			yyyy-mm-dd
Verification scale interval e:	Time:			hh:mm:ss
Resolution during test:	Bar. pres:			hPa
(smaller than e):		(only class XI or Y(I))			

Automatic zero-setting device is:

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

Initial zero-setting > 20 % of Max:

☐ Yes ☐ No

(see ~~R51.1, A.5.1.3~~ R 51.5.1.3)

CLASS X or Y

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

$E_c = E - E_o$ with E_o = error calculated at or near zero (*)

[illegible]

☐ Passed ☐ Failed

Remarks

8.2.2 Nonautomatic (static) operation (continued)

8.2.2.4 Static temperature (5°C, if within the specified range)

Application No:	Temp:	At start	At end	°C
Type designation:	Rel. h:			%
Observer:	Date:			yyyy-mm-dd
Verification scale interval e:	Time:			hh:mm:ss
Resolution during test:	Bar. pres:			hPa
(smaller than e):		(only class XI or Y(I))			

Automatic zero-setting device is:

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

Initial zero-setting > 20 % of Max: ☐ Yes ☐ No (see R51.1, A.5.1.3 R 51.5.1.3)

CLASS X or Y

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

$E_c = E - E_o$ with E_o = error calculated at or near zero (*)

[illegible]

☐ Passed ☐ Failed

Remarks

Formatted: Left

8.3 Temperature effect on no-load indication (2.9R 51-1, 5.8.1.3, A-6.2-R 51-2, 6.22)

Application No:

Type designation:

Observer:

Verification scale interval e:

Resolution during test (smaller than e):

Automatic zero-setting device is:

☐

Non-existent

☐

Not in operation

☐

Out of working range

☐

In operation

$$P = I + \frac{1}{2} e - \Delta L$$

Report Page ⁸	Date	Time	Temp (°C)	Zero indication I	Add load ΔL	P	ΔP	ΔTemp	Zero-change per ... °C

ΔP = difference of P for two consecutive tests at different temperatures

ΔTemp = difference of temperature for two consecutive tests at different temperatures

Check if the zero-change per 1 °C is smaller than e for class XI or Y(I)

Check if the zero-change per 5 °C is smaller than e for all other classes

☐

Passed

☐

Failed

Remarks:

⁸ Give the report page of the relevant weighing test where weighing tests and temperature effect on no-load indication test are conducted together.

8.4.1 Damp heat, steady state – non-condensing (4.1.2, A-6.2.R 51-2, 6.2.3.1)

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

(only class XI or Y(I))

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

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

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

Remarks:

8.4.1.3 Reference temperature of 20 °C and 50 % humidity

8.4.1.3 Reference temperature of 20 °C and 50 % humidity

Application No:	Temp:	At start	At end	°C
Type designation:	Rel. h:			%
Observer:	Date:			yyyy-mm-dd
Verification scale interval e:	Time:			hh:mm:ss
Resolution during test:	Bar. pres:			hPa
(smaller than e):		only class XI or Y(I)			

Automatic zero-setting device is:

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

CLASS X or Y

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

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

[illegible]

☐ Passed ☐ Failed

Remarks:

Application No:	Temp:	°C
Type designation:	Rel. h:	%
Observer:	Date:	yyyy-mm-dd
Verification scale interval e:	Time:	hh:mm:ss
Resolution during test:	Bar. pres:	hPa
(smaller than e):	only class XI or Y(I)		

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

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

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

8.4.2 Damp heat, cyclic (condensing)

Application No:
 Type designation:
 Observer:
 Verification scale interval e:
 Resolution during test:
 (smaller than e):

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

only class XI or Y(I)

Automatic zero-setting and zero-tracking device is:

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

CLASS X or Y

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

 $E_c = E - E_0$ with E_0 = error calculated at or near zero (*)
8.4.2.2 Upper temperature

Load L	Indication I		Add. load ΔL		Error E		Corrected error E_c		mpe
	↓	↑	↓	↑	↓	↑	↓	↑	
(*)					(*)				

☐ Passed
 ☐ Failed

Remarks:

8.4.2 Damp heat, cyclic (condensing)

Application No: Temp:

At start	At end

 °C
 Type designation: Rel. h: %
 Observer: Date: yy-mm-dd
 Verification scale interval e: Time: hh:mm:ss
 Resolution during test: Bar. pres: hPa
 (smaller than e): only class XI or Y(I)

Automatic zero-setting and zero-tracking device is:

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

CLASS X or Y

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

$$E_c = E - E_o \text{ with } E_o = \text{error calculated at or near zero } (^{\circ})$$
8.4.2.3 Lower temperature

Load L	Indication I		Add. load ΔL		Error E		Corrected error E_c		mpe
	↓	↑	↓	↑	↓	↑	↓	↑	
(*)					(*)				

☐ Passed
 ☐ Failed

Remarks:

8.5 AC mains voltage variations (2.9R 51-1, 5.8.2, A.6-2-R 51-2, 6.2)**8.5.1 Automatic operation (A.5-1-4R 51-2, 5.1.1)**

Application No:	Temp: <table border="1" style="display: inline-table;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> °C	At start	At end		
At start	At end				
Type designation:	Rel. h: <table border="1" style="display: inline-table;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> %	At start	At end		
At start	At end				
Observer:	Date: <table border="1" style="display: inline-table;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> yyyy-mm-dd	At start	At end		
At start	At end				
Verification scale interval e:	Time: <table border="1" style="display: inline-table;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> hh:mm:ss	At start	At end		
At start	At end				
Resolution during test:	Bar. pres: <table border="1" style="display: inline-table;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> hPa	At start	At end		
At start	At end				

(smaller than e): only class XI or Y(I)

Automatic zero-setting device is:

☐ Non-existent ☐ Not in operation ☐ Out of working range ☐ In operation
Marked nominal voltage (U_{nom}) or voltage range: V

Rate of operation (max): Selected dynamic load:

Class X

This table shall be used to summarise the test results for automatic operation, with the result sheet at Annex A used to record the individual weight readings.

Voltage conditions ⁹	Mean of indicated readings \bar{X}	Mean error ($\bar{X} - L$)	MPME	Standard deviation (s)	MPSD
U_{nom}					
110 % of U_{max}					
85 % of U_{min}					
U_{nom}					

Class Y

This table shall be used to summarise the test results for automatic operation, with the result sheet at Annex B used to record the individual errors.

Voltage conditions	Number of weighings	Maximum error	MPE
U_{nom}			
110 % of U_{max}			
85 % of U_{min}			
U_{nom}			

☐ Passed ☐ Failed

Remarks:

⁹ (a) U_{nom} is the voltage marked on the instrument, or the average of a range (U_{max} , U_{min}), in which case the test shall be performed at U_{max} and at U_{min} .
 (b) In the case of three-phase mains voltage supply, the voltage variations shall apply for each phase successively.

8.5 AC mains voltage variations (continued)

8.5.2 Nonautomatic (static) operation (A.5.1-2R 51-2, 5.1.2)

Application No:	Temp:	At start	At end	°C
Type designation:	Rel. h:			%
Observer:	Date:			yyyy-mm-dd
Verification scale interval e:	Time:			hh:mm:ss
Resolution during test:	Bar. pres:			hPa
(smaller than e):		only class XI or Y(I)			

Automatic zero-setting device is:

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

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

Class X or Y

$E = I + \frac{1}{2} e - \Delta L - L$
 $E_c = E - E_o$ with E_o = error calculated at or near zero

Voltage conditions ¹⁰	Load L	Indication I	Add load ΔL	Error E	Corrected error E _c	MPE
U _{nom}						
110 % of U _{max}						
85 % of U _{min}						
U _{nom}						

Note

☐ Passed ☐ Failed

Remarks:

Test shall be performed at U_{max} and at U_{min}.

8. 6 DC mains voltage variations (2.9R 51-1, 5.8.2, A.6.2-R 51-2, 6.2)**8.6.1 Automatic operation (A.5.1.1R 51-2, 5.1.1)**

Application No:	Temp: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> °C	At start	At end		
At start	At end				
Type designation:	Rel. h: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> %	At start	At end		
At start	At end				
Observer:	Date: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> yyyy-mm-dd	At start	At end		
At start	At end				
Verification scale interval e:	Time: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> hh:mm:ss	At start	At end		
At start	At end				
Resolution during test:	Bar. pres: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> hPa	At start	At end		
At start	At end				

(smaller than e): only class XI or Y(I)

Automatic zero-setting device is:

☐ Non-existent ☐ Not in operation ☐ Out of working range ☐ In operation
Marked nominal voltage (U_{nom}) or voltage range: V

Rate of operation (max): Selected dynamic load:

Class X

This table shall be used to summarise the test results for automatic operation, with the result sheet at Annex A used to record the individual weight readings.

Voltage conditions ¹¹	Mean of indicated readings \bar{x}	Mean error ($\bar{x} - L$)	MPME	Standard deviation (s)	MPSD
U_{nom}					
U_{max}					
minimum operating voltage					
U_{nom}					

Class Y

This table shall be used to summarise the test results for automatic operation, with the result sheet at Annex B used to record the individual errors.

Voltage conditions	Number of weighings	Maximum error	MPE
U_{nom}			
U_{max}			
minimum operating voltage			
U_{nom}			

☐ Passed ☐ Failed

Remarks:

¹¹ DC mains voltage supply including external or plug-in voltage supply device, including rechargeable battery voltage if (re)charge of batteries during the operation of the instrument is possible. Test shall be performed at U_{max} and at the minimum operating voltage (R 51-1, 2.9.5.8.2).

8.6 DC mains voltage variations (continued)

8.6.2 Nonautomatic (static) operation (A.5.1.2R 51-2, 5.1.2)

Application No:	Temp: <table><tr><th>At start</th><th>At end</th></tr><tr><td></td><td></td></tr></table> °C	At start	At end		
At start	At end				
Type designation:	Rel. h: <table><tr><th>At start</th><th>At end</th></tr><tr><td></td><td></td></tr></table> %	At start	At end		
At start	At end				
Observer:	Date: <table><tr><th>At start</th><th>At end</th></tr><tr><td></td><td></td></tr></table> yyyy-mm-dd	At start	At end		
At start	At end				
Verification scale interval e:	Time: <table><tr><th>At start</th><th>At end</th></tr><tr><td></td><td></td></tr></table> hh:mm:ss	At start	At end		
At start	At end				
Resolution during test:	Bar. pres: <table><tr><th>At start</th><th>At end</th></tr><tr><td></td><td></td></tr></table> hPa	At start	At end		
At start	At end				
(smaller than e):	only class XI or Y(I)				

Automatic zero-setting device is:

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

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

Class X or Y

$E = I + \frac{1}{2} e - \Delta L - L$
 $E_c = E - E_o$ with E_o = error calculated at or near zero

Voltage conditions ¹²	Load L	Indication I	Add load ΔL	Error E	Corrected error E_c	MPE
U_{nom}						
U_{max}						
minimum operating voltage						
U_{nom}						

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

Remarks:

¹² Test shall be performed at U_{max} and at the minimum operating voltage (R 51-1, 2.95.8.2).

8.7 Low voltage of internal battery (not connected to the mains supply) (4.2.6R 51-1, 5.8.2, A.6.2-R 51-2, 6.2)

8.7.1 Automatic operation (A.5.1.4R 51-2, 5.1.1)

Application No:	Temp: <table border="1" style="display: inline-table;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> °C	At start	At end		
At start	At end				
Type designation:	Rel. h: <table border="1" style="display: inline-table;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> %	At start	At end		
At start	At end				
Observer:	Date: <table border="1" style="display: inline-table;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> yyyy-mm-dd	At start	At end		
At start	At end				
Verification scale interval e:	Time: <table border="1" style="display: inline-table;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> hh:mm:ss	At start	At end		
At start	At end				
Resolution during test:	Bar. pres: <table border="1" style="display: inline-table;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> hPa	At start	At end		
At start	At end				

(smaller than e):

Automatic zero-setting device is:

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

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

Rate of operation (max): Selected dynamic load:

Class X

This table shall be used to summarise the test results for automatic operation, with the result sheet at Annex A used to record the individual weight readings.

Voltage conditions ¹³	Mean of indicated readings \bar{X}	Mean error ($\bar{X} - L$)	MPME	Standard deviation (s)	MPSD
U_{nom}					
minimum operating voltage					
U_{nom}					

Class Y

This table shall be used to summarise the test results for automatic operation, with the result sheet at Annex B used to record the individual errors.

Voltage conditions	Number of weighings	Maximum error	MPE
U_{nom}			
minimum operating voltage			
U_{nom}			

☐ Passed ☐ Failed

Remarks:

¹³ Battery voltage supply including non-rechargeable battery voltage (DC), if (re)charge of batteries during the operation of the instrument is not possible. Test shall be performed at the minimum operating voltage (R 51-1, 2-95.8.2).

8.7 Low voltage of internal battery (not connected to the mains supply) Battery voltage variations
(continued)

8.7.2 Nonautomatic (static) operation (A.5.1.2R 51-2, 5.1.2)

Application No:	Temp: <table><tr><th>At start</th><th>At end</th></tr><tr><td></td><td></td></tr></table> °C	At start	At end		
At start	At end				
Type designation:	Rel. h: <table><tr><th>At start</th><th>At end</th></tr><tr><td></td><td></td></tr></table> %	At start	At end		
At start	At end				
Observer:	Date: <table><tr><th>At start</th><th>At end</th></tr><tr><td></td><td></td></tr></table> yyyy-mm-dd	At start	At end		
At start	At end				
Verification scale interval e:	Time: <table><tr><th>At start</th><th>At end</th></tr><tr><td></td><td></td></tr></table> hh:mm:ss	At start	At end		
At start	At end				
Resolution during test:	Bar. pres: <table><tr><th>At start</th><th>At end</th></tr><tr><td></td><td></td></tr></table> hPa	At start	At end		
At start	At end				
(smaller than e):	only class XI or Y(I)				

Automatic zero-setting device is:

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

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

Class X or Y

$E = I + \frac{1}{2} e - \Delta L - L$
 $E_c = E - E_o$ with E_o = error calculated at or near zero

Voltage conditions ¹⁴	Load L	Indication I	Add load ΔL	Error E	Corrected error E_c	MPE
U_{nom}						
minimum operating voltage						
U_{nom}						

☐ Passed ☐ Failed

Remarks:

¹⁴Test shall be performed at the minimum operating voltage (R 51-1, 2-95.8.2).

8.8 Power from external 12 V and 24 V road vehicle batteries (2.9R 51-1, 5.8.2, A.6.2-R 51-2, 6.2)**8.8.1 Automatic operation (A.5.4.4R 51-2, 5.1.1)**

Application No:	Temp: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>At start</td><td>At end</td></tr><tr><td></td><td></td></tr></table> °C	At start	At end		
At start	At end				
Type designation:	Rel. h: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td></td><td></td></tr></table> %				
Observer:	Date: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td></td><td></td></tr></table> yyyy-mm-dd				
Verification scale interval e:	Time: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td></td><td></td></tr></table> hh:mm:ss				
Resolution during test:	Bar. pres: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td></td><td></td></tr></table> hPa				
(smaller than e):	only class XI or Y(I)				

Automatic zero-setting device is:

☐ Non-existent ☐ Not in operation ☐ Out of working range ☐ In operation
Marked nominal voltage (U_{nom}) of the vehicle's electrical system: V

Rate of operation (max):.....

Selected dynamic load:.....

Class X

This table shall be used to summarise the test results for automatic operation, with the result sheet at Annex A used to record the individual weight readings.

Voltage conditions (U_{nom}) ¹⁵	Test limits	Mean of indicated readings \bar{x}	Mean error ($\bar{x} - L$)	MPME	Standard deviation (s)	MPSD
12 V	$U_{max} = 16$ V					
	U_{min} = minimum operating voltage					
24 V	$U_{max} = 32$ V					
	U_{min} = minimum operating voltage					

Class Y

This table shall be used to summarise the test results for automatic operation, with the result sheet at Annex B used to record the individual errors.

Voltage conditions (U_{nom})	Test limits	Number of weighings	Maximum error	MPE
12 V	$U_{max} = 16$ V			
	U_{min} = minimum operating voltage			
24 V	$U_{max} = 32$ V			
	U_{min} = minimum operating voltage			

☐ Passed ☐ Failed

Remarks:

¹⁵ The nominal voltage (U_{nom}) of the vehicle's electrical system is usually 12 V or 24 V. However, the practical voltage at the battery-terminals of a road vehicle can vary considerably. Test shall be performed at U_{max} and at the minimum operating voltage (R 51-1, 2.95.8.2).

8.8 Power from external 12 V and 24 V road vehicle batteries (continued)

8.8.2 Nonautomatic (static) operation (A.5.1.2R 51-2, 5.1.2)

Application No:
Type designation:
Observer:
Verification scale interval e:
Resolution during test:
(smaller than e):

Temp:
Rel. h:
Date:
Time:
Bar. pres:

At start

At end

°C
%
yyyy-mm-dd
hh:mm:ss
hPa

only class XI or Y(I)

Automatic zero-setting device is:

☐ Non-existent

☐ Not in operation

☐ Out of working range

☐ In operation

Marked nominal voltage (U_{nom}) of the vehicle's electrical system: V

Class X or Y

$E = I + \frac{1}{2} e - \Delta L - L$
 $E_c = E - E_o$ with E_o = error calculated at or near zero

Voltage conditions (U_{nom}) ¹⁶	Test limits	Load L	Indication I	Add load ΔL	Error E	Corrected error E_c	MPE
12 V	$U_{max} \approx 16$ V						
	U_{min} = minimum operating voltage (R 51-1, 2.95.8.2)						
24 V	$U_{max} \approx 32$ V						
	U_{min} = minimum operating voltage (R 51-1, 2.95.8.2)						

☐ Passed

☐ Failed

Remarks:

¹⁶ Test shall be performed at U_{max} and at the minimum operating voltage.

8.9 Tilting (2.9R 51-1, 5.8.3, A.6.2-R 51-2, 6.2)**8.9.1 Automatic operation (R 51-2, 5.1.1)**

Application No:	Temp: <table border="1" style="display: inline-table;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> °C	At start	At end		
At start	At end				
Type designation:	Rel. h: <table border="1" style="display: inline-table;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> %	At start	At end		
At start	At end				
Observer:	Date: <table border="1" style="display: inline-table;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> yyyy-mm-dd	At start	At end		
At start	At end				
Verification scale interval e:	Time: <table border="1" style="display: inline-table;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> hh:mm:ss	At start	At end		
At start	At end				
Resolution during test:	Bar. pres: <table border="1" style="display: inline-table;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> hPa	At start	At end		
At start	At end				
(smaller than e):	only class XI or Y(I)				

- ☐ Tilting 5 % not required for fixed installation
- ☐ Tilting 5 % not required, can be adjusted to 1 % or t %¹⁷
- ☐ Tilting 5 % if no level indicator on instrument liable to be tilted

Vehicle mounted catchweighers:

- ☐ Tilting 10 %
- ☐ Tilting t %

Automatic zero-setting and zero-tracking is:

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

CLASS X

This table shall be used to summarise the test results for automatic operation, with the result sheet at Annex A used to record the individual weight readings.

Tilting position	Load L	Mean of indicated readings \bar{x}	Mean error ($\bar{x} - L$)	MPME	Standard deviation (s)	MPSD
Reference						
Longitudinally forward						
Longitudinally backwards						
Transversely forward						
Transversely backwards						

¹⁷ t % = limiting value of tilt limiting device

Reference						

8.9 Tilting (continued)

8.9.2 Automatic operation (continued)

CLASS Y

This table shall be used to summarise the test results for automatic operation, with the result sheet at Annex B used to record the individual errors.

Tilting position	Load L	Number of weighings	Maximum error	MPE
Reference				
Longitudinally forward				
Longitudinally backwards				
Transversely forward				
Transversely backwards				
Reference				

☐ Passed ☐ Failed

Remarks:

8.9 Tilting (continued)**8.9.3 Nonautomatic (static) operation (R 51-2, 5.1.2)**

Application No:	Temp: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>At start</td><td>At end</td></tr><tr><td> </td><td> </td></tr></table> °C	At start	At end		
At start	At end				
Type designation:	Rel. h: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> %				
Observer:	Date: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> yyyy-mm-dd				
Verification scale interval e:	Time: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> hh:mm:ss				
Resolution during test:	Bar. pres: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> hPa				

(smaller than e): only class XI or Y(I)

- ☐ Tilting 5 % not required for fixed installation
- ☐ Tilting 5 % not required, can be adjusted to 1 % or t %¹⁸
- ☐ Tilting 5 % if no level indicator on instrument liable to be tilted

Vehicle mounted catchweighers:

- ☐ Tilting 10 %
- ☐ Tilting t %

Automatic zero-setting and zero-tracking is:

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

Class X or Y

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

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

Tilting position	Load L	Indication I	Add load ΔL	Error E	Corrected error E_c	MPE
Reference						
Longitudinally forward						
Longitudinally backwards						
Transversely forward						
Transversely backwards						
Reference						

- ☐ Passed ☐ Failed

Remarks:

¹⁸ t = limiting value of tilt limiting device

9 DISTURBANCES (4.1.3, A-6R 51-2, 6.3)

9.1 AC mains voltage dips, short interruptions and reductions (A-6R 51-2, 6.3.1)

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

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

Load	Disturbance				Result		
	Amplitude % of U_{nom} ¹⁹	Duration cycles	Number of disturbances ≥ 10	Repetition interval (s)	Indication I	Significant fault (>_1 e)	
						No	Yes (remarks)
	without disturbance						
	0	0.5					
	50	1					
	40 %	10					
	70 %	25					
	80 %	250					
	0 %	250					

☐ 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 In case a voltage-range is marked, use the average value as reference U_{nom} .

9.2 Electrical bursts (transients) on the mains voltage lines and on signal, data and control lines (A-6R 51-2, 6.3.2)

9.2.1 Electrical bursts on AC and DC mains (R 51-2, 6.3.2.1)

Application No:	Temp: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>At start</td><td>At end</td></tr><tr><td> </td><td> </td></tr></table> °C	At start	At end		
At start	At end				
Type designation:	Rel. h: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> %				
Observer:	Date: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> yyyy-mm-dd				
Verification scale interval e:	Time: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> hh:mm:ss				
Resolution during test:	Bar. pres: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> hPa				

(smaller than e):

Mains voltage lines: test voltage 1.0 Kv (peak), duration of the test > 1 minute at each amplitude and polarity

Load	Connection			Polarity	Result	
	L ↓ ground	N ↓ ground	PE ↓ ground		Indication I	Significant fault (> 1 e) No Yes (remarks)
	without disturbance					
	X	X	X	pos		
				neg		
	without disturbance					
	X	X	X	pos		
				neg		
	without disturbance					
	X	X	X	pos		
				neg		

L = phase, N = neutral, PE = protective earth

☐ Passed ☐ Failed

Remarks:

9.2 Electrical bursts (transients) on the mains voltage lines and on signal, data and control lines (continued)

9.2.2 Electrical bursts on signal, data and control lines (R 51-2, 6.3.2.2)

Application No:	Temp: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> °C	At start	At end		
At start	At end				
Type designation:	Rel. h: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> %	At start	At end		
At start	At end				
Observer:	Date: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> yyyy-mm-dd	At start	At end		
At start	At end				
Verification scale interval e:	Time: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> hh:mm:ss	At start	At end		
At start	At end				
Resolution during test:	Bar. pres: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> hPa	At start	At end		
At start	At end				

(smaller than e):

I/O signals, data and control lines: test voltage 0.5 kV (peak), duration of the test > 1 minute at each amplitude and polarity

Load	Cable/Interface	Polarity	Result		
			Indication I	Significant fault (>_1 e)	
				No	Yes (remarks)
without disturbance					
		pos			
		neg			
without disturbance					
		pos			
		neg			
without disturbance					
		pos			
		neg			
without disturbance					
		pos			
		neg			
without disturbance					
		pos			
		neg			
without disturbance					
		pos			
		neg			
without disturbance					
		pos			
		neg			

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

☐ Passed ☐ Failed

Remarks:

9.3 Electrical surges on mains voltage lines or on other voltage supply or signal, data and control lines (A-6R 51-2, 6.3.3)

9.3.1 Electrical surges on AC and DC mains voltage lines (R 51-2, 6.3.3.1)

Application No: Temp:

At start	At end

 °C
 Type designation: Rel. h:

--

 %
 Observer: Date:

--

 yyyy-mm-dd
 Verification scale interval e: Time:

--

 hh:mm:ss
 Resolution during test: Bar. pres:

--

 hPa
 (smaller than e):

Mains voltage lines: test voltage 0.5 kV (line to line) and 1.0 kV (line to earth), duration of test > 1 minute at each amplitude and polarity

Load L	Disturbance					Indication	Result	
	3 positive and 3 negative surges synchronously with AC supply voltage						Significant fault (> <u>1</u> e) or detection and reaction	
	amplitude/ apply on	angle					Polarity	No
0°		90°	180°	270°				
	0.5 kV Live ↓ neutral	without disturbance						
		X				pos		
						neg		
			X			pos		
						neg		
				X		pos		
						neg		
					X	pos		
						neg		
	1.0 kV Live ↓ protective earth	without disturbance						
		X				pos		
						neg		
			X			pos		
						neg		
				X		pos		
						neg		
					X	pos		
						neg		
	1.0 kV Neutral ↓ protective earth	without disturbance						
		X				pos		
						neg		
			X			pos		
						neg		
				X		pos		
						neg		
					X	pos		
						neg		

☐ Passed ☐ Failed

Remarks:

9.3 Electrical surges on mains voltage lines or on other voltage supply or signal, data and control lines (continued)

9.3.2 Any other kind of voltage supply and /or signal, data and control lines (R 51-2, 6.3.3.2)

Application No:	Temp: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>At start</td><td>At end</td></tr><tr><td> </td><td> </td></tr></table> °C	At start	At end		
At start	At end				
Type designation:	Rel. h: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> %				
Observer:	Date: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> yyyy-mm-dd				
Verification scale interval e:	Time: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> hh:mm:ss				
Resolution during test:	Bar. pres: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> hPa				

(smaller than e):

Kind or type of voltage supply

DC ☐ Other form

 Voltage

Other kind of voltage supply and /or I/O circuits and communication lines: test voltage 0.5 kV (line to line) and 1.0 kV (line to earth), duration of test > 1 minute at each amplitude and polarity

Load L	Disturbance		Result		
	3 positive and 3 negative surges.		Indication I	Significant fault (> d1 e) or detection and reaction	
	Amplitude / apply on	Polarity		No	Yes (remarks)
	without disturbance				
	0.5 kV Live ↓ neutral	pos			
		neg			
	without disturbance				
	1.0 kV Live ↓ protective earth	pos			
		neg			
	without disturbance				
	1.0 kV Neutral ↓ protective earth	pos			
		neg			
	without disturbance				

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

☐ Passed ☐ Failed

Remarks:

9.4 Immunity to electromagnetic fields (A-6R 51-2, 6.3.4)**9.4.1 Immunity to radiated (RF) electromagnetic fields (A-6R 51-2, 6.3.4.1)**

Application No: Temp:

At start	At end

 °C
 Type designation: Rel. h: %
 Observer: Date: yyyy-mm-dd
 Verification scale interval e: Time: hh:mm:ss
 Resolution during test: Bar. pres: hPa
 (smaller than e):

Rate of sweep: Load: Material load:

Disturbances				Result		
Antenna	Frequency range (MHz)	Polarization	Facing EUT	Indication I	<u>Significant fault (> 1 e) or detection and reaction</u>	
					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			

Formatted Table

Test severity:

Frequency range: 80 ⁽¹⁾ to 2000 MHz
 Field strength: 10 V/m
 Modulation: 80 % AM, 1 kHz, sine wave

⁽¹⁾ For instruments having no mains or other I/O ports available so that the conducted test according to 9.5.2 cannot be applied, the lower limit of the radiation test is 26 MHz

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

☐ Passed ☐ Failed

Remarks:

9.4 Immunity to electromagnetic fields (continued)**9.4.2 Immunity to conducted electromagnetic fields (A-6R 51-2, 6.3.4.2)**

Application No: Temp:

At start	At end

 °C
 Type designation: Rel. h: %
 Observer: Date: yyyy-mm-dd
 Verification scale interval e: Time: hh:mm:ss
 Resolution during test: Bar. pres: hPa
 (smaller than e):

Rate of sweep: Load: Material load:

Frequency Range (MHz)	Cable/Interface	Level (Volts e.m.f)	Result		
			Indication I	Significant fault (> 1 e) or detection and reaction	
				No	Yes (remarks)
without disturbance					
without disturbance					
without disturbance					
without disturbance					
without disturbance					
without disturbance					

Test severity:

Frequency range: 0.15 – 80 MHz
 RF amplitude (50 ohms): 10 V (e.m.f.)
 Modulation: 80 % AM, 1kHz, sine wave

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

☐ Passed ☐ Failed

Remarks:

9.4 Immunity to electromagnetic fields (continued)

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

Radiated:

Conducted:

9.5 Electrostatic discharges (R 51-2, 6.3.4)**9.5.1 Direct application**

<u>Application No:</u>	<u>Temp:</u> <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>At start</td><td>At end</td></tr><tr><td> </td><td> </td></tr></table> °C	At start	At end		
At start	At end				
<u>Type designation:</u>	<u>Rel. h:</u> <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> %				
<u>Observer:</u>	<u>Date:</u> <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> yy-yy-mm-dd				
<u>Verification scale interval e:</u>	<u>Time:</u> <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> hh:mm:ss				
<u>Resolution during test:</u>	<u>Bar. pres:</u> <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table> hPa				

(smaller than e):

☐ Contact discharges☐ Paint penetration☐ Air dischargesPolarity ²⁰: ☐ pos ☐ neg

Load	Discharges			Result	
	Test Voltage (kV)	Number of discharges ≥ 10	Repetition Interval (s)	Indication I	Significant fault (> 1 e) or detection and reaction
					No Yes (remarks, test points)
	without disturbance				
	2				
	4				
	6				
	8 (air discharges)				

☐ Passed☐ FailedNote: If the EUT fails, the test point at which this occurs shall be recorded.Remarks:²⁰ IEC 61000-4-2 specifies that the test shall be conducted with the most sensitive polarity.

9.5 Electrostatic discharges (continued)**9.5.2 Indirect application (contact discharges only)**

Application No: Temp:

At start	At end

 °C
 Type designation: Rel. h: %
 Observer: Date: yyyy-mm-dd
 Verification scale interval e: Time: hh:mm:ss
 Resolution during test: Bar. pres: hPa
 (smaller than e):

Polarity ²¹: ☐ pos ☐ neg

Horizontal coupling plane

Load	Discharges			Result		
	Test voltage (kV)	Number of discharges ≥ 10	Repetition Interval (s)	Indication I	Significant fault (> 1 e) or detection and reaction	
					No	Yes (remarks)
	without disturbance					
	2					
	4					
	6					

Vertical coupling plane

Load	Discharges			Result		
	Test voltage (kV)	Number of discharges ≥ 10	Repetition Interval (s)	Indication !	Significant fault (>1 e)	
					No	Yes (remarks)
	without disturbance					
	2					
	4					
	6					

☐ Passed ☐ Failed

Note: If the EUT fails, the test point at which this occurs shall be recorded.

Remarks:

²¹ IEC 61000-4-2 specifies that the test shall be conducted with the most sensitive polarity

9.5 Electrostatic discharges (cont.)

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

a) Direct application

Contact discharges:

Air discharges:

b) Indirect application

9.6 Electrical transient conduction for instruments powered from road vehicle batteries (R 51-2, 6.3.6)

9.6.1 Electrical transient conduction along supply lines for 12 V or 24 V road vehicle batteries (R 51-2, 6.3.6.1)

Application No:	Temp: <table border="1" style="display: inline-table;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> °C	At start	At end		
At start	At end				
Type designation:	Rel. h: <table border="1" style="display: inline-table;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> %	At start	At end		
At start	At end				
Observer:	Date: <table border="1" style="display: inline-table;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> yyyy-mm-dd	At start	At end		
At start	At end				
Verification scale interval e:	Time: <table border="1" style="display: inline-table;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> hh:mm:ss	At start	At end		
At start	At end				
Resolution during test:	Bar. pres: <table border="1" style="display: inline-table;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> hPa	At start	At end		
At start	At end				

(smaller than e):

Load:

Marked nominal voltage (U_{nom}) or voltage range:

 V

Voltage conditions (U_{nom})	Test pulse	Pulse voltage U_s	Result		
			Indication I	Significant fault (> 1 e) or detection and reaction	
				No	Yes (remarks) ²²
12 V	2a	+ 50			
	2b ²³	+10			
	3a	-150			
	3b	+100			
	4	-7			
24 V	2a	+50			
	2b	+20			
	3a	-200			
	3b	+200			
	4	-16			

☐ Passed ☐ Failed

Remarks:

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

²³ 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.

9.6 Electrical transient conduction for instruments powered by road vehicle batteries (continued)**9.6.2 Electrical transient conduction via lines other than supply lines for 12 V or 24 V road vehicle batteries (R 51-2, 6.3.6.2)**

Application No:	Temp: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> °C	At start	At end		
At start	At end				
Type designation:	Rel. h: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> %	At start	At end		
At start	At end				
Observer:	Date: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> yyyy-mm-dd	At start	At end		
At start	At end				
Verification scale interval e:	Time: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> hh:mm:ss	At start	At end		
At start	At end				
Resolution during test:	Bar. pres: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><th>At start</th><th>At end</th></tr><tr><td> </td><td> </td></tr></table> hPa	At start	At end		
At start	At end				

(smaller than e):

Load:

--

Marked nominal voltage (U_{nom}) or voltage range:

--

 V

Voltage conditions (U_{nom})	Test pulse	Pulse voltage U_s	Result		
			Indication I	Significant fault (> 1 e) or detection and reaction	
				No	Yes (remarks) ²⁴
12 V	a	-60 V			
	b	+40 V			
24 V	a	-80 V			
	b	+80 V			

☐ Passed ☐ Failed

Remarks:

²⁴ Functional status of the instrument during and after exposure to test pulses

9.7 Battery voltage variations during start-up of a vehicle engine (R 51-2, 6.3.6.3)

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

☐ 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:

<u>Disturbance</u>			<u>Result</u>	
<u>Test Condition</u>		<u>Indication</u> ↓	<u>Significant fault (> 1 e) or detection and reaction</u>	
<u>Voltage</u> ⁽²⁵⁾	<u>Level</u>		<u>No</u>	<u>Yes (remarks)</u> ²⁶
<u>without disturbance</u>				
<u>Reference</u>				
<u>Lower limit</u>				
<u>Upper limit</u>				
<u>Reference</u>				
<u>without disturbance</u>				

☐ 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:

⁽²⁵⁾ The reference voltage shall be as defined in IEC 1000-4-11 (1994) section 5.

²⁶ Functional status of the instrument during and after exposure to test pulses

9.8 Ripple on DC mains power (R 51-2, 6.3.6.4)

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

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

<u>Disturbance</u>			<u>Result</u>	
<u>Test Condition</u>		<u>Indication</u> !	<u>Significant fault (> e) or detection and reaction</u>	
<u>Test</u>	<u>Duration</u>		<u>No</u>	<u>Yes (remarks) ²⁷</u>
<u>without disturbance</u>				
<u>without disturbance</u>				

☐ 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:

²⁷ Functional status of the instrument during and after exposure to test pulses

9.9 Load dump test (R 51-2, 6.3.6.5)

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

☐ Power from external 12 V and 24 V road vehicle batteries, R 51-2, 10.2.8

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

Load, L:

<u>Disturbance</u>			<u>Result</u>	
<u>Test Condition</u>		<u>Indication</u> ↓	<u>Significant fault (> e) or detection and reaction</u>	
<u>Test pulse shape</u> ²⁸	<u>Level</u>		<u>No</u>	<u>Yes (remarks)</u> ²⁹
<u>without disturbance</u>				
<u>Reference</u>				
<u>U_s (V)</u>				
<u>R(Ω)</u>				
<u>Reference</u>				
<u>without disturbance</u>				

☐ 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:

²⁸ Specified by the manufacturer, see applicable test levels in R 61 -2, Table 18.

²⁹ Functional status of the instrument during and after exposure to test pulses

10 SPAN STABILITY (6.4.1R 51-1, 9.5.3, A.7R 51-2, 7)

Application No:
 Type designation:
 Verification scale interval e:
 Resolution during test (smaller than e):

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:	°C
Type designation:	Rel. h:	%
Observer:	Date:	yyyy-mm-dd
Verification scale interval e:	Time:	hh:mm:ss
Resolution during test:	Bar. pres:	hPa

(smaller than e):

☐ Automatic span adjustment device activated (if existent)

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

	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								

Average error = average ($E_L - E_0$) ($E_L - E_0$)_{max} - ($E_L - E_0$)_{min} = 0.1 e =

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

Remarks:

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

10 Span stability (continued)

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 the temperature test, the EUT having been stabilized for at least 16 h;
- after the humidity test, the EUT having been stabilized for at least 16 h;
- after the EUT has been disconnected from the mains for at least 8 h and then stabilized for at least 5 h;
- after any change in the test location;
- under any other specific condition.

Measurement No 2:

Application No:

Type designation:

Observer:

Verification scale interval e:

Resolution during test:

(smaller than e):

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

☐ Automatic span adjustment device activated (if existent)

Conditions of the measurement:

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

	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 ³¹
1								
2								
3								
4								
5								

If five loadings and readings have been performed:

Average error = average (E_L - E₀)

Remarks:

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

10 Span stability (continued)

Measurement No 3:

Application No:	Temp: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>At start</td><td>At end</td></tr><tr><td></td><td></td></tr></table> °C	At start	At end		
At start	At end				
Type designation:	Rel. h: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td></td><td></td></tr></table> %				
Observer:	Date: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td></td><td></td></tr></table> yyyy-mm-dd				
Verification scale interval e:	Time: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td></td><td></td></tr></table> hh:mm:ss				
Resolution during test:	Bar. pres: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td></td><td></td></tr></table> hPa				

(smaller than e):

☐ Automatic span adjustment device activated (if existent)

Conditions of the measurement:

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

	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:

Measurement No 4:

Application No:	Temp: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>At start</td><td>At end</td></tr><tr><td></td><td></td></tr></table> °C	At start	At end		
At start	At end				
Type designation:	Rel. h: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td></td><td></td></tr></table> %				
Observer:	Date: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td></td><td></td></tr></table> yyyy-mm-dd				
Verification scale interval e:	Time: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td></td><td></td></tr></table> hh:mm:ss				
Resolution during test:	Bar. pres: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td></td><td></td></tr></table> hPa				

(smaller than e):

☐ Automatic span adjustment device activated (if existent)

Conditions of the measurement:

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

	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
1								
2								
3								
4								
5								

If five loadings and readings have been performed:

Average error = average ($E_L - E_0$)

Remarks:

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

10 Span stability (continued)

Measurement No 5:

Observer:

Location:

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

☐ Automatic span adjustment device activated (if existent)

Conditions of the measurement:

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

	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 ³³
1								
2								
3								
4								
5								

If five loadings and readings have been performed:

Average error = average ($E_L - E_0$)

Remarks:

Measurement No 6:

Application No:

Type designation:

Observer:

Verification scale interval e:

Resolution during test:

(smaller than e):

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

☐ Automatic span adjustment device activated (if existent)

Conditions of the measurement:

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

	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
1								
2								
3								
4								
5								

If five loadings and readings have been performed:

Average error = average ($E_L - E_0$)

Remarks:

³³When applicable, necessary corrections resulting from variations of temperature, pressure, etc. See remarks.

10 Span stability (continued)

Measurement No 7:

Application No: Temp:

At start	At end

 °C
 Type designation: Rel. h:

At start	At end

 %
 Observer: Date:

At start	At end

 yyyy-mm-dd
 Verification scale interval e: Time:

At start	At end

 hh:mm:ss
 Resolution during test: Bar. pres:

At start	At end

 hPa
 (smaller than e):

☐ Automatic span adjustment device activated (if existent)

Conditions of the measurement:

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

	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 ³⁴
1								
2								
3								
4								
5								

 If five loadings and readings have been performed: Average error = average ($E_L - E_0$)

Remarks:

Measurement No 4:

Application No: Temp:

At start	At end

 °C
 Type designation: Rel. h:

At start	At end

 %
 Observer: Date:

At start	At end

 yyyy-mm-dd
 Verification scale interval e: Time:

At start	At end

 hh:mm:ss
 Resolution during test: Bar. pres:

At start	At end

 hPa
 (smaller than e):

☐ Automatic span adjustment device activated (if existent)

Conditions of the measurement:

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

	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
1								
2								
3								
4								
5								

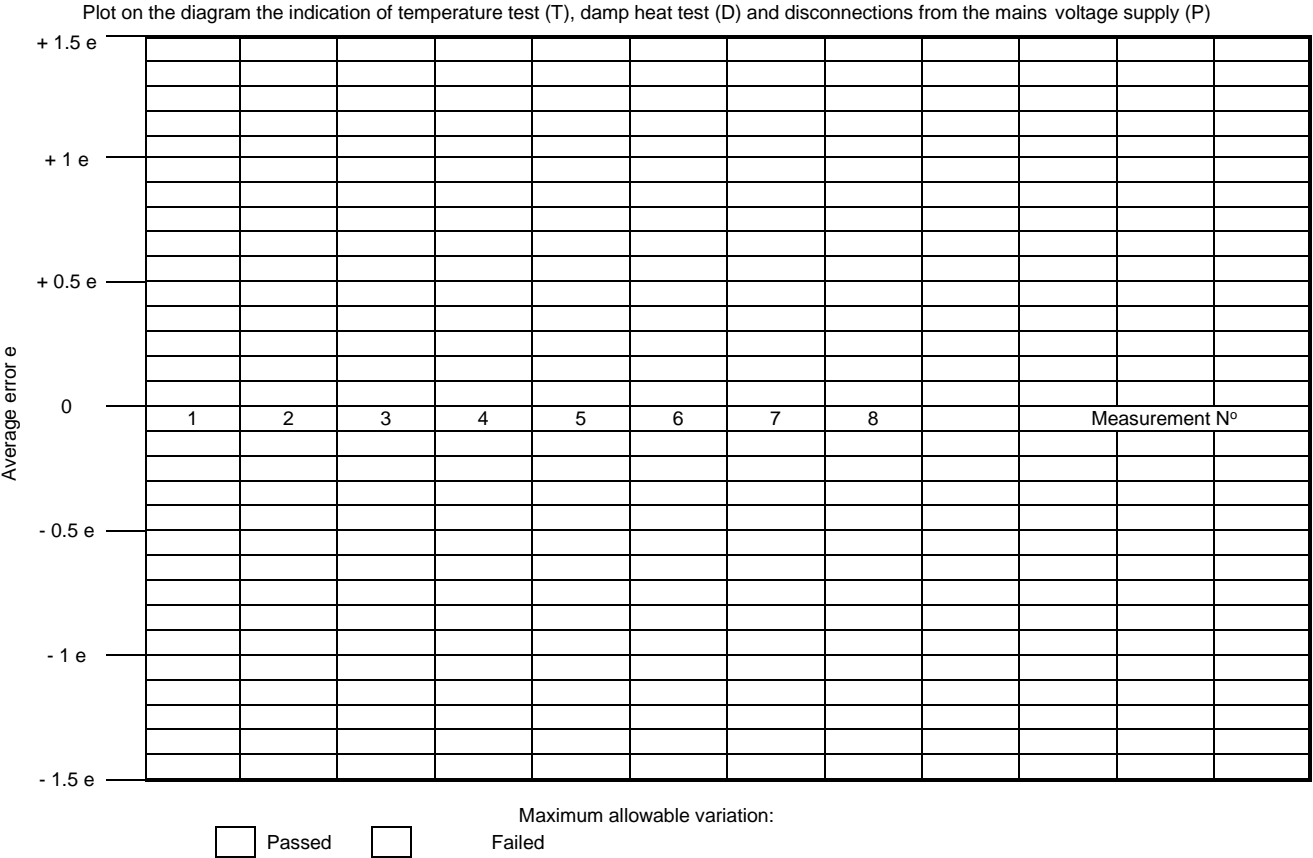
 If five loadings and readings have been performed: Average error = average ($E_L - E_0$)

Remarks:

³⁴⁾When applicable, necessary corrections resulting from variations of temperature, pressure, etc. See remarks.

10 Span stability (continued)

Application No: Type designation:



11 EXAMINATION OF THE CONSTRUCTION OF THE INSTRUMENT

Use this page to indicate any description or information pertaining to the instrument, additional to that already contained in this report and in the accompanying national type approval or OIML certificate. This may include a picture of the complete instrument, a description of its main components, and any remark which could be useful for authorities responsible for the initial or subsequent verifications of individual instruments built according to the type. It may also include references to the manufacturer description.

Description:

Remarks:

CHECKLIST

The checklist has been developed based on the following principles:

To include requirements that cannot be tested according to test 1 through 10 above, but shall be checked experimentally, e.g. the operating range of the tare device (3-6R 51-1, 6.6.3), or visually, e.g. the descriptive markings (3.11);

To include requirements which indicate prohibitions of some functions, e.g. semi-automatic zero-setting devices shall not be operable during automatic operation (3-5R 51-1, 6.5.3);

Not to include general requirements, e.g. suitability for use (3.1);

This checklist is intended to serve as a summary of the results of examinations to be performed and not as a procedure. The items on this checklist are provided to recall the requirements specified in R51-1 and they shall not be considered as a substitution for these requirements.

The requirements that are not included in this type evaluation report (test 1 through 10 and checklist 12) are considered to be globally covered by the type approval or OIML certificate (e.g. classification criteria [2.2 and 2.3], suitability for use [3.1]).

For non-mandatory devices, the checklist provides space to indicate whether or not the device exists and, if appropriate, its type. A cross in the box for "present" indicates that the device exists and that it complies with the definition given in the terminology; when indicating that a device is "not present", also check the boxes to indicate that the tests are not applicable (see p. 5).

If appropriate, the results stated in this checklist may be supplemented by remarks given on additional pages.

12 CHECKLIST (continued)

Application No: Type designation:

Requirement (R 51-1)	Test procedure (R 51-2)	Catchweigher checklist	Passed	Failed	Remarks
25.4		Instrument fitted with auxiliary indicating device	Present []	Not-Present []	
		Located to the right of the decimal sign			
		Category Y(a) and Y(b) use of auxiliary indicating device limited to testing applications only			
		Multi-interval instruments are not fitted with auxiliary indicating device			
		Multi-interval instruments are not fitted with auxiliary indicating device			
25.5		Maximum permissible errors			
25.5.1.1	A-5.1.1	Maximum permissible errors for Category X			
		Maximum permissible mean (systematic) error for automatic operation			
		Maximum permissible standard deviation of the errors (random errors) for automatic operation			
25.5.1.2	A-5.1.1	Maximum permissible errors for Category Y			
		Maximum and minimum capacity in automatic operation			
		Minimum capacity			
2.6		Maximum permissible errors for influence factor tests			
	A-5.1.1	Category X automatic operation			
	A-5.1.2	Category X nonautomatic (static) operation			
	A-5.1.1	Category Y automatic operation			
	A-5.1.2	Category Y nonautomatic (static) operation			
5.6	A-1.4	Units of measurement	Present	Not-Present	
2.7		ct	[]	[]	
		mg	[]	[]	
		g	[]	[]	
		kg	[]	[]	
		t	[]	[]	
25.87		Permissible differences between results			
2.8.15.7.1	A-5.7	Effect of eccentric loading			
		Maximum permissible errors in 2R 51-1.5.5 are not exceeded.			
2.8.25.7.12	A.5.10	Agreement between indicating and printing devices			
		For the same load, the difference between the weighing results from any two devices having the same scale interval is:			
		– zero for digital indicating or printing devices;			
		– not greater than the absolute value of the MPE for automatic weighing for analogue devices.			

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Requirement (R 51-1)	Test procedure	Catchweigher checklist	Passed	Failed	Remarks
2.95.8		Influence factors			
2.95.8.1	A.6.2-6.21	Static temperature limits			
2.95.8.1.2	A.6.2-6.22	Temperature effect on no-load indication			
2.95.8.2		Voltage supply			
	A.6.2-6.24	AC mains voltage			
	A.6.2-6.25	DC mains voltage			
	A.6.2-6.26	Battery voltage			
		12 V or 24 V road vehicle battery			
2.95.8.3	A.6.2-6.28	Tilting			
		Levelling device and level indicator	Present []	Not-Present []	
		If present, fixed in a clearly visible place and representative for the tilt sensitive part			
		Instrument not permanently installed with level indicator, can be set to 1 % or less, or to a limiting value as defined by marking on the level indicator			
		Vehicle mounted or incorporated instruments comply with the appropriate metrological and technical requirements when tilted (longitudinally and transversely) by 10 % or less			
5.9	3.9	<u>Indication or printout for test purposes (automatic operation)</u>			
		<u>For category X instruments, practical means shall be provided in accordance with R 51-1, 9.1.8 for determining the mean error and the standard deviation of the error to demonstrate compliance with Tables 3 and 4, e.g. indications and/or print-outs of the mass (or the difference between the mass and a nominal set-point).</u>			
		<u>For category Y instruments, practical means for determining the individual errors of weighings shall be provided in accordance with R 51-1, 9.1.7.2 to demonstrate compliance with Table 5.</u>			
5.10	7	<u>Span stability</u>			
		<u>For the span stability, the absolute value of the difference between the errors obtained for any two measurements shall not exceed the maximum span error.</u>			
		<u>The maximum span error is equal to one half the maximum permissible error for influence factor tests for a near maximum capacity load.</u>			

36		Technical requirements			
36.2	A-1.4	Security of operation			
36.2.1		Instrument has no characteristics likely to facilitate fraudulent use			
36.2.2		Effect of accidental breakdown or maladjustment is evident			
36.2.3	A-3.3	Dynamic setting facility	Present []	Not-Present []	
		Access to dynamic setting automatically and non-erasably record and available			
36.2.4		Controls			
		Come to rest in intended positions			
		Unambiguously marked keys			
36.2.5	A-6.2-6.28	Tilt limiting device	Present []	Not-Present []	
		Inhibits operation above predetermined value of tilt			
36.2.6	A-5.11	Means of securing	Present []	Not-Present []	
		Form			
		Prevents access and adjustment			
		Prevents the introduction into the instrument of data that can influence the metrological properties of results			
		Any access to secured controls or functions becomes automatically self-evident			
		Span adjustment device	Present []	Not-Present []	
		External influence span adjustment device practically impossible after securing			
36.2.7		Sorting device	Present []	Not-Present []	
		Sub-divides loads into separate groups			

Requirement (R 51-1)	Test procedure	Catchweigher checklist	Passed	Failed	Remarks
36.3	1.4	Indication of weighing results			
36.3.1		Quality of reading			
		Reliable, easy and unambiguous under conditions of use			
		Overall inaccuracy of an analogue device is $\leq 0.2 e$			
		Figures forming the primary indications is of a size, shape and clarity for reading to be easy			
		Scales, numbering and printing permits the figures to be read by simple juxtaposition			
36.3.2		Form of the indication:			
		Results contain names and symbols of the units of mass			
		For any one indication, only one unit of mass			
		Scale interval in the form 1×10^k , 2×10^k or 5×10^k units (k being a positive or negative whole number or zero)			
		All indicating, printing and tare weighing devices have the same scale interval within any one weighing range			
		Digital indication displays at least one figure beginning at extreme right			
		Decimal sign to separate integer and decimal fraction			
		One zero displayed to the extreme right without a decimal sign			
		Unit of mass is such that there is not more than one non-significant zero to the right			
36.3.3		Limits of indication			
		Class X instruments: no indication above $\text{Max} + 9 e$, or			
		Max + 3 times the appropriate MPSD from Table 4 whichever is the greater			
		Class Y instruments: no indication above $\text{Max} + 9 e$			
36.3.4		Indication or printout for normal operation			
		Scale interval of indication or printout of weight for normal operation is the verification scale interval e			
36.4		Digital indicating and printing devices (continued)			
36.4.1		Under continuous or temporary disturbance of stable equilibrium:			
		printed or stored weighing values show no more than two adjacent; with one of them being the final weighing value			
		for zero or tare operations, correct operation according to R 51-1, 3.4.3 (printing), 3.5R 51-1, 6.5.3 (control of zero-setting), 3.5R 51-1, 6.5.4 (stability of zero-setting), 3.5R 51-1, 6.5.5 (zero-tracking) and 3.6R 51-1, 6.6.7 (tare operation) is achievable			

Requirement (R 51-1)	Test procedure	Catchweigher checklist	Passed	Failed	Remarks	
36.4.2		Extended indicating device	Present []	Not-Present []		
		not allowed when there is an auxiliary indicating device				
		On instrument fitted with extended indicating device printing inhibited:				
		– while pressing key, or				
		at most, 5 seconds after a manual command				
36.4.3		Printing device	Present []	Not-Present []		
		Clear and permanent				
		Name or symbol of unit is to the right of the value or above a column of values				
		Printing inhibited if stability criteria not fulfilled				
		At least 2 mm high				
36.4.4		Data storage	Present []	Not-Present []		
		Storage, transfer, totalizing inhibited when stability criteria not fulfilled				
36.4.5		A.1-1Annex A	Software			
			Present in such a form that alteration is not possible without breaking a seal, or automatically generating a signal by means of an identification code.			
			Legally relevant software adequately protected against accidental or intentional changes.			
	Evidence of any intervention is available until the next verification or comparable official inspection.					
	Software is assigned with a fixed version number or software identification that is adapted in the case of every software change that may affect the functions and accuracy of the instrument.					
	Software documentation with the instrument include:					
	– Description of the system hardware and legally relevant software environment;					
	– Description of the device-specific parameters that is assigned to the metrologically relevant functions;					
	– Description of the relevant menus and dialogues;					
	– The securing measures foreseen					
	– Description of the data storage device(s)					
	– Other information regarding the legally relevant characteristics of the instrument					
36.5	A.5.4	Zero-setting, -tracking and -indicating	Present	Not-Present		
		Initial zero-setting	[]	[]		
		Automatic zero-setting	[]	[]		
		Semi-automatic zero-setting	[]	[]		
		Non-automatic zero-setting	[]	[]		
		Zero-tracking - not more than one	[]	[]		
		Zero-indicating	[]	[]		

Requirement (R 51-1)	Test procedure	Catchweigher checklist	Passed	Failed	Remarks
36.5.1	A-5.4.2	Effect of zero-setting device:			
		Shall not alter the maximum weighing capacity			
		Overall effect of:			
		Zero-setting			= %
		Zero-tracking			= %
36.5.2	A-5.4.3	Initial zero-setting			= %
36.5.3	A-5.5	Accuracy of zero-setting:			
		Deviation $\leq 0.25 e$			
		Control of zero-setting:			
		Separate from that of tare weighing device			
		Semi-automatic zero-setting: functions only:			
36.5.4	A-5.5	– when the instrument is in stable equilibrium			
		– If it cancels any previous tare operation			
		Nonautomatic or semi-automatic zero-setting:			
		Shall not be operable during automatic operation			
		Automatic zero-setting			
		Operates only when stable equilibrium			
		Sufficiently often to maintain zero within 0.5 e			
		When operating as part of every weighing cycle, it is not possible to disable or set at time intervals			
		Maximum time interval is less than the value necessary to ensure zero error is not greater than 0.5 e			
		Automatic zero-setting:			
36.5.5	A-5.5	– occurs after allocated time, or			
		– the instrument stops automatically so that zero setting can occur, or			
		– generating information to overdue zero-setting			
		Zero-tracking			
		Operates only when indication is at zero, or at negative net zero value equivalent to gross zero			
		Stability criteria is fulfilled			
		Corrections are not more than 0.5 e/second			
36.6	A-5.6	When operates after tare, overall effect is 4 % of Max			
		Tare device			
			Present	Not-Present	
		Tare weighing	[]	[]	
		Tare balancing	[]	[]	
36.6	A-5.6	Combined zero-setting and tare balancing	[]	[]	
		Tare indicating	[]	[]	
		Type: Additive [] Subtractive []			

Requirement (R 51-1)	Test procedure	Catchweigher checklist	Passed	Failed	Remarks
3-66.6.1	A-5.6.2	Tare weighing device			
		$d_T = d$ (for class Y instruments)			
3-66.6.2		Accuracy:			
		Deviation $\leq 0.25 e$, with $e = e_1$ for multi-interval instruments			
3-66.6.3		Operating range			
		Prevention of operation at or below its zero effect			
		Prevention of operation above its maximum indicating effect			
3-66.6.4		Visibility of operation			
		Operation indicated			
		Net with sign "N", "NET", "Net", "net" or complete word (digital indication)			
		NET disappears if gross displayed temporarily			
		Tare with sign "T" or complete word (digital indication)			
3-66.6.5		Subtracting tare			
		Prevention of use above Max or indication that capacity is reached			
3-66.6.6		Multiple range			
		Operation effective in greater weighing ranges if switching when loaded possible			
3-66.6.7		Operation weighing device			
		Semi-automatic or automatic tare operate only when stability criteria fulfilled			
		Nonautomatic or semi-automatic tare shall not be operable during automatic operation			
3-66.6.8		Combined zero/tare			
		Accuracy (3R 51-1.6.5.2)			
		Zero-tracking (3R 51-1.6.5.5)			
3-66.6.9		Consecutive tare operations			
		Indicated or printed tare weight values clearly designated (if tare devices operative at the same time)			
3-66.6.10		Printing of weighing results			
		Without designation			
		Designation: by G or B (gross)			
		by N (only net printed)			
		Designation of net and tare by N and T (if net printed with gross and/or tare)			
		Instead of G, B, N and T, complete words			
		Printing separately net and tare with identification (different tare devices)			

Requirement (R 51-1)	Test procedure	Catchweigher checklist	Passed	Failed	Remarks
36.7 36.7.1 36.7.2 36.7.3		Preset tare device	Present []	Not-Present []	
		Scale interval (d_T) of preset tare value			
		$d_T \leq e$ (Category X instruments)			
		$d_T = d$ or automatically rounded to d (Category Y instruments)			
		Transferred from one range to another one with larger e_1 , shall be rounded to the latter (multiple range)			
		Tare value entered is smallest e_1 , and maximum tare value is less than Max_1 for the same net weight value (multi-interval) and calculated net value rounded to the scale interval for the same net weight value			
		Modes of operation			
		Requirements in <u>R 51-1, 36.6.9</u> (consecutive tare operations) applies			
		Cannot be modified/cancelled if tare operated after the preset tare is still in use			
		Operates automatically if clearly identified with load			
		Indication of operation			
		<u>R 51-1, 36.6.4</u> (visibility of tare operation) applies provided that "T" is replaced by "PT"			
		Possibility to indicate preset tare			
		Requirements in <u>R 51-1, 36.6.10</u> (printing of weighing results) applies			
		If calculated net printed then preset tare printed as well			
		Designation of preset tare by PT or complete word			
36.8 36.8.1 36.8.2		Multiple weighing ranges	Present []	Not-Present []	
		Range in operation clearly indicated			
		Manual selection			
		Selection from smaller to greater range possible at any load			
		Selection from greater to smaller range only at no load			
		When no load, tare cancelled and zero to $\pm 0.25 e_1$ both automatically			
		Manual selection inhibited during automatic operation			
		Automatic selection			
		Selection from smaller to the greater following range possible only for load $\geq Max_i$ of smaller range			
		Selection only from a greater to the smallest range only when no load			
		When no load, tare cancelled and zero to $\pm 0.25 e_1$ both automatically			

Requirement (R 51-1)	Test procedure	Catchweigher checklist	Passed	Failed	Remarks
36.9		Devices for selection between load receptors, various transmitting and measuring devices	Present []	Not-Present []	
36.9.1		Compensation for unequal no-load effect			
36.9.2		Zero-setting without ambiguity and in accordance with requirements in 3R 51-1.6.5.			
36.9.3		Weighing impossible while selection devices in use			
36.9.4		Combinations of load receptors and measuring devices easily identifiable			
36.10		Weigh or weigh-price labelling instrument	Present []	Not-Present []	
		At least one display for the weight			
		Actual values of unit price can be verified during automatic operation			
		Actual values of preset tare can be verified during automatic operation			
36.10.1		Price computing			
		Price is calculated and rounded to the nearest scale interval of price to pay			
		The interval of price to pay, and the monetary symbols complies with national regulations			
		Unit price is in the form of Price/100 g or Price/kg, or			
		Specified in accordance with national regulations for trade			
36.10.2		Totalisation			
		Total values of totalised weight and price data are identified by a special word or symbol and are algebraic sums of all the values printed			
36.10.3		Printing includes weight, unit price and price to pay			
		Stored in memory: before printing			
		same data not printed twice			
36.11	A-1.4	Descriptive markings			
36.11.1		Markings shown in full			
		Identification mark of the manufacturer			
		Identification mark of the importer (if applicable)			
		Serial number and type designation of the instrument			
		Maximum rate of operation			
		Maximum speed of load transport system (if applicable)			
		Electrical supply voltage			
		Electrical supply frequency			
		Pneumatic/hydraulic pressure (if applicable)			
		Adjustment range (referred to set point) (if applicable)			
		Temperature range (when not -10 °C to 40 °C)			
		software identification (if applicable)			

Requirement (R 51-1)	Test procedure	Catchweigher checklist	Passed	Failed	Remarks
36.11.2	A-1.4	Markings shown in code			
		Type approval sign			
		Indication of the class of accuracy X() or Y()			
		Verification scale interval			
		Scale interval			
		Maximum capacity			
		Minimum capacity			
		Maximum tare additive			
		Maximum tare subtractive			
36.11.3		Supplementary markings			
		Any additional markings	enter in remarks		
36.11.4		Presentation of descriptive markings			
		Indelible and of size, shape and clarity that allows easy reading			
		Shown in an official language in accordance with national legislation.			
		Size, shape and clarity that allows easy reading			
		Grouped together in a clearly visible place either on a descriptive plate or sticker fixed permanently near the indicating device, or on a non removable part of the instrument itself			
		Alternatively, the descriptive markings simultaneously displayed by an indicator device, and			
		– at least Max, Min, e, d if $d \neq e$, and X() or Y() shown permanently in one place and displayed be displayed as long as the instrument is switched on			
		– the other marking may be shown on manual commend			
		– access to reprogramming of markings is automatically and non-erasably recorded, and			
		– made evident by an audit trail			
		In the case of a plate or sticker which is not destroyed when removed, a means of securing shall be provided.			
		Plate contains type, designation of instrument, manufacturer, type approval sign, electrical supply voltage, electrical supply frequency, pneumatic/hydraulic pressure			
36.12		Verification marks			
36.12.1		Place where verification marks are located cannot be removed without damaging the marks			
		Allows easy application of marks			
		Visible without the instrument having to be removed			
36.12.2	Mounting				
	Verification mark support ensures conservation of the marks				
	Support is of the correct construction				

Requirement (R 51-1)	Test procedure	Catchweiger checklist	Passed	Failed	Remarks
47.2		Functional requirements			
47.2.1		Indicator display test			
		For displays other than non-segmented displays, upon switch-on all relevant signs of indicating device are active and non-active for sufficient time to be checked by operator			
47.2.2		Acting upon significant faults			
		Either the instrument is made inoperative automatically ³⁵ , or			
		Visual or audible indication is provided automatically and continues until the user takes action or the fault disappears(*)			
47.2.3		Warm-up time			
		No indication or transmission of weighing results			
		Automatic operation is inhibited			
47.2.4		Interfaces	Present []	Not-Present []	
		Prevents functions and measuring data to be inadmissibly influenced by peripheral devices or other connected instrument or disturbance			
		Prevents the displaying of data which could be mistaken for a weighing result			
		Not possible to introduce data or programs through interface suitable to falsify displayed, processed, stored weighing results			
		Not possible to introduce data or programs through interface suitable to unauthorised adjustment of the instrument			
		Transmits data relating to primary indications so that peripheral devices can meet requirements			
		Functions performed or initiated through the interface meet relevant requirements of <u>Clause R 51-1, 36</u> .			
4.2.5	A.5.12	Voltage supply failure:			
		Metrological information retained for at least 24 hours			
		Switch-over to emergency voltage supply shall not cause significant fault			
5.8.2	A.5.13	DC voltage variations:			
		For DC-mains and battery powered instruments, whenever voltage drops below the minimum operating level, the instrument either:			
		Continue to function correctly,			
		Show an error message, or			
		Is automatically put out of service			

³⁵ Checked by verifying the compliance with documents [] or by simulating faults []; this check does not duplicate the disturbance tests 9.46.3.1 through 9.66.3.6.

Use this space to detail remarks from the checklist

ANNEX A

SAMPLE TEST REPORT FOR RECORDING INDIVIDUAL WEIGHTS
CLASS X INSTRUMENTS - AUTOMATIC OPERATION ³⁶

Test:

Test section (R51-2):

Relevant section(s) of R51-1:

	At start	At end	
Application No:	Temp:	°C
Type designation:	Rel. h:	%
Observer:	Date:	yyyy:mm:dd
	Time:	hh:mm:ss
	Bar. Pres:	hPa

only class XI or Y(I)
Record only the data applicable to the test

Verification scale interval e:

Resolution during test (smaller than e):

Load:

Eccentricity band:
(if applicable)

Rate of operation (max):

Automatic zero-setting device is:

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

Test	Indication	Error	Test	Indication	Error
1			16		
2			17		
3			18		
4			19		
5			20		
6			21		
7			22		
8			23		
9			24		
10			25		
11			26		
12			27		
13			28		
14			29		
15			30		

³⁶ Refer to [Annex A.5.1 in R51-1](#) [R 51-2, 5.1](#) for the material test procedure

SAMPLE TEST REPORT FOR RECORDING INDIVIDUAL WEIGHTS (continued)
CLASS X INSTRUMENTS - AUTOMATIC OPERATION

	Indication	Error	Test	Indication	Error
31			46		
32			47		
33			48		
34			49		
35			50		
36			51		
37			52		
38			53		
39			54		
40			55		
41			56		
42			57		
43			58		
44			59		
45			60		

Mean of indicated readings: $\bar{I} = \frac{\sum_{i=1}^n I_i}{n} = \dots\dots\dots$

Standard deviation: $s = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}} = \dots\dots\dots$

Remarks:

ANNEX B

SAMPLE TEST REPORT FOR RECORDING INDIVIDUAL WEIGHTS
CLASS Y INSTRUMENTS - AUTOMATIC OPERATION ³⁷

Test:

Test section (R51-2):

Relevant section(s) of R51-1:

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

only class XI or Y(I)
Record only the data applicable to the test

Verification scale interval e:

Resolution during test (smaller than e):

Load:

Eccentricity band:
(if applicable)

Rate of operation (max):

Automatic zero-setting device is:

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

Test	Indication	Error	Test	Indication	Error
1			16		
2			17		
3			18		
4			19		
5			20		
6			21		
7			22		
8			23		
9			24		
10			25		
11			26		
12			27		
13			28		
14			29		
15			30		

Remarks:

³⁷ Refer to [Annex A.5.1 in R51-1](#) [R 51-2, 5.1](#) for the material test procedure