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Part 2: Test report Format

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EXPLANATORY NOTE

This third committee draft revision of OIML R 106-2 has been developed by the OIML TC 9 / SC 2 Automatic weighing instruments, in response to comments received to the second committee draft revision in July 2006.

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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;

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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 instrument for weighing road vehicles in motion (total vehicle weight) 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 106-1 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 106-1.

All metrology services or laboratories evaluating types of automatic instruments for weighing rail wagons in motion (wagon mass) accordingly to R 106-1 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, surges (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 106-2 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 RAIL-WEIGHBRIDGES

TYPE EVALUATION REPORT

EXPLANATORY NOTES

Symbols	Meaning
I	Indication
I_n	n^{th} indication
L	Load
ΔL	Additional load to next changeover point
P	I + 1/2 e – ΔL = Indication prior to rounding (digital indication)
E	I – L or P – L = Error
E%	(P - L)/L %
E_0	Error at zero load
d	Actual scale interval
d_s	Stationary scale interval
p_i	Fraction of the MPE applicable to a module of the instrument which is examined separately.
MPE	Maximum permissible error
EUT	Equipment under test
sf	Significant fault
Max	Maximum capacity of the weighing instrument
Min	Minimum capacity of the weighing instrument
U_{nom}	Nominal voltage value marked on the instrument
U_{max}	Highest value of a voltage range marked on the instrument
U_{min}	Lowest value of a voltage range marked on the instrument
v_{min}	Minimum operating speed
v_{max}	Maximum operating speed
e.m.f	Electromotive force
I/O	Input / Output ports
RF	Radio frequency
V/m	Volts Per Meter
kV	kilovolt
DC	Direct current
AC	Alternating current
MHz	Megahertz

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:

	P	F
when the instrument has passed the test:	X	
when the instrument has failed the test:		X
when the test is not applicable:	—	—

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:	2006-01-29	2006-01-30	yyyy-mm-dd
Time:	16:00:05	16:30:25	hh:mm:ss
Bar Pres:			hPa

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

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

Section numbers in brackets refer to the corresponding subclauses of R 106-1.

GENERAL INFORMATION CONCERNING THE TYPE

Application N°: ..... Manufacturer: .....

Type designation: ..... Applicant: .....

Instrument category: .....

Testing on: ☐ Full draught weighbridge ☐ Partial-draught weighbridge
☐ Complete instrument ☐ Module[1]

Accuracy class: ☐ 0.2 ☐ 0.5 ☐ 1 ☐ 2

Maximum capacity = ☐ Max wagon weight = ☐ n_{max} = ☐ v_{max} = ☐
Minimum capacity = ☐ Min wagon weight = ☐ n_{min} = ☐ v_{min} = ☐

T = + ☐ T = - ☐ d = ☐ d_s = ☐

U_{nom} = ☐ 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 device
☐ Subtractive tare
☐ Additive tare

☐ Combined zero/tare device

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

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

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: .....
.....

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

GENERAL INFORMATION CONCERNING THE TYPE (continued)

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:	…..…….....		

Manufacturing Documentation

(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: …..…….....

Section R106-2	TESTS		Report page	Passed	Failed	Remarks
1	Zero-setting					
2	Warm-up time					
3.1	Static temperatures					
3.2	Temperature effect on no load indication					
3.3	Damp heat, steady state					
3.4	Voltage supply variations					
4.1	AC mains short time power reduction					
4.2	Electrical bursts on:	Mains voltage lines				
		I/O circuits and communication lines				
4.3	Surges on:	AC power supply lines				
		Any other kind of voltage lines and signal and communication lines				
4.4	Electrostatic discharges:	Direct application				
		Indirect application (contact discharges only)				
4.5	Immunity to electromagnetic fields:	Radiated				
		Conducted				
5	Span stability test					
6.1	Accuracy of zero-setting					
6.2	Determination of weighing performance					
6.2.1	Eccentricity test					
6.2.2	Discrimination test					
6.2.3	Repeatability test					
6.2.4	Stability of equilibrium:	Printing, storage				
		Zero-setting				
7.1	Full-draught weighing of reference wagons					
7.2	Partial-draught weighing of reference wagons					
7.3	Rail-alignment correction procedure					
8	Examination of the construction					
9	Checklist					

SUMMARY OF TYPE EVALUATION (continued)

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

1 ZERO-SETTING (3.2.7, A.5.2)

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

E = I + ½ d - ΔL
E = I - L or P - L = Error

1.1 Range of zero-setting (A.5.2.1)

Zero-setting mode	Positive zero limit load L_1	Negative zero limit load L_2	Range $L_1 + L_2$	% of maximum load

☐ Passed ☐ Failed

Remarks:

1.2 Accuracy of zero-setting (A.5.2.2)

Zero-setting mode	ΔL	E = ½ d - ΔL	MPE

☐ Passed ☐ Failed

Remarks:

2 WARM-UP TIME (4.3.4, A.6.1)

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

Duration of disconnection before test: ..... hrs

Automatic zero-setting and zero-tracking device is:

☐ Non-existent ☐ Not in operation ☐ Out of working range ☐ In operation[2]

$E = I + ½\ d - \Delta L - L$
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	MPE	R106-1 Clause:
	a)	Initial zero-setting error, E_{0I}	$\leq 0.25\ d$	
Check if:	b)	Maximum value of error unloaded, E_0	$\leq 0.25\ d$	3.2.7.1, A.5.2.2
	c)	Maximum value of zero variation, $E_0 - E_{0I}$	$\leq 0.25\ d * P_i$	
	d)	Maximum value of error loaded, $E_L - E_0$	$\leq 0.25\ d * P_i$	

☐ Passed ☐ Failed

Remarks:

[2] In operation only if zero operates as part of every automatic weighing cycle

3 INFLUENCE FACTORS

3.1 Static temperatures (2.7.1.1, A.7.2.1)

3.1.1 Reference temperature of 20 ºC

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

Automatic zero-setting and zero-tracking device is:

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

$E = I + ½\ d - \Delta L - L$

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

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

Check if $E_C \leq$ MPE

☐ Passed ☐ Failed

Remarks:

3.1.2 Static temperatures (specified high = ……°C)

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

Automatic zero-setting and zero-tracking device is:

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

$E = I + ½\ d - \Delta L - L$

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

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

Check if $E_C \leq$ MPE

☐ Passed ☐ Failed

Remarks:

3.1.3 Static temperatures (specified low = …….. °C)

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

Automatic zero-setting and zero-tracking device is:

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

E = I + ½ d - ΔL - L
$E_c = E - E_o$ with E_o = error calculated at or near zero (*)

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

Check if $E_C \leq$ MPE

☐ Passed ☐ Failed

Remarks:

3.1.4 Static temperatures (5ºC if within the specified low temperature is ≤ 0ºC)

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

Automatic zero-setting and zero-tracking device is:

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

$E = I + ½\ d - \Delta L - L$
$E_c = E - E_o$ with E_o = error calculated at or near zero (*)

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

Check if $E_C \leq$ MPE

☐ Passed ☐ Failed

Remarks:

3.1.5 Static temperatures (Reference temperature of 20ºC)

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

Automatic zero-setting and zero-tracking device is:

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

$E = I + ½\ d - \Delta L - L$

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

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

Check if $E_C \leq$ MPE

☐ Passed ☐ Failed

Remarks:

3.2 Temperature effect on no-load indication (2.7.1.2, A.7.2.2)

Application No: .....

Type designation: .....

Observer: .....

Scale interval d: .....

Resolution during test: (smaller than d): .....

Automatic zero-setting and zero-tracking device is:

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

$P = I + ½ d - \Delta L$

Report Page[3]	Date	Time	Temp (°C)	Zero indication I	Add load ΔL	P	ΔP	ΔTemp	Zero-change per 5 °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 5 °C is smaller than d

☐ Passed ☐ Failed

Remarks:

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

3.3 Damp heat tests, steady state – non-condensing (4.3.3, A.7.2.3)

3.3.1 Reference temperature of 20 °C and 50 % humidity

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

	At start	After 3 h	At end	
Temp:				°C
Rel. h:				%
Date:				yyyy-mm-dd
Time:				hh:mm:ss
Bar. Pres:				hPa

Automatic zero-setting and zero-tracking device is:

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

$E = I + ½\ e - \Delta L - L$
$E_c = E - E_o$ with E_o = error calculated at or near zero (*)

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

Check if $E_C \leq$ MPE

☐ Passed ☐ Failed

Remarks:

3.3 Damp heat, steady state tests (continued)

3.3.2 Upper limit temperature (……..°C) and 85 % humidity

	At start	After 3 h	At end	
Temp:				°C
Rel. h:				%
Date:				yyyy-mm-dd
Time:				hh:mm:ss
Bar. Pres:				hPa

E = I + ½ e - ΔL - L
$E_c = E - E_o$ with E_o = error calculated at or near zero (*)

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

Check if $E_C \leq$ MPE

☐ Passed ☐ Failed

Remarks:

3.3 Damp heat, steady state tests (continued)

3.3.3 Reference temperature of 20 °C and 50 % humidity

	At start	After 3 h	At end	
Temp:				°C
Rel. h:				%
Date:				yyyy-mm-dd
Time:				hh:mm:ss
Bar. Pres:				hPa

E = I + ½ e - ΔL - L
$E_c = E - E_o$ with E_o = error calculated at or near zero (*)

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

Check if $E_C \leq$ MPE

☐ Passed ☐ Failed

Remarks:

3.4 Mains power supply variations (2.7.2, A.7.2)

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

☐ AC power supply, A.7.2.4

☐ DC power supply, A.7.2.5

☐ Battery Power (DC), A.7.2.6

Supply voltage[4]: U_{nom} = ☐ V U_{min} = ☐ V U_{max} = ☐ V

Automatic zero-setting and zero-tracking device is:

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

$E = I + ½\ e - \Delta L - L$ $E_c = E - E_0$ with E_0 = error calculated at or near zero

Category of voltage supply (if an instrument has more than one voltage supply): .....

Voltage	U (V)	Load L	Indication I	Add. load ΔL	Error E	Corrected error E_c	MPE
Reference value							
Lower limit							
Upper limit							

[4]Calculate lower and upper limits of applied voltages according to 2.7.2. In case a voltage-range (U_{min} / U_{max}) is marked, use the average value as reference value.

3.5 Mains power supply variations (continued)

Category of voltage supply (if an instrument has more than one voltage supply): .....

Voltage	U (V)	Load L	Indication I	Add. load ΔL	Error E	Corrected error E_c	MPE
Reference value							
Lower limit							
Upper limit							

☐ Passed ☐ Failed

Remarks:

Category of voltage supply (if an instrument has more than one voltage supply): .....

Voltage	U (V)	Load L	Indication I	Add. load ΔL	Error E	Corrected error E_c	MPE
Reference value							
Lower limit							
Upper limit							

☐ Passed ☐ Failed

Remarks:

4 DISTURBANCES (4.1.2, A.7.3)

4.1 AC power supply dips and short interruptions (A.7.3.1)

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

Marked nominal voltage (U_{nom}) or voltage range[5]: ☐ V

Load L	Disturbance				Result		
	Amplitude % of U_{nom}	Duration cycles	Number of disturbances	Repetition interval (s)	Indication I	Significant fault (> d) or detection and reaction	
						No	Yes (remarks)
	without disturbance						
	0	0.5	10				
	0	1	10				
	40	10	10				
	70	25	10				
	80	250	10				
	0	250	10				

☐ Passed ☐ Failed

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

Remarks:

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

4.2 Bursts (transients) on mains power lines and on I/O circuits and communication lines (A.7.3.2)

4.2.1 Mains voltage lines

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

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

Load L	Disturbance		Result		
	Disturbance	Polarity	Indication I	Significant fault (> d) or detection and reaction	
				No	Yes (remarks)
	without disturbance				
	Live ↓ ground	pos			
		neg			
	without disturbance				
	Neutral ↓ ground	pos			
		neg			
	without disturbance				
	Protective earth ↓ ground	pos			
		neg			

☐ 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:

4.2 Bursts (transients) on mains power lines and on I/O circuits and communication lines (continued)

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

4.2.2 I/O circuits and communication lines

I/O signals, data and control lines: test voltage 1.0 kV, duration of the test > 1 minute at each polarity

Load L	Disturbance		Result		
	Bursts on cable / interface (Type, nature)	Polarity	Indication I	Significant fault (> d) or detection and reaction	
				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; use an additional page.

☐ Passed ☐ Failed

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

Remarks:

4.3 Electrical surges on mains power lines (A.7.3.3)

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

4.3.1 Mains voltage supply lines[6]

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

☐ Passed ☐ Failed

Remarks:

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

4.3 Electrical surges on mains power lines (continued)

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

4.3.2 Any other kind of voltage supply[7]

Kind or type of power supply

DC ☐ Other form ☐ Voltage ☐

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

Use another page for additional test set-up information.

☐ Passed ☐ Failed

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

Remarks:

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

4.4 Electrostatic discharges (A.7.3.4)

4.4.1 Direct application

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

☐ Contact discharges ☐ Paint penetration

☐ Air discharges Polarity[8]: ☐ pos ☐ Neg

Load L	Discharges			Result		
	Test Voltage[9] (kV)	Number of discharges ≥ 10	Repetition Interval (s)	Indication I	Significant fault (> d) or detection and reaction	
					No	Yes (remarks, test points)
	without disturbance					
	2					
	4					
	6					
	8 (air discharges)					

☐ 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:

[8] IEC 61000-4-2 specifies that the test shall be conducted with the most sensitive polarity.

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

4.4 Electrostatic discharges (continued)

4.4.2 Indirect application (contact discharges only)

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

Polarity: ☐ pos ☐ neg

Horizontal coupling plane

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

Vertical coupling plane

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

☐ Passed ☐ Failed

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

Remarks:

4.4 Electrostatic discharges (continued)

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

a) Direct application

Contact discharges:

Air discharges:

b) Indirect application

4.5 Immunity to electromagnetic fields (A.7.3.5)

4.5.1 Radiated electromagnetic fields (A.7.3.5.1)

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

Rate of sweep: Load: Material load:

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

Test severity;

Frequency range: 80 MHz [(1)] to 2000 MHz
RF amplitude (50 ohms): 10 V/m
Modulation: 80 % AM, 1 kHz, sine wave

[(1)] Lower limit is 26 MHz if the test according to A.7.3.5.2 cannot be applied due to lack of mains or I/O ports.

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

☐ Passed ☐ Failed

Remarks:

4.5 Immunity to electromagnetic fields (continued)

4.5.2 Conducted electromagnetic fields (A.7.3.5.2)

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

Rate of sweep: Load: Material load:

Disturbance			Result		
Frequency Range (MHz)	Cable / Interface	Level (Volts RMS)	Indication I	Significant fault (> d)	
				No	Yes (remarks)
without disturbance					
without disturbance					
without disturbance					
without disturbance					
without disturbance					
without disturbance					

Test severity;

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

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

☐ Passed ☐ Failed

Remarks:

4.5 Immunity to electromagnetic fields (continued)

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

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

Radiated:

Conducted:

5 SPAN STABILITY (4.4.3, A.8)

Application No: .....

Type designation: .....

Scale interval d: .....

Resolution during test: (smaller than d) .....

Automatic zero-setting and zero-tracking device is:

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

Zero load = ☐ Test load = ☐

Automatic span adjustment device:

☐ Non-existent ☐ In operation

Measurement No 1: Initial measurement

Application No: .....

Type designation: .....

Observer: .....

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

$E_0 = I_0 + ½\ d - \Delta L_0 - L_0$ $E_L = I_L + ½\ d - \Delta L - L$

N°	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[10]
1								
2								
3								
4								
5								

Average error = average ($E_L - E_0$) ☐

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

0.1 d = ☐

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

Remarks:

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

5 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
☐	the damp heat test, the EUT having been stabilized for at least 16 h
☐	the EUT has been disconnected from the mains for at least 8 h and then stabilized for at least 5 h
☐	any change in the test location
☐	any other specific condition: ……...

Measurement No 2:

Application No: .....

Type designation: .....

Observer: .....

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

$E_0 = I_0 + ½\ d - \Delta L_0 - L_0$ $E_L = I_L + ½\ d - \Delta L - L$

N°	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:

5 Span stability (continued)

Measurement No 3:

Application No: .....

Type designation: .....

Observer: .....

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

$E_0 = I_0 + ½ d - \Delta L_0 - L_0$ $E_L = I_L + ½ d - \Delta L - L$

N°	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:

Measurement No 4:

Application No: .....

Type designation: .....

Observer: .....

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

$E_0 = I_0 + ½ d - \Delta L_0 - L_0$ $E_L = I_L + ½ d - \Delta L - L$

N°	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:

5 Span stability (continued)

Measurement No 5:

Application No: .....

Type designation: .....

Observer: .....

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

$E_0 = I_0 + ½ d - \Delta L_0 - L_0$ $E_L = I_L + ½ d - \Delta L - L$

N°	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:

Measurement No 6:

Application No: .....

Type designation: .....

Observer: .....

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

$E_0 = I_0 + ½ d - \Delta L_0 - L_0$ $E_L = I_L + ½ d - \Delta L - L$

N°	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:

5 Span stability (continued)

Measurement No 7:

Application No: .....

Type designation: .....

Observer: .....

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

$E_0 = I_0 + ½ d - \Delta L_0 - L_0$ $E_L = I_L + ½ d - \Delta L - L$

	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:

Measurement No 8:

Application No: .....

Type designation: .....

Observer: .....

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

$E_0 = I_0 + ½ d - \Delta L_0 - L_0$ $E_L = I_L + ½ d - \Delta L - L$

N°	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 ($E_L - E_0$)

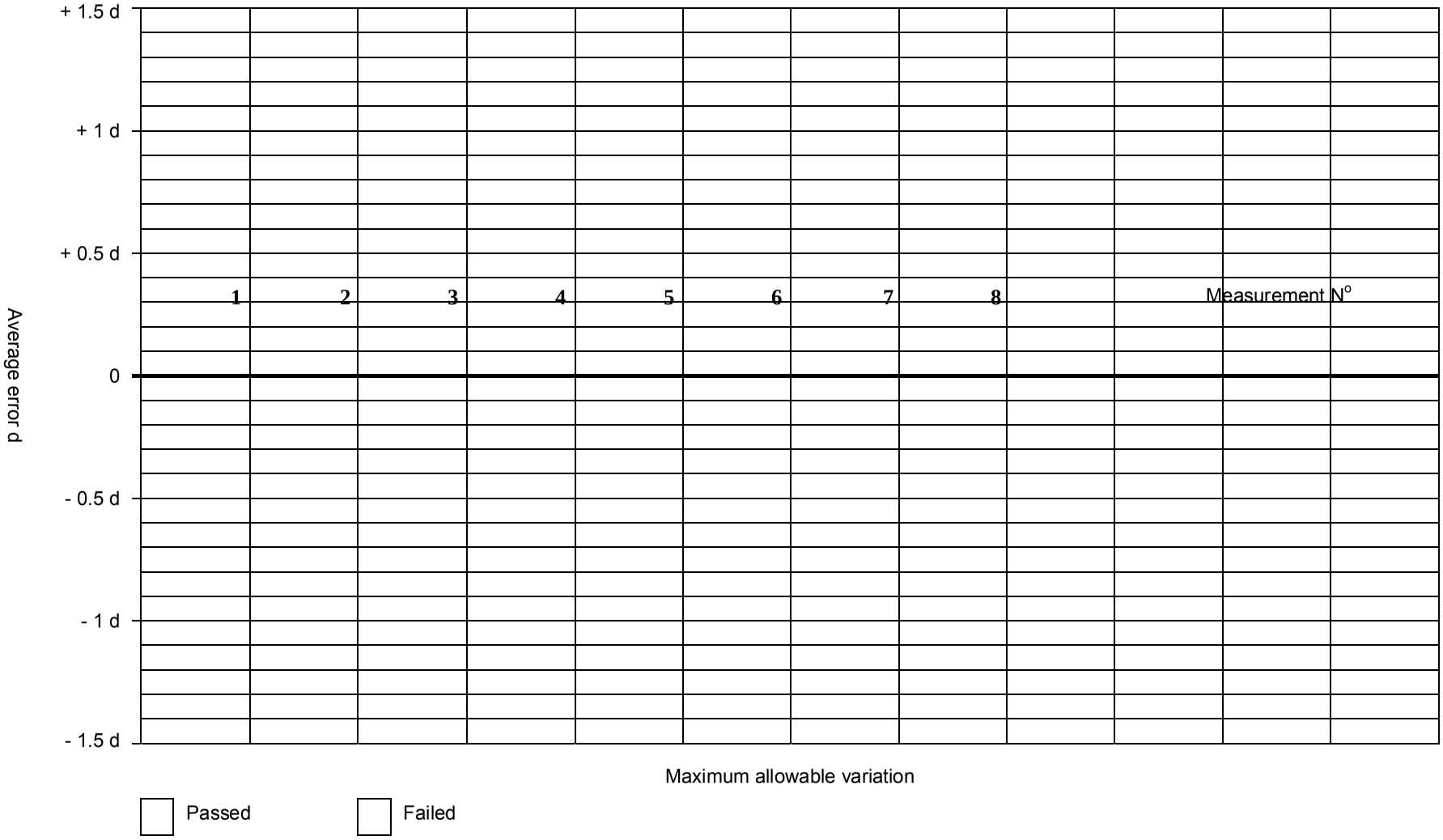
Remarks:

5 SPAN STABILITY (A.8)

Application N°: ……

Type designation: ……

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



☐ Passed ☐ Failed

6 Static weighing (6.2.1, A.5.3)

6.1 Accuracy of zero-setting (6.2.1.1, A.5.3.1.1)

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

Zero-setting mode	ΔL	$E = ½ d - \Delta L$	MPE

☐ Passed ☐ Failed

Remarks:

6.2 Determination of weighing performance (6.2.1, A.5.3.2)

6.2.1 Weighing test (A.5.3.2.2, A.9.3.1)

(Calculation of the error)

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

Automatic zero-setting device is:

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

Initial zero-setting > 20 % of Max: ☐ Yes ☐ No

$E = I + ½\ d - \Delta L - L$
$E_c = E - E_o$ with E_o = error calculated at or near zero (*)

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

☐ Passed ☐ Failed

Remarks:

6.2.2 Eccentricity tests (6.2.1.2, A.5.3.2.4)

Note: If operating conditions are such that no eccentricity can occur, eccentricity tests need not be performed.

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

Load ($^1/_3$ Max) .....

Location of test loads for each section of the load receptor: mark on a sketch (see example below) the successive locations of test loads, using letters which shall be repeated in the table below).

a	b	c

Also indicate on the sketch the location of the display or another perceptible part of the instrument.

Automatic zero-setting device is:

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

$E = I + ½\ e - \Delta L - L$

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

Section	Direction (← / →)	Load L	Location	Indication I	Add load ΔL	Error	Corrected error E_c	MPE
		(*)				(*)		
		(*)				(*)		
		(*)				(*)		
		(*)				(*)		

☐ Passed ☐ Failed

Remarks:

6.2.3 Discrimination test (6.2.1.3, A.5.3.2.5)

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

Load L	Indication I_1	Remove load ΔL	Add. 1/10 d	Extra load = 1.4 d	Indication I_2	$I_2 - I_1$

☐ Passed ☐ Failed

Remarks:

6.2.4 Repeatability test (6.2.1.4, A.5.3.2.6)

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

Automatic zero-setting device is:

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

Load (weighing 1-6) ☐ Load (weighing 7-12) ☐

E= I + 1/2 e - ΔL - L

N°	Indication of load I	Add. load ΔL	Error E
1			
2			
3			
4			
5			
6			

N°	Indication of load I	Add. load ΔL	Error E
7			
8			
9			
10			
11			
12			

E_{max} - E_{min} (weighing 1 - 6) ☐ E_{max} - E_{min} (weighing 7 - 12) ☐

mpe ☐ mpe ☐

Check if: a) E ≤ mpe (2.9)

b) E_{max} - E_{min} ≤ absolute value of mpe (3.2.7)

☐ Passed ☐ Failed

Remarks:

6.2.5 Stability of equilibrium (3.3.5.3, A.6.5)

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

Automatic zero-setting device is:

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

In the case of printing or data storage

N°	Load (about 50 % of Max)	First printed or stored weight value after disturbance and command	Reading during 5 s after print-out or storage	
			minimum value	maximum value
1				
2				
3				
4				
5				

Check if the first printed or stored weight value does not deviate more than 1 d from the readings during 5 seconds after print-out or storage, only two adjacent values allowed

☐ Passed ☐ Failed

In the case of zero-setting

Zero-setting			$E_0 = I_0 + 1/2\ e - \Delta L - L_0$		
N° (*)	Zero-load (< 4 % of Max)	Load L_0 (**) (10 d)	Indication I_0 after zero-setting	Add. load ΔL	Error E_0
1					
2					
3					
4					
5					

(*) Apply the zero load, disturb the equilibrium and immediately release zero-setting, apply L_0 if necessary and calculate the error according to A.5.2.2 of R106-1. Perform this 5 times.

(**) L_0 shall be applied only if an automatic zero-setting is in operation. L_0 shall be applied after releasing zero-setting, immediately after zero is displayed the first time.

☐ Passed ☐ Failed

Remarks:

7 Static weighing test (6.2.1, A.9.3.1)

7.1 Full-draught weighing of static reference wagons (A.9.3.1.1)

Application No: .....
Type designation: .....
Observer: .....
Scale interval d: .....
Resolution during test: (smaller than d): .....

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

Control instrument is: ☐ Integral ☐ Separate

7.1.1 Uncoupled wagon weighing

Uncoupled wagon static weighing:

No	Reference wagon identification	Total wagon mass	Remarks
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
Mean			
Error			
MPE			

Remarks:

7.1 Full-draught weighing of static reference wagons (continued)

7.1.2 Coupled wagon weighing

Coupled wagon static weighing (empty):

No	Reference wagon identification	Total wagon mass	Remarks
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			

Coupled wagon static weighing (loaded):

Reference wagon identification	Total wagon mass	Remarks

Remarks:

7.2 Rail alignment correction procedure (A.9.3.1.2, Annex B)

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

Accuracy class: A .....

Maximum capacity: B .....

Standard weights required: C .....

(A – 1.5B, rounded down)

Scale interval (d): .....

Scale interval for stationary load .....

	Position on load receptor	Indicated mass (t)	
		Empty wagon ( )	Loaded wagon ( )
First axle	Leading end Middle Trailing end		
Second axle	Leading end Middle Trailing end		
Total of six weighings		D =	E=
Divide total by three			
Derived mass of standard weight		F = E – D =	
Alignment correction		C – F =	

Note: The use of the capital letters A to F correlate to the table below and the example given in R 106-1, Annex B.

Remarks:

7.3 Partial-draught weighing of static reference wagons (A.9.3.1.3)

Application No: .....
Type designation: .....
Observer: .....
Scale interval d: .....
Resolution during test: (smaller than d): .....

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

Control instrument is:
☐ Integral ☐ Separate
☐ Partial axle weighing ☐ Partial bogie weighing

7.3.1 Empty reference wagons

Partial-draught static weighing (empty):

No	Reference wagon ID	Partial-draught weighing				Total mass ( )	Corrected total (*) ( )	Remarks
		1st mass	2nd mass	3rd mass	4th mass			
1								
2								
3								
4								
5								
6								
7								
8								
9								
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11								
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16								
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18								
19								
20								
21								
22								
23								
24								
25								

(*) Total to be corrected with the rail alignment correction procedure in R106-1, Annex B.
Corrected total = Total mass – rail alignment correction)

7.3 Partial-draught weighing of static reference wagons (continued)

7.3.2 Loaded reference wagons

Partial-draught static weighing (loaded):

No	Reference wagon ID	Partial-draught weighing				Total mass ( )	Corrected total (*) ( )	Remarks
		1st mass	2nd mass	3rd mass	4th mass			
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
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16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

(*) Total to be corrected with the rail alignment correction procedure in R106-1, Annex B.
Corrected total = Total mass – rail alignment correction)

Remarks:

8 In-motion weighing tests (coupled, uncoupled or train) (6.2.2, A.9.3.2)

Application No: .....
Type designation: .....
Observer: .....
Scale interval d: .....
Resolution during test: (smaller than d): .....

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

8.1 Summary of test data

Modes of operation tested (6.3)	
Uncoupled	
Coupled	
Train	
Direction of coupled wagons (single or dual)	

Operating speed (2.10, A.6.3, A.9.4)	
Maximum operating speed v_{max}	
Minimum operating speed v_{min}	
Site operating speed (Site)	

Coupled wagon and train weighing (6.3)	
Maximum number of wagons per train n_{max}	
Minimum number of wagons per train n_{mim}	
Total number of wagons coupled	
Number of reference wagons coupled n_{ref}	

	Test run 1 Test speed			Test run 2 Test speed			Test run 3 Test speed			Test run 4 Test speed			Test run 5 Test speed		
	v_{max}	v_{min}	Site	v_{max}	v_{min}	Site	v_{max}	v_{min}	Site	v_{max}	v_{min}	Site	v_{max}	v_{min}	Site
Percentage of reference wagons within MPE															
Percentage of reference wagons within twice MPE															

	Test run 1 Test speed			Test run 2 Test speed			Test run 3 Test speed			Test run 4 Test speed			Test run 5 Test speed		
	v_{max}	v_{min}	Site	v_{max}	v_{min}	Site	v_{max}	v_{min}	Site	v_{max}	v_{min}	Site	v_{max}	v_{min}	Site
Sum of reference wagons in train															

8.2 Uncoupled wagon in-motion weighing (6.2.2.2, A.9.3.2.2)

Test speed near v_{max}: _____ km / h

No	Reference wagon identification	Reference wagon mass -static ( )	Test run 1 ( )		Test run 2 ( )		Test run 3 ( )		Test run 4 ( )		Test run 5 ( )		Remarks
			Indicated mass	Error	Indicated mass	Error	Indicated mass	Error	Indicated mass	Error	Indicated mass	Error	
1													
2													
3													
4													
5													
6													
7													
8													
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8.2.1 Uncoupled wagon in-motion weighing (continued)

Test speed near typical site speed: _____ km / h

No	Reference wagon identification	Reference wagon mass -static ( )	Test run 1 ( )		Test run 2 ( )		Test run 3 ( )		Test run 4 ( )		Test run 5 ( )		Remarks
			Indicated mass	Error	Indicated mass	Error	Indicated mass	Error	Indicated mass	Error	Indicated mass	Error	
1													
2													
3													
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6													
7													
8													
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8.2.3 Uncoupled wagon in-motion weighing (continued)

Test speed near v_{min}: _____ km / h

No	Reference wagon identification	Reference wagon mass -static ( )	Test run 1 ( )		Test run 2 ( )		Test run 3 ( )		Test run 4 ( )		Test run 5 ( )		Remarks
			Indicated mass	Error	Indicated mass	Error	Indicated mass	Error	Indicated mass	Error	Indicated mass	Error	
1													
2													
3													
4													
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6													
7													
8													
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8.3 Coupled wagon or train in-motion weighing (6.2.2.3, A.9.3.3)

Test speed near v_{max}: _____ km / h

No	Reference wagon identification	Reference wagon mass -static ( )	Test run 1 ( )		Test run 2 ( )		Test run 3 ( )		Test run 4 ( )		Test run 5 ( )		Remarks
			Indicated mass	Error	Indicated mass	Error	Indicated mass	Error	Indicated mass	Error	Indicated mass	Error	
1													
2													
3													
4													
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7													
8													
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8.3.1 Coupled wagon or train in-motion weighing (continued)

Test speed near typical site speed: _____ km / h

No	Reference wagon identification	Reference wagon mass -static ( )	Test run 1 ( )		Test run 2 ( )		Test run 3 ( )		Test run 4 ( )		Test run 5 ( )		Remarks
			Indicated mass	Error	Indicated mass	Error	Indicated mass	Error	Indicated mass	Error	Indicated mass	Error	
1													
2													
3													
4													
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7													
8													
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8.3.2 Coupled wagon or train weighing (continued)

Test speed near v_{min}: _____ km / h

No	Reference wagon identification	Reference wagon mass -static ( )	Test run 1 ( )		Test run 2 ( )		Test run 3 ( )		Test run 4 ( )		Test run 5 ( )		Remarks
			Indicated mass	Error	Indicated mass	Error	Indicated mass	Error	Indicated mass	Error	Indicated mass	Error	
1													
2													
3													
4													
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7													
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8.3 Continuation report page

Continuation of report page ……..

No	Reference wagon identification	Reference wagon mass -static ( )	Test run 1 ( )		Test run 2 ( )		Test run 3 ( )		Test run 4 ( )		Test run 5 ( )		Remarks
			Indicated mass	Error	Indicated mass	Error	Indicated mass	Error	Indicated mass	Error	Indicated mass	Error	
1													
2													
3													
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Note: Reproduce this page as necessary for the number of wagon weighings.

9 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 6 above, but shall be checked experimentally 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 (3.3.3);

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 R106-1 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 6 and checklist 8) are considered to be globally covered by the type approval or OIML certificate (e.g. classification criteria [2.1], 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 non-existent, 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.

8 CHECKLIST (continued)

Application No: ..... Type designation: .....

Requirement (R 106-1)	Test procedure	Automatic rail-weighbridges	Passed	Failed	Remarks
2	**A.2**	**METROLOGICIAL REQUIREMENTS**			
2.3		**Scale interval (d)** for all mass indicating and printing devices on an instrument is:			
		– the same for a particular method of weighing-in-motion and combination of load receptors,			
		– in the form of 1×10^k, 2×10^k, or 5×10^k, "k" being a positive or negative whole number or zero.			
2.4		**Scale interval for stationary load (d_s)** is:			
		– automatically put out of service if not equal to the scale interval d during weighing-in-motion			
		– not be readily accessible, and			
		– only used for static testing if instrument not verified for use as a non-automatic weighing instrument			
2.5		**Minimum capacity:** – is not less than 1t and not greater than the value of the result of the minimum wagon mass divided by the number of partial weighings			
2.6		**Minimum wagon mass:** – is not be less than 50 d.			
2.7.1		**Static temperature:**			
		– stated in descriptive markings; or			
		– - 10 °C to + 40 °C			
2.7.2		**Supply voltage:**			
		– AC power supply			
		– DC power supply			
		– Battery Power (DC) voltage			
2.8		**Units of measurement on the instrument:**			
		Kilogram (kg) and tonne (t).			
3	**A.1**	**TECHNICAL REQUIREMENTS**			
3.2		**Security of operation:**			
3.2.1		**Fraudulent use:** – instrument has no characteristics likely to facilitate its fraudulent use			
3.2.2		**Accidental maladjustment:** – effect of accidental breakdown or maladjustment is evident			
3.2.3		**Interlocks:** Prevent the indication and recording of the mass of any wagon that has travelled over the load receptor outside specified working conditions for:			
	A.6.4	– minimum operating voltage (2.7.2)			
		– railway vehicle recognition (3.6)			
		– wheel position on the load receptor (3.6)			
	A.6.3	– range of operating speeds (2.10)			
		– wagon weighment detection			

Requirement (R 106-1)	Test procedure	Automatic rail-weighbridges	Passed	Failed	Remarks
3.2.4		**Uncoupled wagon weighing**			
		Instruments for uncoupled wagon weighing recognise and indicate the passage of:			
		a) a coupled wagon			
		b) 2 or more uncoupled wagons so close as to cause either malfunction or errors exceeding the MPE.			
		c) Whether or not weighing has occurred			
3.2.5		**Automatic operation:**			
		Instrument is designed for accurate operation in accordance with R106-1 for a specified period durably in accordance with the intended use of the instrument.			
		Any malfunction is automatically and clearly indicated (e.g. fault indication or automatic switch off).			
		Level of confidence takes account of uncertainties of measurement, significant faults, overload situation, high speed and failure of the instrument.			
	A.1.1	Documentation submitted by the manufacturer includes a description of how this requirement is met.			
3.2.6	**A.5.3**	**Use as a non-automatic weighing instrument:**			
		– the automatic rail-weighbridge is to be used as an AWI and as a NAWI complies with R 106 and with R 76, and if used as a control instrument its error and uncertainty shall be less than one-third (if verified immediately before the in-motion tests) or less than one-fifth (if verified at any other time) of the mpe for weighing in motion in 2.2.1;			
		– the automatic rail weighbridge is to be used as an integral control instrument complies with R106 and its error and uncertainty in static weighing shall be less than one-third (if verified immediately before the in-motion tests) or less than one-fifth (if verified at any other time) of the mpe for weighing in motion in 2.2.1.			
3.2.7	**A.5.2**	**Zero-setting and zero-tracking device:**			
		– Initial zero-setting			
		– Automatic zero-setting or zero tracking			
		– Semi-automatic zero-setting			
		– Non-automatic zero-setting			
		– Zero-tracking			
		A semi-automatic zero-setting device shall not be operable during automatic operation.			
3.2.7.1	**A.5.2.2**	**Accuracy of zero-setting**: – is not more than $\pm$ 0.25 d			
3.2.7.2		**Maximum effect:**			
		– Effect of zero-setting shall not alter the maximum weighing capacity of the instrument			
		– Zero-setting range = %			
		– Initial zero-setting range = %			

Requirement (R 106-1)	Test procedure	Automatic rail-weighbridges	Passed	Failed	Remarks
3.2.7.3	**A.5.2.2.2**	**Stability of automatic zero-setting:**			
	A.6.5	– operates only when the instrument is in stable equilibrium as specified in 3.3.5.3;			
		– operates sufficiently often to maintain zero within 0.5 d per second;			
		– when operating as part of every weighing cycle, it is not possible to disable or set at time intervals;			
		– description of the operation of the automatic zero-setting device is specified by manufacturer;			
3.2.7.5		**Zero-tracking device operates only when:**			
		- the indication is at zero			
		- In stable equilibrium as specified in 3.3.5.3			
		- operates sufficiently often to maintain zero within 0.5 d per second			
3.3	**A.1.3**	**Indication of weighing results**			
3.3.1		**Quality of indication:**			
		Reading of the primary indications:			
		– is reliable, easy and unambiguous under conditions of normal use;			
		– overall inaccuracy ≤ 0.2 d for analogue indication;			
		– size, shape and clarity for easy reading;			
		– reading by simple juxtaposition			
3.3.2		**Printing device:**			
		– printing is clear and permanent for the intended use.			
		– printed figures at least 2 mm high.			
		– name or the symbol of the unit of measurement is either to the right or above a column of values, or placed according to national regulation.			
3.3.3		**Information from weighing-in-motion operation:**			
		– minimum information resulting from each weighing operation is dependent upon the application of the instrument;			
		– includes the date, time, operating speed and the instrument identification;			
		– in the case of wagon weighing each wagon mass;			
		– in the case of train weighing each train mass and the number of wagons in the train;			
		– scale interval of indications for wagon mass or train mass shall be scale interval d in accordance with 2.3;			
		– scale interval of indications for measured or calculated mass values, may be to a higher resolution than the scale interval d;			
		– weighing results shall bear the name or symbol of the appropriate unit of mass in accordance with 2.8;			
3.3.4		**Digital indication:**			
		– includes the display of a zero for all places displayed to the right of a decimal point and at least one place to the left;			
		– when no decimal values are displayed, a zero is displayed for each place of the displayed division;			
		– decimal fraction is separated from its integer by a decimal sign, with the indication showing at least one figure to the left of the sign and all figures to the right.			
		– decimal sign shall be on one line with the bottom of the figures			

Requirement (R 106-1)	Test procedure	Automatic rail-weighbridges	Passed	Failed	Remarks
3.3.5		**Limits of indication or recording of weighing results:**			
3.3.5.1		**Weighing capacity:**			
		– Instruments shall not indicate or record the following if it would cause a weighing result less than Min or greater than Max + 9 d:			
		– the mass of the locomotive, unless the value is clearly marked and separated from other weighing values;			
		– the mass of any wagon;			
		– a totalised mass inclusive of any wagon			
		Indications inhibited when the equilibrium is not stable			
3.3.5.2		**Roll back:**			
		No alteration of indicated values of wagon mass due to any part of any wagon travelling over the load receptor more than once, unless the wagon is been reweighed.			
3.3.5.3		**Stable equilibrium**:			
		a) the condition of the instrument such that the indicated mass of each separate weighing test do not deviate more than 1 d_s from the final weight value (T.3.9), and			
		b) in the case of zero operations a correct operation of the device according to 3.2.7 and A.6.5 within relevant accuracy requirements is achieved.			
3.4		**Totalising device:**	Present [ ]	Not-Present [ ]	
		a) Automatic			
		b) Semi-automatic			
3.5		**Data storage device:**			
		– In memory of the instrument (hard drive),	Present [ ]	Not-Present [ ]	
		– Removable external storage	Present [ ]	Not-Present [ ]	
		Stored data is adequately protected against intentional and unintentional changes during the transfer and storage process;			
		Stored data contains all relevant information necessary to reconstruct an earlier measurement.			
		Securing of data storage:			
		a) Appropriate the requirements for security of software given in 3.8;			
		b) If software realizing the data storage can be transmitted to or downloaded into the instrument these processes shall be secured in accordance with 3.9;			
		c) External storage devices identification and security attributes shall be automatically verified to ensure integrity and authenticity;			
		d) Exchangeable storage media for storing measurement data need not be sealed provided that the stored data is secured by a specific checksum or key code;			
		e) When storage capacity is exhausted, new data may replace oldest data provided that the owner of the old data has authorises the data replacement.			

Requirement (R 106-1)	Test procedure	Automatic rail-weighbridges	Passed	Failed	Remarks
3.6		**Wagon recognition device:**			
		a) detects the presence of a wagon in the weigh zone and detect when the whole wagon has been weighed.			
		b) generates an error message or prevent the indication or recording of the wagon mass if it travels in the wrong direction If only one direction of travel is specified for an instrument,.			
3.7		**Installation**			
3.7.1		**General**			
		a) automatic rail-weighbridges manufactured and installed to minimise any adverse effects of the installation environment;			
		b) the space between the load receptor and ground shall allow all covered parts of the load receptor to be kept free from all debris or other matter that could affect the accuracy of the instrument;			
3.7.2		**Composition:**			
		Instruments comprise any of the following:			
		a) one or more load receptors			
		b) aprons			
		c) vehicle-type identification devices			
		d) indicating, recording or printing device;			
		e) data processing module			
3.7.3		**Ease of static testing:**			
		Accessible to vehicles moving test weight if used as a control instrument			
3.7.4		**Drainage**			
		If the weighing mechanism is contained in a pit, there shall be a provision for drainage to ensure that no portion of the instrument becomes submerged or partially submerged in water or any other liquid.			
		Heating			
3.7.5		If the weighing mechanism is installed in environment where temperatures below the minimum specified temperature can be expected, the effects on the accuracy of the instrument from any provision for heating shall be taken into account.			

Requirement (R 106-1)	Test procedure	Automatic rail-weighbridges	Passed	Failed	Remarks
3.8		**Software:**			
	Observe	Legally relevant software of the instrument is identified by the manufacturer.			
	A.1.1	**Software documentation:**			
		a) Description of the legally relevant software;			
		b) Description of the accuracy of the measuring algorithms (e.g. programming modes);			
		c) Description of the user interface, menus and dialogues;			
		d) The unambiguous software identification;			
		e) Description of the embedded software;			
		f) Overview of the system hardware, e.g. block diagram, type of computer(s), software source code, etc, if not described in the operating manual;			
		g) Means of securing software;			
		h) Operating manual.			
		Security of legally relevant software			
		a) Appropriate requirements for securing given in 3.5 and 3.9 of R106-1;			
		b) Adaptable legally relevant software in the case of every software change that may affect the functions and accuracy of the instrument;			
		c) Legally relevant functions performed or initiated via connected interfaces comply with the securing requirements for interfaces in 4.3.5 in R 106-1.			
3.9	**A.2.4**	**Securing of components, interfaces and pre-set controls** subject to legal control shall be:			
		a) fitted with a securing means, or			
		b) enclosed;			
		c) if enclosed, the enclosure is sealed;			
		d) national prescribed types of securing are permitted which provide sufficient integrity;			
		e) seals are easily accessible;			
		f) breakable security seals fitted on devices for changing the parameters of legally relevant measurement results;			
		g) securing provided on all parts of the measuring system which cannot be materially protected in any other way against operations liable to affect the measurement accuracy			

Requirement (R 106-1)	Test procedure	Automatic rail-weighbridges	Passed	Failed	Remarks
3.9.2		**Means of securing:**			
		a) Hardware and/or software means of security to restrict access to authorised persons only;			
		b) Records of interventions including the date and a means of identifying the authorised person making the intervention (see a) above):			
		i. can be memorised, accessed and displayed;			
		ii. traceability of the interventions is assured for at least the period of time in between periodical verifications depending on national legislation.			
		c) Records may not be overwritten, and if the storage capacities for records is exhausted, no further intervention shall be possible without breaking a physical seal;			
		c) Software functions are secured against intentional, unintentional and accidental changes in accordance with 3.8;			
		d) Transmission of legally relevant data via interfaces secured against intentional, unintentional and accidental changes in accordance with 4.3.5;			
		e) Securing possibilities available in an instrument shall be such that separate securing of the settings is possible;			
		f) Stored data shall be secured against intentional, unintentional and accidental changes in accordance with 3.4.			
3.10		**Span adjustment:**			
		a) automatic or a semi-automatic span adjustment device incorporated inside the instrument.			
		b) external influence upon this device shall be practically impossible after securing.			
3.11	A.2.3	**Descriptive markings, variable according to national regulation:**			
3.11.1	Observe	**Markings shown in full:**			
		- identification mark and / or name of the manufacturer			
		- identification mark and / or name of the importer (if applicable)			
		- serial number of the instrument and modules			
		- maximum wagon mass .....kg or t			
		- minimum wagon mass ..... kg or t			
		- not to be used to weigh liquid products (if applicable)			
		- number of partial-draught weighings per wagon			
		- maximum transit speed .....km/h			
		- direction of weighing (if applicable)			
		- supply voltage..... V			
		- power supply frequency .....Hz			
		- temperature range (when not -10°C to 40°C)			
		- software identification, (if applicable)			

Requirement (R 106-1)	Test procedure	Automatic rail-weighbridges	Passed	Failed	Remarks
3.11.2.1	Observe	**Markings shown in code:**			
		– type approval sign in accordance with national requirements			
		– accuracy class wagon mass (each weighing method, if applicable) 0.2, 0.5, 1 or 2			
		– maximum capacity; Max = ... kg or t			
		– minimum capacity; Min = ... kg or t			
		– scale interval; d = ... kg or t			
		– scale interval for stationary load; d_s (if applicable) ……kg or t			
		– maximum operating speed; v_{max} = ... km / h			
		– minimum operating speed; v_{min} = ... km / h			
3.11.2.2		**Train weighing:**			
		– maximum number of wagons per train; n_{max} =.....			
		– minimum number of wagons per train; n_{min} =.....			
3.11.3		**Supplementary markings:**			
		as required: (please list)			
		–			
		–			
		–			
3.11.4		**Presentation of descriptive markings:**			
		– indelible			
		– size, shape and clarity that allows easy reading			
		– grouped together in a clearly visible place			
		– plate bearing markings to be sealed, unless it cannot be removed without being destroyed			
		– Shown on a programmable display bearing:			
		– at least Max, Min and d shall be displayed as long as the instrument is switched on;			
		– other marking may be shown on manual commend;			
		– described in the type approval (OIML) certificate			
		– device-specific parameters			
		Shown on a programmable display bearing:			
		– at least Max, Min and d shall be displayed as long as the instrument is switched on;			
		– other marking may be shown on manual commend;			
		– described in the type approval (OIML) certificate			
		– device-specific parameters			
		Markings on a data plate for software controlled display include:			
		– Max, Min and d shown near the display ;			
		– type approval sign in accordance with national requirements,			
		– name or identification mark of the manufacturer,			
		– type approval number,			
		– supply voltage,			
		– supply voltage frequency,			
		– pneumatic / hydraulic pressure, (if applicable).			

Requirement (R 106-1)	Test procedure	Automatic rail-weighbridges	Passed	Failed	Remarks
3.11.5		**Presentation of descriptive markings:**			
		– indelible			
		– size, shape and clarity that allows easy reading			
		– grouped together in a clearly visible place			
		– plate bearing markings to be sealed, unless it cannot be removed without being destroyed			
		Shown on a programmable display bearing:			
		– at least Max, Min and d shall be displayed as long as the instrument is switched on;			
		– other marking may be shown on manual commend;			
		– it must be described in the type approval (OIML) certificate			
		– markings are considered as device-specific parameters			
		Markings on a data plate for software controlled display include:			
		– Max, Min and d shown near the display ;			
		– type approval sign in accordance with national requirements,			
		– name or identification mark of the manufacturer,			
		– type approval number,			
		– supply voltage,			
		– supply voltage frequency,			
		– pneumatic / hydraulic pressure, (if applicable).			
3.12	**A.2.4**	**Verification marks**			
3.12.1	Observe	**Position of verification marks:**			
		– Cannot be removed without damaging the marks			
		– Allows easy application of marks			
		– Visible without the instrument having to be removed			
3.12.2	Observe	**Mounting:**			
		– Verification mark support ensures conservation of the marks			
		– The type and method of sealing shall be determined by national prescription.			
		TECHNICAL REQUIREMENTS			
4		**General requirements**			
4.1.1		Rated operating conditions: – errors do not exceed mpe			
4.1.2		**Disturbances:**			
		Electronic instruments designed and manufactured so that:			
		– Significant faults do not occur, or			
		– Significant faults are detected and acted upon			
4.3	**A.1.4**	**Functional requirements**			
4.3.1		**Acting upon a significant fault:**			
		By verifying the compliance with documents or by simulating faults check that :			
		– either the instrument is made inoperative automatically, or			
		– a visual or audible indication is provided automatically and continues until the user takes action or the fault disappears			
4.3.2		**Upon switch-on:** – Relevant signs of indicator are active and non-active for sufficient time to be checked by operator.			
4.3.4		– **Warm-up time:**			
		– no indication or transmission of weighing results			
		– automatic operation is inhibited			

Requirement (R 106-1)	Test procedure	Automatic rail-weighbridges	Passed	Failed	Remarks
4.3.5		**Interfaces:**			
		Instrument with interface(s) shall continue to function correctly and its metrological functions shall not be influenced.			
4.3.5.1		**Interface documentation:**			
		The manufacturer shall provide documentation on all interfaces comprising of at least:			
		a) A list of all commands (e.g. menu items);			
		b) Description of the software interface;			
		c) A list of all commands together;			
		d) A brief description of their meaning and their effect on the functions and data of the instrument.			
4.3.5.2		**Securing of interfaces:**			
		a) legally relevant software, measurement data and functions of the instrument are not inadmissibly influenced by other interconnected instruments, or by disturbances acting on the interface			
		b) data is protected (e.g. with a protective interface) against accidental or deliberate interference during the transfer;			
		c) all functions in the software interface are subjected to the software securing requirements in 3.8;			
		d) all functions in the hardware interface are subjected to the hardware securing requirements in 3.9;			
		e) metrologically relevant parts of the target instrument are included in the initial verification (or equivalent conformity assessment procedures);			
		f) easily possible to verify the authenticity and integrity of data transmitted to and from the instrument;			
		g) functions performed or initiated by other connected instruments through the interfaces meet the appropriate requirements of R 106.			
		Other instruments required by national regulation to be connected to the interfaces of an instrument shall be secured to inhibit automatically the operation of the instrument for reasons of the non-presence or improper functioning of the required device.			
4.3.6	A.6.4	**AC power supply:**			
		– maintains metrological information for 24 hours after voltage failure			
		– emergency switch-over does not cause significant fault			
4.3.7	A.6.4	**DC power supply**			
		When below manufacturer's specified value:			
		– continues to function correctly, or			
		– is automatically put out of service			

Requirement (R 106-1)	Test procedure	Automatic rail-weighbridges	Passed	Failed	Remarks
5.1.1	**A.1.1**	**Type Approval Documentation**			
		– metrological characteristics of the instrument;			
		– a standard set of specifications for the instrument;			
		– a functional description of the components and devices (3.7.2);			
		– drawings, diagrams and general software information (if applicable), explaining the construction and operation;			
		– description and application of securing components, interlocks, adjustment devices, controls, fault indication function, etc. (3.2.3, 3.2.5, 3.9, 3.10);			
		– printing devices (3.3.2);			
		– data storage device (3.5);			
		– zero-setting devices (3.2.7);			
		– connection of different load receptors (2.3, 6.2.1.5)			
		– interfaces (types, intended use, immunity to external influences instructions (3.9, 4.3.5);			
		– for software controlled instruments general software information (3.8, 3.11.5);			
		– description of the stable equilibrium function of the instrument (3.3.5.3);			
		– drawing or photo of the instrument showing the principle and the location of control marks, securing marks, descriptive and verification marks (3.11, 3.12);			
		– any document or other evidence demonstrating that the design and construction of the instrument complies with the requirements of R 106-1;			
		– operating manual.			
6.1		**Test standards**			
6.1.1		**Control instruments for reference wagon weighing:**			
		Full draught weighing on:			
		– integral control instrument; or			
		– separate control instrument.			
		– control instrument for bogie partial weighing			
6.1.1.1		Accuracy of control instruments:			
		– combined error and uncertainty of integral control instrument for reference wagon weighing is less than one-third of the mpe in 2.2.1 applicable to the weighing-in-motion instrument under test;			
		– combined error and uncertainty of separate control instrument for reference wagon weighing is less than one-fifth of the mpe for weighing-in-motion in 2.2.1			
		– for re-verification tests combined error and uncertainty of control instrument (separate and integral) following completion of reference wagon weighing shall be as specified for the appropriate control instrument.			
		– takes into account the combined error and uncertainty obtained from a calibration recently before (and if appropriate, after) the verification, and under about the same environmental conditions.			
6.1.1.2	A.5.3	**Integral control instrument:**			
		– have an appropriate scale interval or scale interval for stationary load (2.4); and			
		– comply with the requirements in 6.2.1, or.			
		– a similar accuracy must be assured by a defined test procedure which is described in the type approval			

Requirement (R 106-1)	Test procedure	Automatic rail-weighbridges	Passed	Failed	Remarks
6.1.1.3		**Partial weighing of reference wagons:**			
		– it shall have a scale interval for stationary load (2.4),			
		– comply with the requirements in 6.2.1, and			
		– the alignment correction test for single-axle weighing instruments in Annex B shall be successfully applied.			
6.1.2		**Test weights used for type examination or verification:**			
		– meet the metrological requirements of OIML R 111;			
		– combined error and uncertainty of test weights is less than one-fifth of the mpes in 2.2.2 of the instrument to be verified for the load.			
		For testing control instruments for bogie partial weighing:			
		– a special test railway vehicle with known mass shall be used. (e.g. a normal three-axle-bogie with a platform for the standard test weights)			
6.2		**Weighing methods**			
6.2.1		**Static weighing:**			
		Control instrument for full-draught or partial weighing weighing complies with requirements of 6.1.1.1 to 6.1.1.3, and with the mpes in 2.2.2 Table 2.			
6.2.2		**Devices for selection (or switching) between various load receptors, load-transmitting devices and load-measuring devices**			
6.2.2.1		Compensation of no-load effect			
		The selection device compensates for the unequal no-load effect of the various load receptors and/or load-transmitting devices in use.			
6.2.2.2		Zero-setting			
		Zero setting of an instrument with any multiple combination of various load-measuring devices and various load receptors shall be possible without ambiguity and in accordance with the requirements of 3.2.7.			
6.2.2.3		Impossibility of weighing			
		Weighing shall not be possible while selection devices are being used.			
6.2.2.4		Identification of the combinations used			
		Combinations of load receptors and load measuring devices used shall be readily identifiable. It shall be clearly visible which indication(s) correspond to which load receptor(s).			
6.2.3		**In-motion weighing:**			
		Reference wagons used for testing represent the range of wagons available in the appropriate Member State and for which the instrument is intended			

Requirement (R 106-1)	Test procedure	Automatic rail-weighbridges	Passed	Failed	Remarks
		Modes of operation:			
		Reference wagons shall be selected to cover, as far as practicable, each mode of operation for which the instrument is to be approved including:			
		– loaded or empty wagons,			
		– pushing or pulling,			
		– range of operating speed (Min, Max and Site), and			
		– one or both directions.			
		Wagons carrying liquid loads or other products that may be subjected to fluctuations in its gravity centre when the wagon moves, shall be used as reference wagons only if the automatic rail-weighbridge will be applied subsequently for determining the mass of such wagons.			
6.2.2.3		Coupled wagon or train in-motion weighing:			
		The test train shall comprise a number of wagons equal to the minimum number of wagons in accordance with Table 6 that the automatic rail-weighbridge is intended to weigh in motion.			