



First Committee Draft (1CD)

Project: New Recommendation

Title: Electrical Vehicle Supply Equipment (EVSE)

— Part 3: Test report format

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TITLE OF THE CD (English):

OIML R XX-3

Electric Vehicle Supply Equipment (EVSE)

Part 3: Test report format

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Foreword

This test report format gives guidance on how to present test results. It is meant as an example, not necessarily the only correct format.

Explanatory Notes

Meaning of symbols used in this report

BMPE	=	base maximum permissible error
δ	=	base maximum permissible error (at the appropriate current) expressed as a percentage (%) and taken as a positive value
c	=	mean temperature coefficient
e_u and e_l	=	errors at the uppermost and the lowest temperatures respectively in the temperature interval of interest
t_u and t_l	=	uppermost and the lowest temperatures respectively in the temperature interval of interest
f_{nom}	=	nominal frequency
U_{nom}	=	nominal voltage
U_{test}	=	test voltage
I_{max}	=	maximum current
I_{tr}	=	transitional current
I_{min}	=	minimum current
I_{st}	=	starting current
H1	=	humidity class 1: enclosed locations where the instruments are not subjected to condensed water, precipitation, or ice formations
H2	=	humidity class 2: enclosed locations where the instruments may be subjected to condensed water, to water from sources other than rain and to ice formations.
H3	=	humidity class 3: open locations with average climatic conditions
$ x $	=	absolute value of x
τ	=	expected time between two pulses (period)
m	=	number of elements
k	=	is the number of pulses emitted by the test output per kilowatt hour (the meter constant expressed in imp/kWh)
Δt	=	test period (for test of no-load condition)

Tabel met opmaak

References to the test procedures in Part 2 of this Recommendation are given in brackets after each test heading.

1 Information

1.1 Test information

Test Report

Report reference number:	
Date of Issue:	
Date(s) of testing:	

Laboratory

Name:	
Address:	
Contact details:	

Client / applicant

Name:	
Address:	

Test specification

Record any variations from Parts 1 and 2 of this Recommendation.

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1.2 EVSE information

Manufacturer and type

EVSE manufacturer:	
EVSE type (model designation):	

Does this EVSE have a separately type approved meter as its main metrology component? Yes ☐ No ☐

Meter manufacturer:	
Meter type (model designation):	

Sample EVSE

Serial number(s):	
-------------------	--

1.2.1 Remarks

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1.3 EVSE specification

Type

Construction: ☐ Unitary EVSE ☐ Complex DC EVSE
Mode(s): ☐ AC Single Phase ☐ AC 3-Phase ☐ DC

Transaction types supported

Transaction types: ☐ Ad hoc public ☐ Contractual public ☐ Contractual private

Accuracy class

Accuracy class: ☐ A (2%) ☐ B (1%) ☐ C (0.5%)

Output electrical parameters

AC EVSE

Nominal frequency, f_{nom} :		Hz		Hz
Nominal voltage(s), U_{nom} :		V	Current values negative direction:	V
Maximum current, I_{max} :		A		A
Transitional current, I_{tr} :		A		A
Minimum current, I_{min} :		A		A
Starting current, I_{st} :		A		A
MMQ:		kWh		

DC EVSE

Minimum voltage, U_{min} :		V
Maximum voltage, U_{max} :		V
Maximum current, I_{max} :		A
Transitional current, I_{tr} :		A
Minimum current, I_{min} :		A
Starting current, I_{st} :		A
MMQ:		kWh

Environment

Lower specified temperature: ☐ -55 °C ☐ -40 °C ☐ -25 °C ☐ -10 °C ☐ +5 °C
Upper specified temperature: ☐ +30 °C ☐ +40 °C ☐ +55 °C ☐ +75 °C ☐ +85 °C
Humidity class: ☐ H1 ☐ H2 ☐ H3
For use: ☐ Outdoor ☐ Indoor use only

Direction of energy flow

Energy flow: ☐ EVSE to EV only ☐ Bidirectional

Hardware and software

Hardware version(s):	
Software version(s):	
Maximum current, I_{max} :	

Auxiliary devices

Provide information about any auxiliary devices

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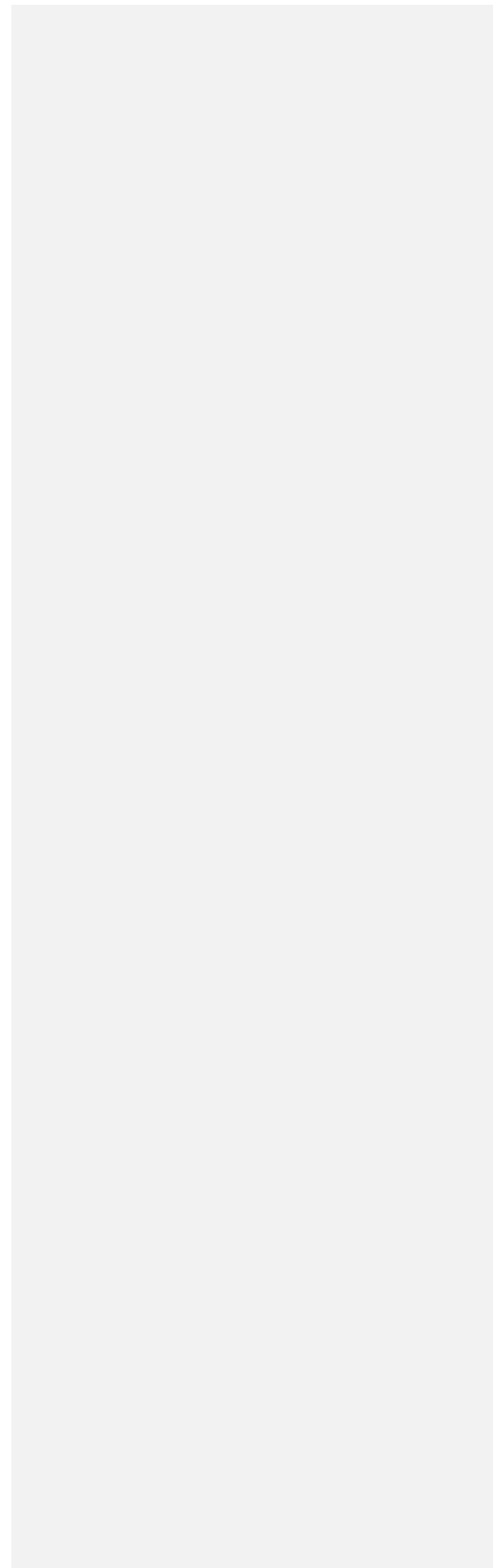
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Remarks

1.4 Adjustments or modifications

Provide information about any authorised and agreed upon adjustments or modifications for sample meters during the evaluation.



1.5 Test values and configuration

Specify the values used for testing (unless otherwise specified in individual tests).

Test voltage:	<input type="text"/>	V
Test frequency:	<input type="text"/>	Hz
Test connection mode:	<input type="checkbox"/> AC single phase <input type="checkbox"/> AC three-phase <input type="checkbox"/> DC	

Remarks

1.6 Critical change value

The critical change value is used as part of the acceptance criteria for some disturbance tests. See OIML R 46-2, 2.1.3.

Number of measuring elements:	m	
Nominal voltage:	U_{nom}	V
Maximum current:	I_{max}	A
Critical change value:	$\varepsilon = 10^{-6} \times m \times U_{nom} \times I_{max}$	(include units)

1.71.6 Test equipment

List all test equipment used in this report.

Equipment name	Manufacturer	Type no.	Serial no.	Used for (test reference)
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Remarks

2 Tests for compliance with maximum permissible error

2.1 Initial intrinsic error for positive and negative flow (7.37.2.1)

EVSE serial no.			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		
EVSE MMQ:				
Claimed accuracy class:				

System powered up for 15 minutes prior to testing: ☐

Test voltage #1:	Minimum V_{nom} for AC, 375 ± 50 VDC for DC
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Positive energy flow					
Test Current (A)	Energy per EVSE	Energy per Standard	Error (%)	BMPE (%)	Pass
I_{min}					<input type="checkbox"/>
I_{tr}					<input type="checkbox"/>
$50\% I_{max}$					<input type="checkbox"/>
I_{max}					<input type="checkbox"/>
Negative energy flow					
I_{min}					<input type="checkbox"/>
I_{tr}					<input type="checkbox"/>
$50\% I_{max}$					<input type="checkbox"/>
I_{max}					<input type="checkbox"/>
Positive energy flow					
Test Current (A)	Energy per EVSE (kWh)	Energy per reference meter (kWh)	Error (%)	BMPE (%)	Pass
I_{min}					<input type="checkbox"/>
I_{tr}					<input type="checkbox"/>
$50\% I_{max}$					<input type="checkbox"/>
I_{max}					<input type="checkbox"/>
$50\% I_{max}$					<input type="checkbox"/>
I_{tr}					<input type="checkbox"/>
I_{min}					<input type="checkbox"/>
Negative energy flow					
Test Current (A)	Energy per EVSE (kWh)	Energy per reference meter (kWh)	Error (%)	BMPE (%)	Pass
I_{min}					<input type="checkbox"/>
I_{tr}					<input type="checkbox"/>
$50\% I_{max}$					<input type="checkbox"/>
I_{max}					<input type="checkbox"/>
$50\% I_{max}$					<input type="checkbox"/>
I_{tr}					<input type="checkbox"/>
I_{min}					<input type="checkbox"/>

Test voltage #2:

Maximum V_{nom} for AC, 750±50 VDC for DC

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Positive energy flow

Test Current (A)	Energy per EVSE (kWh)	Energy per Standard Energy per reference meter (kWh)	Error (%)	BMPE (%)	Pass
I_{min}					<input type="checkbox"/>
I_{tr}					<input type="checkbox"/>
50% I_{max}					<input type="checkbox"/>
I_{max}					<input type="checkbox"/>
50% I_{max}					<input type="checkbox"/>
I_{tr}					<input type="checkbox"/>
I_{min}					<input type="checkbox"/>
Negative energy flow					
I_{min}					<input type="checkbox"/>
I_{tr}					<input type="checkbox"/>
50% I_{max}					<input type="checkbox"/>
I_{max}					<input type="checkbox"/>

Negative energy flow

Test Current (A)	Energy per EVSE (kWh)	Energy per reference meter (kWh)	Error (%)	BMPE (%)	Pass
I_{min}					<input type="checkbox"/>
I_{tr}					<input type="checkbox"/>
50% I_{max}					<input type="checkbox"/>
I_{max}					<input type="checkbox"/>
50% I_{max}					<input type="checkbox"/>
I_{tr}					<input type="checkbox"/>
I_{min}					<input type="checkbox"/>

Test voltage #3:

Positive energy flow

Test Current (A)	Energy per EVSE (kWh)	Energy per reference meter (kWh)	Error (%)	BMPE (%)	Pass
I_{min}					<input type="checkbox"/>
I_{tr}					<input type="checkbox"/>
50% I_{max}					<input type="checkbox"/>
I_{max}					<input type="checkbox"/>
50% I_{max}					<input type="checkbox"/>
I_{tr}					<input type="checkbox"/>
I_{min}					<input type="checkbox"/>

Negative energy flow

Test Current (A)	Energy per EVSE (kWh)	Energy per reference meter (kWh)	Error (%)	BMPE (%)	Pass
I_{\min}					<input type="checkbox"/>
I_k					<input type="checkbox"/>
$50\% I_{\max}$					<input type="checkbox"/>
I_{\max}					<input type="checkbox"/>
$50\% I_{\max}$					<input type="checkbox"/>
I_k					<input type="checkbox"/>
I_{\min}					<input type="checkbox"/>

- Check that in every test $|\text{error}| \leq |\text{BMPE}|$ ☐ Passed ☐ Failed

Remarks:

2.2 Starting current (7.37.2.2)

Meter serial no.			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		

Positive energy flow:

I_{st} (A)	MMQ	Energy per EVSE (kWh)	Energy per standard reference meter (kWh)	BMPE (%)	Passed
					<input type="checkbox"/>

Tabel met opmaak

Negative energy flow:

I_{st} (A)	MMQ	Energy per EVSE (kWh)	Energy per reference meter (kWh)	BMPE (%)	Passed
					<input type="checkbox"/>

Tabel met opmaak

Note: the BMPE is calculated according to the formula listed in Table 2 of Part 1 for the applied current. Test passes if energy registered by the EVSE is greater than 75 %

Remarks:

3 Tests for influence quantities

3.1 Self heating (7.47.3.2)

EVSE serial no.			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		

AC EVSE

Test current (A)	Current (A)	Time at I_{max} (minutes)	Error (%)	Error shift (%)	
$\geq I_U$ $50\% I_{max}$		Initial Measurement		N/A	N/A
I_{max}		For 6.3 hours			<input type="checkbox"/>
$\geq I_U$ $50\% I_{max}$		Final measurement			Passed <input type="checkbox"/>

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DC EVSE

Test current (A)	Current (A)	Time at I_{max} (minutes)	Error (%)	Error shift (%)	
$\geq I_U$ $50\% I_{max}$		Initial Measurement		N/A	N/A
I_{max}		Deliver 25 kWh			<input type="checkbox"/>
I_{max}		Deliver 25 kWh			<input type="checkbox"/>
I_{max}		Deliver 25 kWh			<input type="checkbox"/>
$\geq I_U$ $50\% I_{max}$		Final measurement			Passed <input type="checkbox"/>

Tabel met opmaak

Remarks:

3.2 Temperature dependence (7.47.3.3)

EVSE serial no.			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		

- The mean temperature coefficient, c , is calculated by $c = (e_u - e_l) / (t_u - t_l)$.
- The temperature intervals, $(t_u - t_l)$, span at least 15 °C and no more than 23 °C; and the set of intervals span the entire specified operating range (intervals may overlap).

Test voltage:	
Test current:	

I_{tr}

Temperature interval, t_l to t_u (°C):		Error (%)		Mean temperature coefficient (%/K)	
Low temperature	High temperature	e_l	e_u	c	Limit
−55 °C	−40 °C				
−40 °C	−25 °C				
−25 °C	−10 °C				
−10 °C	+5 °C				

+5 °C	+23 °C				
+23 °C	+40 °C				
+40 °C	+55 °C				
+55 °C	+70 °C				
+70 °C	+85 °C				

Test voltage:	
Test current:	50% I_{\max}

Temperature interval, t_l to t_u (°C):		Error (%)		Mean temperature coefficient (%/K)	
Low temperature	High temperature	e_l	e_u	c	Limit
−55 °C	−40 °C				
−40 °C	−25 °C				
−25 °C	−10 °C				
−10 °C	+5 °C				
+5 °C	+23 °C				
+23 °C	+40 °C				
+40 °C	+55 °C				
+55 °C	+70 °C				
+70 °C	+85 °C				

Test voltage:	
Test current:	I_{\max} (Only required for AC EVSE)

Temperature interval, t_l to t_u (°C):		Error (%)		Mean temperature coefficient (%/K)	
Low temperature	High temperature	e_l	e_u	c	Limit
−55 °C	−40 °C				
−40 °C	−25 °C				
−25 °C	−10 °C				
−10 °C	+5 °C				
+5 °C	+23 °C				
+23 °C	+40 °C				
+40 °C	+55 °C				
+55 °C	+70 °C				
+70 °C	+85 °C				

Add temperature coefficients table for each temperature interval.

- Check that each $|c| \leq |\text{limit}|$.
- Check that after the test:
 - the EVSE shows no damage
 - the EVSE operates with no degradation to metrological performance

☐ Passed

☐ ~~Failed~~Failed

Remarks:

3.3 Voltage variation (AC EVSE) (7.42.3.4)

EVSE serial no.			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		

Test current: 50% I_{max}

Voltage	Error (%)	Error shift (%)	Limit-MPE shift (%) for EVSE class
Reference (U_{nom})		N/A	N/A
0.9 lowest U_{nom}			
lowest U_{nom}			
next U_{nom}			
next U_{nom}			
highest U_{nom}			
1.1 highest U_{nom}			

Add rows for additional U_{nom} values as required.

- Check that each $|\text{error shift}| \leq |\text{limit}|$
- Check that after the test:
 - the EVSE shows no damage
 - the EVSE operates with no degradation to metrological performance

☐ Passed

☐ ~~Failed~~Failed

Remarks:

3.4 Frequency variations (AC EVSE) (7.47.3.5)

EVSE serial no.			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		

f_{nom} (Hz):				
Test current (A)	Frequency variation	Error (%)	Error shift (%)	MPE shift (%) for EVSE classLimit (%)
50% I_{max}	Reference (f_{nom})		N/A	N/A
	0.98 f_{nom}			
	1.02 f_{nom}			

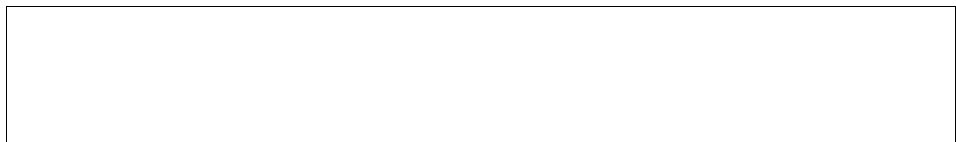
Add tables for additional f_{nom} values as required.

- Check that each $|\text{error shift}| \leq |\text{limit}|$
- Check that after the test:
 - the EVSE shows no damage
 - the EVSE operates with no degradation to metrological performance

☐ Passed

☐ ~~Failed~~Failed

Remarks:



3.5 Harmonics in voltage and current (AC EVSE) (7.47.3.6)

EVSE serial no.			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		

- ~~Test current 50 % I_{max}~~
- The EV#1 current waveform is specified in OIML R XX-2, clause 6.47.3.6, Table 12 and Figure 3.
- The EV#2 voltage waveform is specified in OIML R XX-2, clause 6.47.3.6, Table 13 and Figure 4.

Test number	Condition	Error (%)	Error shift (%)	MPE shift (%) for EVSE classLimit (%)
Ref	Reference, sinusoidal voltage and current		N/A	N/A
1	Sinusoidal voltage EV#1 current			
2	EV#1 voltage EV#1 current			
3	EV#2 voltage EV#1 current			

- Check that each $|\text{error shift}| \leq |\text{limit}|$
- ~~Check that after the test:~~
 - ◯ ~~the meter shows no damage~~
 - ◯ ~~the meter operates with no degradation to metrological performance~~

☐ Passed ☐ ~~Failed~~Failed

Remarks:

3.6 Reversed phase sequence (any two phases interchanged) (AC EVSE) (7.47.3.7)

EVSE serial no.			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		

Test current (A)	Phase sequence	Error (%)	Error shift (%)	MPE shift (%) for EVSE classLimit (%)
50% I_{max}	Reference (L1, L2, L3)		N/A	N/A
	L1, L3, L2			

- Check that each $|\text{error shift}| \leq |\text{limit}|$
- ~~Check that after the test:~~
 - ◯ ~~the meter shows no damage~~
 - ◯ ~~the meter operates with no degradation to metrological performance~~

☐ Passed ☐ ~~Failed~~Failed

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Remarks:

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3.7 Continuous (DC) magnetic induction of external origin (7.47.3.8)

EVSE serial no.			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		

Test current: $\geq I_{tr}$

Specify or illustrate the three orthogonal directions relative to the EVSE designated as x, y & z:

	Error shift						
Magnet placement	Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	MPE shift (%) for EVSE class Limit %
No magnet							
Front							
Left side							
Right side							
Rear							

- Check that each |error shift| \leq |limit|
- Check that after the test:
 - the EVSE shows no damage
 - the EVSE operates with no degradation to metrological performance

☐ Passed ☐ ~~Failed~~Failed

Remarks:

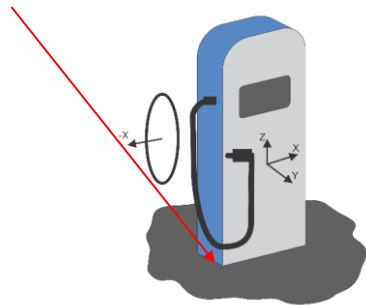
3.8 Magnetic field (AC, power frequency) of external origin (7.47.3.9)

EVSE serial no.			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		

EVSE state:	Operating
Applicable standard:	(IEC 61000-4-8 or IEC 61851-21-2)

Test current:	$50\% \geq I_{\text{max}}$
---------------	----------------------------

x, y, z coordinates have origin at the left, front, lower corner



Determination of worst case location phase and orientation

Loop orientation (Poynting Vector)	EVSE Face (front, back, left, right, top)	Height (center of coil from floor)	Phase	EVSE Measurement	Standard Reference meter Measurement	MPE shift (%) for EVSE classError Shift

Extend if needed.

Highest measured error shift (%)Maximum error shift:	
MPE Shift (%) for EVSE classTable 4 limit:	

- Check that |maximum error shift| ≤ |limit|
- Check that after the test:

- the EVSE shows no damage
- the EVSE operates with no degradation to metrological performance

☐ Passed

☐ ~~Failed~~Failed

Remarks:

3.9 Radiated, radio frequency (RF), electromagnetic fields (7.47.3.10.1)

EVSE serial no.			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		

EVSE state:	Operating
Applicable standard:	(IEC 61000-4-3 or IEC 61851-21-2)

Test current:	$\geq 50\% I_{max}$
---------------	---------------------

Antenna / facility:						
Field Strength (V/m):						
Dwell time:						
Test current (A)	Power factor	Frequency value / range (MHz)	Polarization	Facing EVSE	Error shift (%)	MPE Shift (%) for EVSE class Limit (%)
$10 I_{fr}$	unity		Vertical	Front		
				Back		
				Right		
				Left		
				Top		
				Bottom		
			Horizontal	Front		
				Back		
				Right		
				Left		
				Top		
				Bottom		

Extend for each antenna/facility, field strength and frequency values (including sensitive frequencies).

- Check that each |error shift| ≤ |limit|
- Check that after the test:
 - the EVSE shows no damage
 - the EVSE operates with no degradation to metrological performance

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

Remarks:

3.10 Immunity to conducted disturbances, induced by low frequency fields
(7.47.3.10.2)

EVSE serial no.			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		

EVSE state:	Active transaction
Applicable standard:	IEC 61000-4-19:2014, 5.2.2 and 5.2.3

Test current:	$\geq 50\% I_{m\limax}$
---------------	-------------------------

RF Amplitude:			
Dwell time:			
Frequency	Differential Current	Error shift (%)	MPE shift (%) for EVSE classLimit (%)
None	None	Reference	
2 kHz			
3 kHz			
5 kHz			
7 kHz			
10 kHz			
15 kHz			
20 kHz			
30 kHz			
40 kHz			
50 kHz			
70 kHz			
85 kHz			
100 kHz			
120 kHz			
150 kHz			

- Check that each |error shift| ≤ |limit|
- Check that after the test:
 - the EVSE shows no damage
 - the EVSE operates with no degradation to metrological performance

☐ Passed ☐ Failed

Remarks:

3.11 Immunity to conducted disturbances, induced by radiofrequency fields
(7.3.11.27.4.10.3)

EVSE serial no.			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		

EVSE state:	Transaction active
Applicable standard:	IEC 61000-4-6 and IEC 61851-21-2

Test current:	$\geq 50\% I_{maxLL}$
---------------	-----------------------

RF Amplitude:		
Dwell time:		
Susceptible Frequencies	Error shift (%)	MPE shift (%) for EVSE classLimit (%)
None	Reference	

- Check that each |error shift| ≤ |limit|
 - ~~Check that after the test:~~
 - ~~the EVSE shows no damage~~
 - ~~the EVSE operates with no degradation to metrological performance~~
- ☐ Passed ☐ ~~Failed~~Failed

Remarks:

3.12 Operation of ancillary devices (7.4.117.3.12)

EVSE serial no.			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		

Test current (A)	Power factor	Operation of ancillary deviceTest-profile	Error (%)	Error shift (%)	MPE shift (%) for EVSE classLimit (%)
$\geq 50\%$ I_{maxctr}	unity	No operation of any ancillary deviceReference		N/A	N/A
		1) 10 s-on, 10 s-offDevice 1			
		2) 5 s-on, 5 s-offDevice 2			
		3) Device 35 s-on, 0.5 s-off			

- Check that each $|\text{error shift}| \leq |\text{limit}|$
- ~~Check that after the test:~~
 - ~~the meter shows no damage~~
 - ~~the meter operates with no degradation to metrological performance~~

☐ Passed ☐ ~~Failed~~Failed

Remarks:

Met opmaak: Links

Met opmaak: Geen opsommingstekens of nummering

Met opmaak: Geen opsommingstekens of nummering

Met opmaak: Geen opsommingstekens of nummering

4 Test for disturbances

Electrical disturbances

4.1 Electrostatic discharge (7.57.4.2)

EVSE serial no.			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		

EVSE state	Applied current:	Operating, with 50% I _{max} current
Voltage applied to voltage circuits:		U_{nom}
Applicable standard:	IEC 61000-4-2 and IEC 61851-21-2, if applicable	

heeft opmaak toegepast: Lettertype: Cursief

Test #1: Check for significant fault (critical change value)

ApplicationTest / event	Discharge mode	Test voltage (kV)	Polarity	Number of discharges (≥ 10)	Change in energy RegisterError (%)	Critical change valueError shift (%)
Initial error	▲					
Direct	Contact	6	Positive			
			Negative			
	Air	8	Positive			
			Negative			
Indirect, Horizontal coupling plane	Contact	8	Positive			
			Negative			
Indirect, Vertical coupling plane	Contact	8	Positive			
			Negative			

heeft opmaak toegepast: Markeren

Tabel met opmaak

Test #2: Check BMPE

Test current (A)	Power factor (AC EVSE only)	Error (%)	BMPE (%)
50%I _{max}	unity		

- Check that for each change in energy is not more than the critical change value test, the error shift is within 1 base MPE.
- Check that after the test:
 - the EVSE shows no damage
 - the EVSE operates with no degradation to metrological performance
 - the EVSE still fulfils the BMPE

Met opmaak: Geen opsommingstekens of nummering

Met opmaak

☐ Passed ☐ ...FailedFailed

Remarks:

4.2 Fast transients (7.57.4.3)

EVSE serial no.			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		

EVSE state:	Operating
Voltage applied to voltage circuits:	
Applicable standards:	IEC 62052-11, IEC 61000-4-4, and IEC 61851-21-2, if applicable
Duration of test:	60 s at each polarity
Repetition rate:	100 kHz

Test current (A)	Power factor	Circuit	Test Voltage (kV)	Error (%)	Fault (%) E(error shift (%))	Fault-L limit (%)
10 I_{te}	unity	Reference			N/A	N/A

- Check that each $|faultshift| \leq |faultlimit|$ 1.0 BMPE
 - Check that after the test:
 - the EVSE shows no damage
 - the EVSE operates with no degradation to metrological performance
- ☐ Passed ☐ ~~Failed~~Failed

Remarks:

heeft opmaak toegepast: Lettertype: Niet Cursief

4.3 Voltage dips and interruptions (7.57.4.4)

EVSE serial no.			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		

EVSE state:	Operating, with no current
Voltage applied to voltage circuits:	
Applicable standards:	IEC 61000-4-11, IEC 61000-4-342

Check for significant fault (critical change value)

Event / Test	Residual voltage (% ref)	Duration (cycles ¹)	No. of events	Inception angle	Error (%)	Error shift (%)
Initial error						
Dip 1	0 %	0.5/0.5	10	0		
			10	180		
Dip 2	0 %	1/1	10	0		
Dip 3	40 %	10/12	10	0		
Dip 4	70 %	25/30	10	0		
Dip 5	80 %	250/300	10	0		
Interruption Test	0 %	250/300	10	0		

Note 1: Cycles are given for 50 Hz and 60 Hz power line frequencies. E.g. 25/30 means 25 cycles for 50 Hz, and 30 cycles for 60 Hz.

Check BMPE

Test current (A)	Power factor	Error (%)	BMPE (%)
50%I _{max}	unity		

- Check that each |shift| ≤ 1.0 BMPE. Check that each change in energy is not more than the critical change value.
- Check that after the test:
 - the EVSE shows no damage
 - the EVSE operates with no degradation to metrological performance
 - the EVSE still fulfils the BMPE

☐ Passed ☐ Failed

Remarks:

4.4 Surges on AC mains power lines (7.57.4.5)

EVSE serial no.			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		

EVSE state:	Operating, with no current
Voltage applied to voltage circuits:	

Applicable standard:	IEC 61000-4-5, IEC 61851-21-2
Number of tests:	5 positive, 5 negative
Repetition rate:	Maximum 1 per minute

Check for significant fault (critical change value)

Voltage circuits, application	Test voltage (kV)	Generator source impedance (Ω)	Phase angle	Polarity
Voltage circuits line to line	2	2	0°	Positive
				Negative
			90°	Positive
				Negative
			180°	Positive
				Negative
Voltage circuits line to earth	4	2	0°	Positive
				Negative
			90°	Positive
				Negative
			180°	Positive
				Negative
Auxiliary circuits, application	Test voltage (kV) ¹	Generator source impedance (Ω)	0°	Polarity ²
			90°	Positive
				Negative
			180°	Positive
				Negative
Auxiliary circuits line to line	1	42	0°	Positive
				Negative
			90°	Positive
				Negative
			180°	Positive
				Negative
Auxiliary circuits line to earth	2	42	0°	Positive
				Negative
			90°	Positive
				Negative
			180°	Positive
				Negative
Auxiliary circuits line to earth	2	42	0°	Positive
				Negative
			90°	Positive
				Negative
			180°	Positive
				Negative
Auxiliary circuits line to earth	2	42	0°	Positive
				Negative
			90°	Positive
				Negative
			180°	Positive
				Negative

Test current (A)	Power factor	Error (%)	BMPE (%)
$50\%I_{max}$	unity		

Test current (A)	Power factor	Error (%)	BMPE (%)
50% I_{max}	unity		

- Check that after the test:
 - the EVSE shows no damage
 - the EVSE operates with no degradation to metrological performance
 - the EVSE still fulfils the BMPE

☐ ~~Failed~~ Failed

Met opmaak: Standaard

4.5 Short-time overcurrent (7.57.4.6)

EVSE serial no.			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		

EVSE state:

Voltage applied to voltage circuits:

Short-time overcurrent (A):

Duration:

Before application of short-time overcurrent				After return to normal temperature	
Test current (A)	Power factor	Phase	Intrinsic Error (%)	Error (%)	Fault limit BMPE (%)
50% I_{max}	unity	L1			
		L2			
		L3			

- ~~Check that each $|fault| \leq |fault\ limit|$~~
- Check that after the test:
 - the EVSE shows no damage;
 - the EVSE operates ~~with no degradation to metrological performance~~ within the BMPE.

☐ Passed ☐ ~~Failed~~ Failed

Remarks:

4.6 Impulse Voltage (7.4.7)

EVSE serial no.:			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		
		Relative humidity (%):		
		Atmospheric pressure (kPa):		

Impulse waveform:	1.2/50 µs impulse specified in IEC 60060-1
Voltage rise time:	±30 %
Voltage fall time:	±20 %
Source energy:	10.0 J
Source impedance:	500 Ω

Check for significant fault (critical change value)

Test	Circuits tested	Impulse Voltage (V)	Polarity	Critical fault observations
For circuits and between circuits			Positive	
			Negative	
Circuits relative to earth			Positive	
			Negative	

Note: For each test, the impulse voltage is applied 10 times for each polarity. Minimum of 30 s between impulses.

Check BMPE

Test current (A)	Power factor	Error (%)	BMPE (%)
50%I _{max}	unity		

- Check that each change in energy is not more than the critical change value.
- Check that after the test:
 - the EVSE shows no damage
 - the EVSE operates with no degradation to metrological performance
 - the EVSE still fulfils the BMPE

☐ Passed ☐ ..FailedFailed

Remarks:

Environmental tests-disturbances (7.57.4.78)
4.74.6 Protection against solar radiation (7.57.4.78.1)

EVSE serial no.			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		

EVSE state:	Non-operating
Applicable standard:	IEC 60068-2-5:2018ISO 4892-3

Test cycle:	8 h dry; 4 h condensation (12 h) 8 h irradiation and 16 h darkness; upper temperature +55 °C
Spectral irradiance:	0.76 W·m ⁻² ·nm ⁻¹ at 340 nm
Duration:	66 days (1323 cycles) or 3 days

Check for significant fault (critical change value)

After exposure to solar radiation test	Change in energy		Critical change value
	Register	Test output	

Check BMPE

Test current (A)	Power factor	Error (%)	BMPE (%)
50% I_{max} current $> I_{dc}$	unity		

- Check that each change in energy is not more than the critical change value.
- Check that after the test:
 - the EVSE shows no damage
 - the EVSE operates with no degradation to metrological performance
 - the EVSE still fulfils the BMPE

☐ Passed

☐ ~~Failed~~ Failed

Remarks:

4.8 — Protection against ingress of dust (7.4.8.2)

EVSE serial no.:		At start	At end
Observer:		Temperature (°C):	
Date (dd/mm/yyyy):		Time (hh:mm):	

EVSE state:	Non-operating
Applicable standard:	IEC 60529, IEC 61851-1
Test conditions:	reference
Enclosure rating	IP 5X
Category:	2

Check for accumulation of dust

After exposure to talcum powder or other dust	Change in energy		Observation of dust
	Register	Test output	

Check BMPE

Test current (A)	Power factor	Error (%)	BMPE (%)
50% I_{max}	unity		

- Check that each change in energy is not more than the critical change value.
- Check that after the test:
 - the EVSE shows no damage
 - the EVSE operates with no degradation to metrological performance
 - the EVSE still fulfils the BMPE

heeft opmaak toegepast: Lettertype: Vet

Met opmaak: Standaard

heeft opmaak toegepast: Lettertype: Cursief

heeft opmaak toegepast: Subscript

☐ Passed ☐ ..FailedFailed

Remarks:

4.7 5.9 — Extreme temperatures - Dry Heat (7.4.8.37.5.7.2)

EVSE serial no.		At start	At end
Observer:		Temperature (°C):	
Date (dd/mm/yyyy):		Time (hh:mm):	

Met opmaak: Inspringing: Links: 0 cm, Meerdere niveaus + Niveau: 2 + Nummeringstijl: 1, 2, 3, ... + Beginnen bij: 1 + Uitlijning: Links + Uitgelijnd op: 16 cm + Tab na: 17,2 cm + Inspringen op: 17,2 cm, Tabstops: 1,2 cm, Tab weergeven + Niet op 17,2 cm

EVSE state:	Non-operating
Applicable standards:	IEC 60068-2-2, IEC 60068-3-1
Test temperature (one-step higher than upper specified temperature) (°C):	
Duration:	2 h

Check BMPE

Test current (A)	Power factor	Error (%)	BMPE (%)
	unity		

heeft opmaak toegepast: Lettertype: Vet

Met opmaak: Standaard

Before application of dry heat			After application of dry heat		
Test current (A)	Power factor	Intrinsic Error (%)	Error (%)	Fault (%) (error shift)	Fault limit (%)
50% I_{max}	unity				

• Check that each $|fault| \leq |fault\ limit|$

- Check that after the test:
 - the EVSE shows no damage
 - the EVSE still fulfils the BMPE e EVSE operates with no degradation to metrological performance

☐ Passed ☐ ..FailedFailed

4.94.8 Extreme temperatures - Cold (7.4.8.47.5.7.3)

EVSE serial no.		At start	At end
Observer:		Temperature (°C):	
Date (dd/mm/yyyy):		Time (hh:mm):	

EVSE state:	Non-operating
Applicable standards:	IEC 60068-2-1, IEC 60068-3-1
Test temperature (one-step lower than lower specified temperature) (°C)	
Duration (hours)	2

Check BMPE

Test current (A)	Power factor	Error (%)	BMPE (%)
	unity		

heeft opmaak toegepast: Lettertype: Vet

Met opmaak: Standaard

Before application of cold			After application of cold		
----------------------------	--	--	---------------------------	--	--

Test current (A)	Power factor	Intrinsic Error(%)	Error (%)	Fault (%) (error shift)	Fault limit (%)
50% I_{max}	unity				

- Check that each $|fault| \leq |fault\ limit|$
 - Check that after the ~~test~~exposure:
 - the EVSE shows no damage
 - the EVSE still fulfils the BMPE
 - ~~the EVSE operates with no degradation to metrological performance~~
- ☐ Passed
 ☐ ~~Failed~~[Failed](#)

Remarks:

4.104.9 Damp Heat, steady-state (non-condensing), for humidity class H1
(7.5.7.47-4.8.5)

EVSE serial no.			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		

EVSE state:	Operating, with no current
Applicable standards:	IEC 60068-2-78, IEC 60068-3-4
Test temperature:	30 °C
Humidity:	85 %
Duration:	2 days

Check BMPE

Test current (A)	Power factor	Error (%)	BMPE (%)
	unity		

Before application of damp heat			After application of damp heat		
Test current (A)	Power factor	Intrinsic Error (%)	Error (%)	Fault (%) (error shift)	Fault limit (%)
50% I _{max}	unity				
After 24 h, check BMPE Test current (A)	Power factor	Error (%)	BMPE (%)		
50% I _{max}	unity				

heeft opmaak toegepast: Lettertype: Vet

Met opmaak: Standaard

• Check that each change in energy is not more than the critical change value.

Met opmaak: Geen opsommingstekens of nummering

- Check that during and after the test the EVSE operates correctly.
- Check that after the exposure:
 - the EVSE shows no mechanical damage or water ingress;
 - the EVSE still fulfils the BMPE.
- Check that after the test:
 - the EVSE shows no damage
 - the EVSE operates with no degradation to metrological performance
 - the EVSE still fulfils the BMPE

Met opmaak: Geen opsommingstekens of nummering

Met opmaak

☐ Passed ☐ FailedFailed

Remarks:

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4.114.10 Damp Heat, cyclic (condensing), for humidity class H2 and H3
(7.4.8.6, 7.5.7.5)

EVSE serial no.			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		

EVSE state:	Operating, with no current
Applicable standards:	IEC 60068-2-30, IEC 60068-3-4
Specified humidity class:	
Upper temperature:	
Lower temperature:	25 °C
Humidity:	85 %
Duration:	2 days (2 cycles)

Check BMPE

Test current (A)	Power factor	Error (%)	BMPE (%)
	unity		

heeft opmaak toegepast: Lettertype: Vet
Met opmaak: Standaard

Before application of damp heat			After application of damp heat		
Test current (A)	Power factor	Intrinsic Error (%)	Error (%)	Fault (%) (error shift)	Fault limit (%)
10 I _N	unity				

After 24 h, check BMPE

Test current (A)	Power factor	Error (%)	BMPE (%)
50% I _{max}	Unity		

- Check that during and after the test the EVSE operates correctly each change in energy is not more than the critical change value.
- Check that after the test:
 - the EVSE shows no mechanical damage or water ingress;
 - the EVSE operates with no degradation to metrological performance
 - the EVSE still fulfils the BMPE.

☐ Passed ☐ FailedFailed

Remarks:

4.12 Water test (7.4.8.7)

EVSE serial no.			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		

EVSE state:	Functional mode
Applicable standard:	IEC 60068-2-18, IEC 60512-14-7, IEC 60529
Test duration:	10 minutes

Angles of inclination 0° and 180°

Check for significant fault (critical change value)

During the test	Change in energy		Critical change value
	Register	Test output	
Immediately after exposure			

After 24 h, Check BMPE

Test current (A)	Power factor	Error (%)	BMPE (%)
50% I_{max}	unity		

- Check that each change in energy is not more than the critical change value.
- Check that after the test:
 - the EVSE shows no damage
 - the EVSE operates with no degradation to metrological performance
 - the EVSE still fulfils the BMPE

☐ Passed ☐...FailedFailed

Remarks:

4.13 Durability (7.4.9)

EVSE serial no.:			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		

Standard(s):

Specify details of durability test including test conditions and severity levels

EVSE state:	Functional mode
Operating Temperature	
Test Load:	50% I _{max}
Duration of applied load	8h
Of cycles	10

Other details

Before application of durability test			After application of durability test		
Test current (A)	Power factor	Intrinsic Error (%)	Error (%)	Fault (%) (error shift)	Fault limit (%)
I _{tr}	unity				
50% I _{max}	unity				

- Check that each |fault| ≤ |fault limit|
 - Check that after the test:
 - the EVSE shows no damage
 - the EVSE operates with no degradation to metrological performance
- ☐ Passed ☐ Failed

Remarks:

Mechanical Testsdisturbances

4.14.11 Vibrations (7.4.10.17.5.8.1)

EVSE serial no.			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		

Applicable standards	IEC 60068-2-47, IEC 60068-2-64
EVSE state:	Non-operating, without packing
Frequency range:	10 Hz to 150 Hz
Acceleration Spectral Density (ASD) level 10–20 Hz:	1 m ² s ⁻³
Acceleration Spectral Density (ASD) level 20–150 Hz:	–3 dB/octave
Duration per axis	2

Met opmaak: Geen opsommingstekens of nummering

Check BMPE

Test current (A)	Power factor	Error (%)	BMPE (%)
	unity		

heeft opmaak toegepast: Lettertype: Vet

Met opmaak: Standaard

Met opmaak: Geen opsommingstekens of nummering

- Check that after the disturbance:

- the EVSE shows no mechanical damage;
- the EVSE still fulfils the BMPE.

Before application of vibrations			After application of vibrations		
Test current (A)	Power factor	Intrinsic Error (%)	Error (%)	Fault (%) (error shift)	Fault limit (%)
50 I_{max}	unity				

- Check that each $|fault| \leq |fault\ limit|$

- Check that after the test:

- the EVSE shows no damage
- the EVSE operates with no degradation to metrological performance

- Supply and load control switches are allowed to change state during the disturbance

☐ Passed

☐ ~~Failed~~Failed

Met opmaak: Inspringing: Links: -0,4 cm

Met opmaak: Inspringing: Links: 0 cm

4.154.12 Shock (7.4.10.27.5.8.2)

EVSE serial no.		At start	At end
Observer:		Temperature (°C):	
Date (dd/mm/yyyy):		Time (hh:mm):	

Applicable standard	IEC 60068-2-27
EVSE state:	Non-operating, without packing
Pulse shape:	Half-sine
Peak acceleration:	30 g_n
Duration of the pulse:	18 ms

Check BMPE

Test current (A)	Power factor	Error (%)	BMPE (%)
	unity		

heeft opmaak toegepast: Lettertype: Vet

Met opmaak: Standaard

- Check that after the disturbance:

- the EVSE shows no mechanical damage;
- the EVSE still fulfils the BMPE.

Before application of shock			After application of shock		
Test current (A)	Power factor	Intrinsic Error (%)	Error (%)	Fault (%) (error shift)	Fault limit (%)
50% I_{max}	unity				

- Check that each $|fault| \leq |fault\ limit|$

- Check that after the test:

- the EVSE shows no damage
- the EVSE operates with no degradation to metrological performance

- Supply and load control switches are allowed to change state during the disturbance

☐ Passed

☐ ~~Failed~~ [Failed](#)

Remarks:

4.13 Durability (7.5.9)

EVSE serial no.			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		

EVSE state:	Functional mode
Maximum operating Temperature:	
Test Load:	50% I _{max} , reference voltage
Duration of applied load:	8h
Number of cycles	10

Other details

Before application of durability test			After application of durability test		
Test current (A)	Power factor	Intrinsic Error (%)	Error (%)	Error shift (%)	Limit (%) (0.5 × BMPE)
I _g	unity				
50% I _{max}	unity				

- Check that each |shift| ≤ 0.5 BMPE
- Check that after the test the EVSE shows no damage.

☐ Passed ☐Failed

Remarks:

5 Tests for technical requirements

5.1 Internal clocks (2.5.1)

EVSE serial no:			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		

Applicable standards: IEC 62054-21:2004-05, clause 7.5

Synchronous clock

Test	Temperature (°C)	Duration	Result (s/day)	Limit (s/day)
Mains supply	23	30 days		0.167
Operation reserve—spring	23	36 hours		120
Operation reserve—battery/super-capacitor/primary-cell	23	36 hours		1

Crystal-controlled clock

Test	Temperature (°C)	Duration	Result (s/day)	Limit (s/day)
Mains operation	23	30 days		0.5
Operation reserve:	23	36 hours		1
High temperature:	45	24 hours		0.15
Low temperature:	−10	24 hours		0.15

• Check that each $|result| \leq |limit|$

☐ Passed ☐ ..FailedFailed

Remarks:

5.25.1 Tests for the evaluation of software-controlled EVSEs (~~Annex C~~)

EVSE serial no.			At start	At end
Observer:		Temperature (°C):		
Date (dd/mm/yyyy):		Time (hh:mm):		

Requirements for software-controlled components and EVSE meters (OIML R xx 46-1, Annex B4.4)	Validation method	Validation Description	Passed	Failed
Software identification (4.4.3)	AD + VFTSw			
Audit trail (4.4.4)	AD + VFTSw			
Error protection (4.4.5)	AD + VFTSw			
Time stamps (4.4.6)	AD + VFTM			
Dynamic modules (4.4.7)	AD			
Software update (4.4.8)	AD + VFTSw			
Remote verification update capabilities (4.4.9)	AD + VFTSw			
Software (4.4.10)	AD + VFTSw			
Compatibility of operating system and hardware (4.4.11)	AD + VFTSw			
Constraints for operation (4.4.12)	AD + VFTSw			
Parameter (4.4.13)	AD + VFTM			
Measurement data (4.4.14)	AD + VFTSw			
Client interface (4.4.15)	AD + VFTSw			
Communication interface (4.4.16)	AD + VFTSw			
Separation of electronic devices and components (4.4.17)	AD			
Separation of modules (4.4.18)	AD			
Storage of data (4.4.19)	AD + VFTSw			
Transmission of measurement data (4.4.20)	AD + VFTSw			
Software identification (4.4.21)	AD + VFTSw			