TEST REPORT

IEC 60529: Edition 2.2, 2013-08

Degrees of protection provided by enclosures (IP Code)

Report reference No.	1708766STO-001
Compiled by (+ signature)	Robert Söderqvist
Approved by (+ signature)	Mats Nyström
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Testing laboratory

Name	Intertek Semko AB
Address	Torshamnsgatan 43, SE-164 22 Kista, Sweden
Testing location	as above
Test date	8 – 9 March 2017

Client

Name	MCT Brattberg AB
Address	Lyckeåborg, 371 92 Karlskrona, Sweden

Test specification

Standard	IEC 60529: Edition 2.2, 2013-08
Specified IP-code	**IP65 / IP67**
TRF date	-

Equipment Under Test (EUT)

Type of test object	Cabinet seal
Trademark	MCT Brattberg AB
Model and/or type reference	RFCS
Article No	-
Manufacturer	MTC Brattberg AB
S/N	-

Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

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Possible test case verdicts:
Test case does not apply to the test object ..... : N/A (Not Applicable)
Test object does meet the requirement ..... : P (Pass)
Test item does not meet the requirement ..... : F (Fail)
Test case has not been checked ..... : Not Checked

General remarks:
"(see remark #)" refers to a remark appended to the report.
"(see appended table)" refers to a table appended to the report.
Throughout this report a point is used as the decimal separator.
The test results presented in this report relate only to the object tested.
This test report shall not be reproduced except in full without the written approval of the testing laboratory.

General description:

Cabinet seal tested for IP65 and IP67.

MCT Brattberg AB cabinet seal of type RFCS. The system consists of a frame, flexible sealing modules of type CS20 and CS40, compression unit PTG-40, mounting hardware and gaskets between frame and cabinet and between the frame halves.

10	**Marking.**		
	Marking		N/A
11	**General requirement for tests.**		
11.1	Tests should be carried out under the standard atmospheric conditions described in IEC 68-1		P
11.2	Test samples shall be in a clean and new condition.		P
	The relevant product standard shall specify details such as:The number of samples to be tested;		N/A
	-conditions for mounting, assembling and positioning of the samples;	As in normal use	P
	-the pre-conditioning, if any, which is to be used;		N/A
	-whether to be tested energized or not;	Not energized	P
	-whether to be tested with its parts in motion or not;		N/A
11.5	**Empty enclosures**		
	If the enclosure is tested without equipment inside, the manufacturer shall ensure that after the electrical equipment is enclosed the enclosure meets the declared degree of protection of the final product.		N/A
12	**Tests for protection against access to hazardous parts indicated by the first characteristic numeral.**		**-**
	Test conditions for IP 0X:	No test required	N/A
	Test conditions for IP 1X: The sphere of 50 mm ∅		N/A
	Test conditions for IP 2X: The jointed test finger may penetrate up to its 80 mm length ,but adequate clearance shall be kept.		N/A
	Test conditions for IP 3X: The test rod of 2.5 mm ∅ shall not penetrate and adequate clearance shall be kept.		N/A
	Test conditions for IP 4X: The test wire of 1.0 mm ∅ shall not penetrate and adequate clearance shall be kept.		N/A
	Test conditions for IP 5X: Same as above.		N/A
	Test conditions for IP 6X: Same as above.	The test wire Ø 1 mm did not penetrate the enclosure.	P

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13	**Tests for protection against solid foreign objects indicated by the first characteristic numeral.**				
First, characteristic numeral.	Test means (object probes and dust chamber)	Test force	Test conditions,see		N/A
0	No test required	-	-		N/A
1	Rigid sphere without handle or guard $50_0^{+0.05\ mm}$ diameter.	50 N ± 10%	13.2		N/A
2	Rigid sphere without or guard $12,5_0^{+0.2}$ mm diameter.	30 N ± 10%	13.2		N/A
3	Rigid steel rod $2,5_0^{+0.05}$ mm diameter with edges free from burrs	3 N ± 10%	13.2		N/A
4	Rigid steel wire $1,0_0^{+0.05}$ mm diameter with edges free from burrs.	1N ± 10%	13.2		N/A
5	Dust chamber, with or without underpressure	-	13.4+13.5		N/A
6	Dust chamber, with underpressure	-	13.4+13.6	Duration of test: 8 hours. Max 20 mBar underpressure inside enclosure during test.	P
13.6.2	**Acceptance conditions for the first characteristic numeral 6.** The protection is satisfactory if no deposit of dust is observable inside the enclosure at the end of test.			No ingress of talcum powder.	P

14	**Tests for protection against water indicated by the second characteristic numeral.**		
14.2.0	No test required		N/A
14.2.1	Test for second characteristic numeral 1 with a drip box.		N/A
14.2.2	Test for second characteristic numeral 2 with a drip box.		N/A
14.2.3	Test for second characteristic numeral 3 with an oscillating tube or spray nozzle.		N/A
14.2.4	Test for second characteristic numeral 4 with oscillating tube or spray nozzle.		N/A
14.2.5	Test for second characteristic numeral 5 with a 6.3-mm nozzle,tested with a spraying nozzle.	Flow: 12 L/min Distance: 2.5 – 3 m Duration: 3 min Nozzle: 6.3 mm	P
14.2.6	Test for second characteristic numeral 6 with a 12.5-mm nozzle		N/A
14.2.7	Test for second characteristic numeral 7: Temporary immersion between 0.15 m and 1 m	Temporary immersion Water-level on enclosure: 1,0 m above bottom at least 0,15 m above top Duration: 30 min	P
14.2.8	Test for second characteristic numeral 8: Continuos immersion subject to agreement.		N/A
14.2.9	Test for second characteristic numeral 9 by high pressure and temperature water jetting.		N/A
14.3	Acceptance conditions: The protection is satisfactory if any water has entered, it shall not be sufficient to interfere the correct operation or impair the safety of the equipment.	No ingress of water inside the enclosure.	P
15.	Tests for protection against access to parts indicated by the additional letter.		N/A

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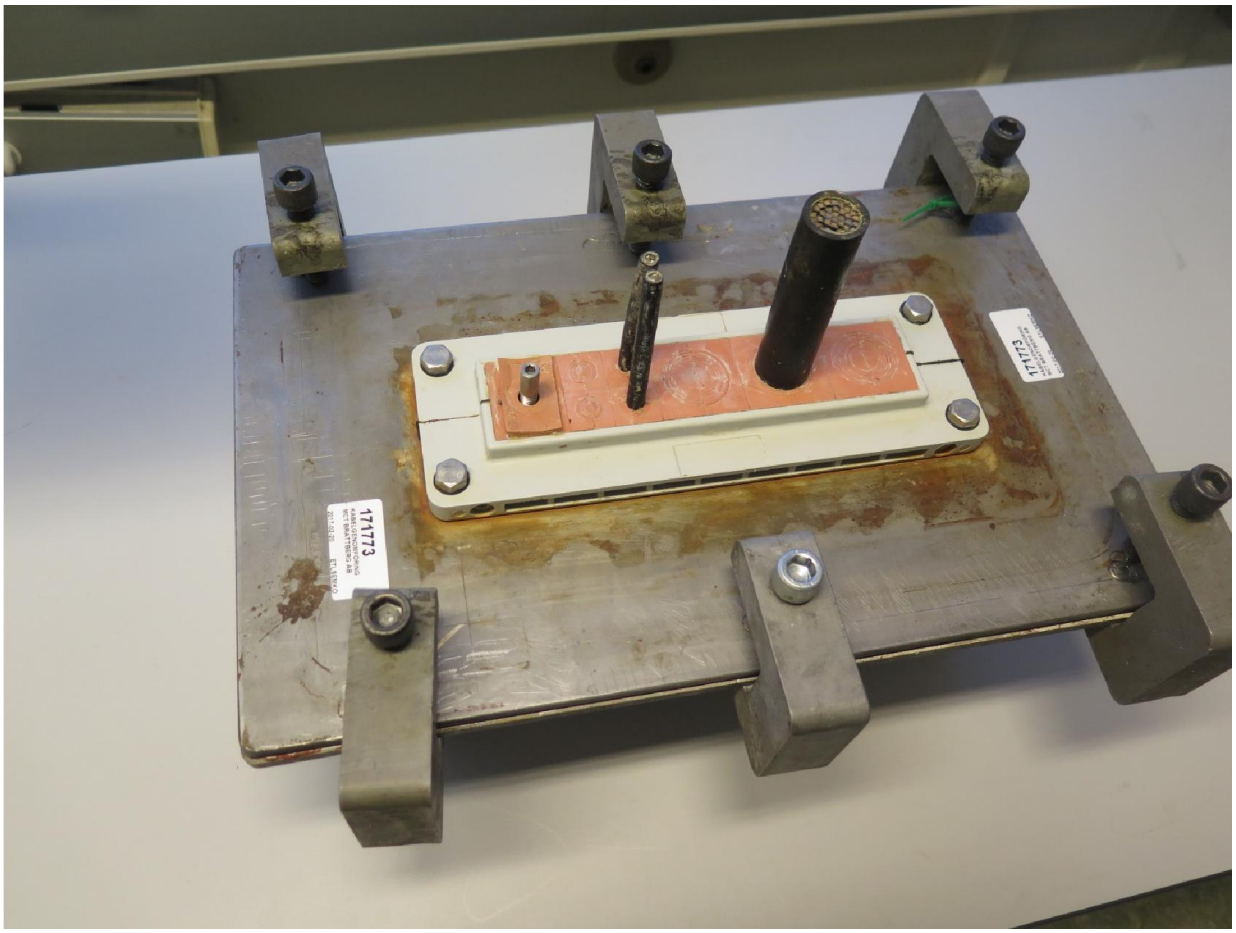
SUMMARY OF ENCAPSULATION TESTS ACCORDING TO IEC 60 529: 2013

Conclusion of the IP65 / IP67 test: PASS

The result of the test was in compliance with the requirements in the standard IEC 60 529 Ed 2.2: (2013)



Picture 1: EUT

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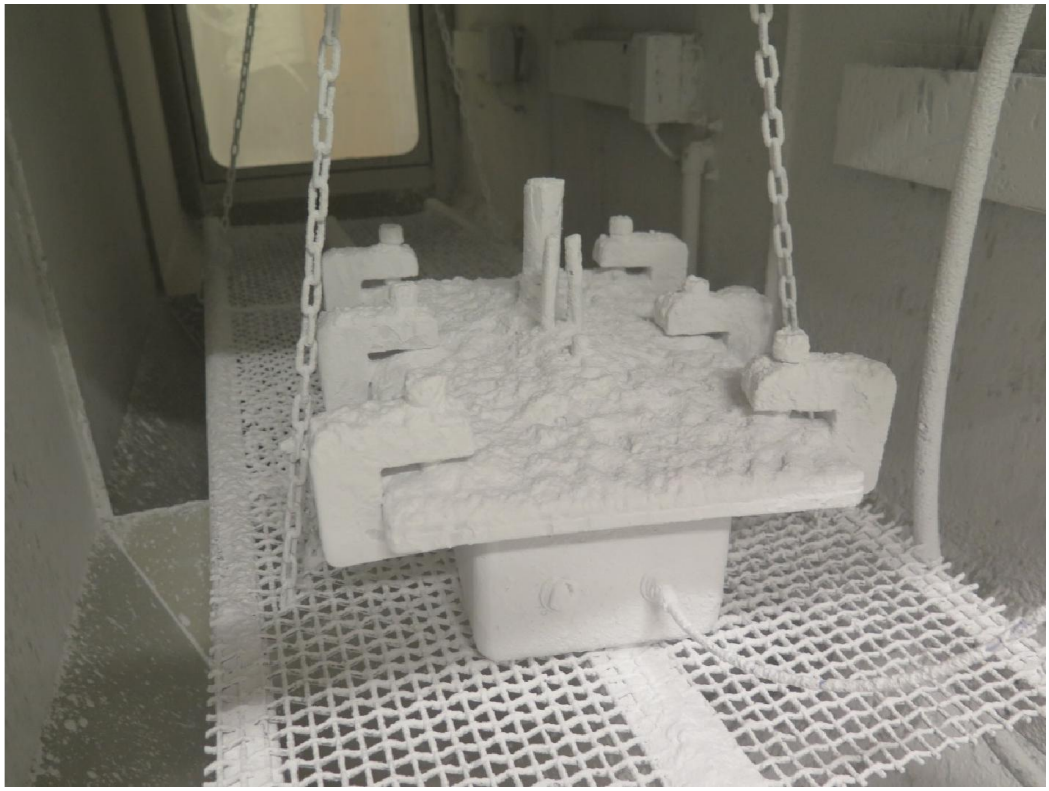
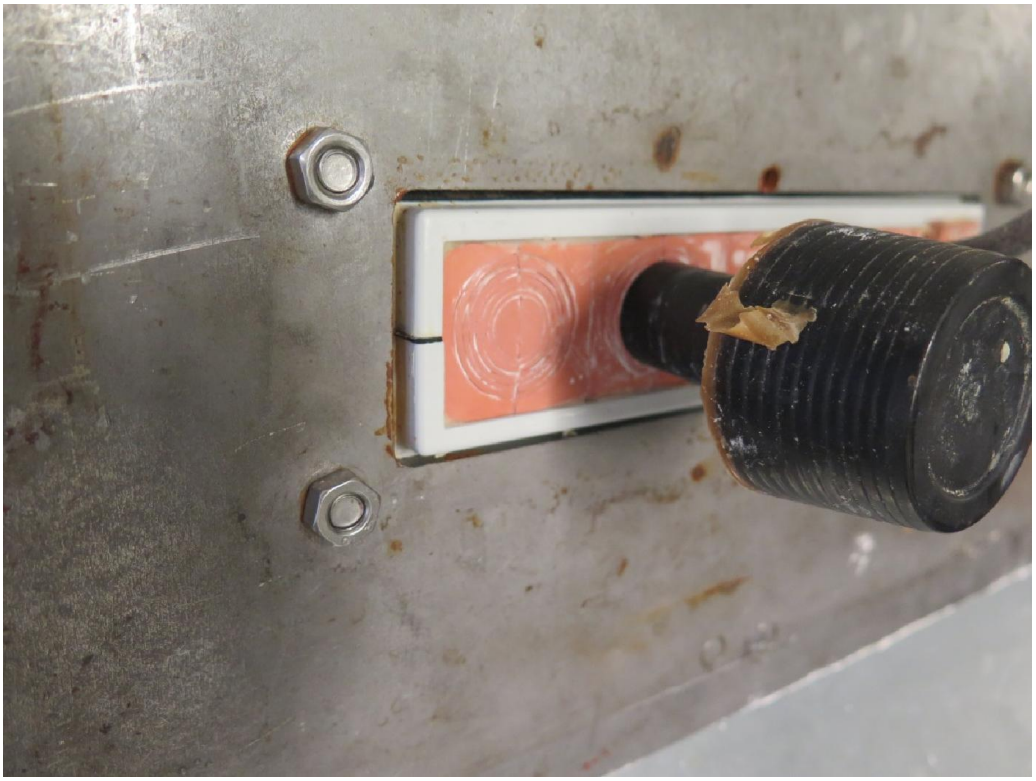
Picture 2: Test probe Ø 1.0 mm for IP6X-test

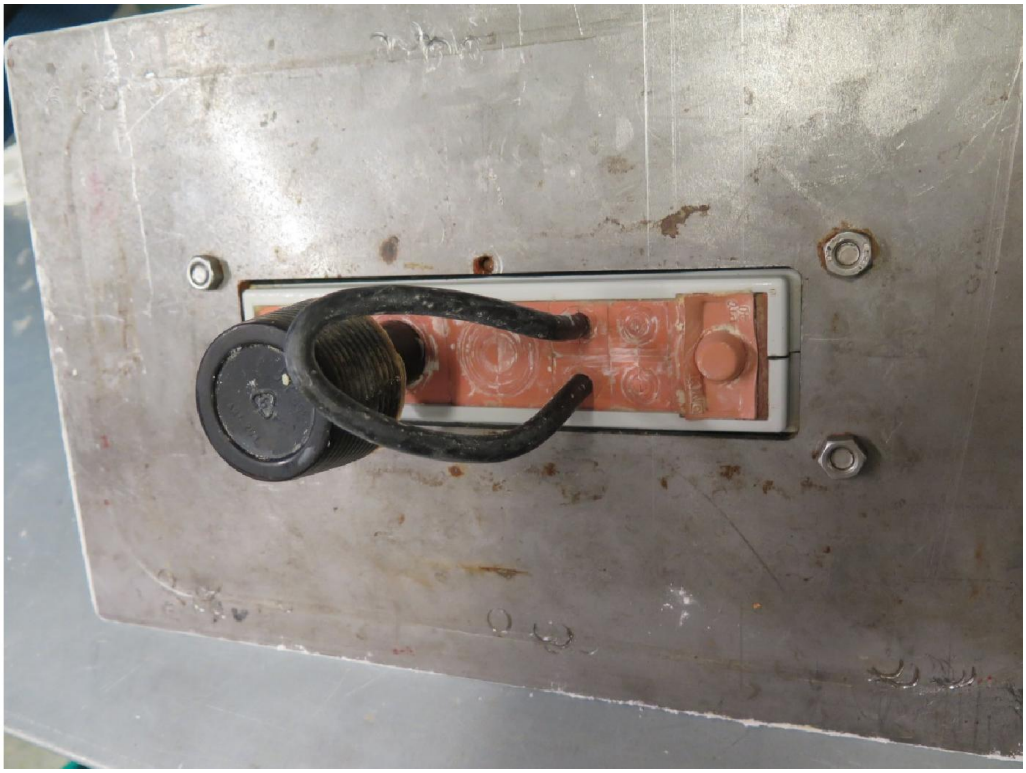
Picture 3: EUT inside the dust chamber before the IP6X test



Picture 4: EUT inside the dust chamber after the IP6X test

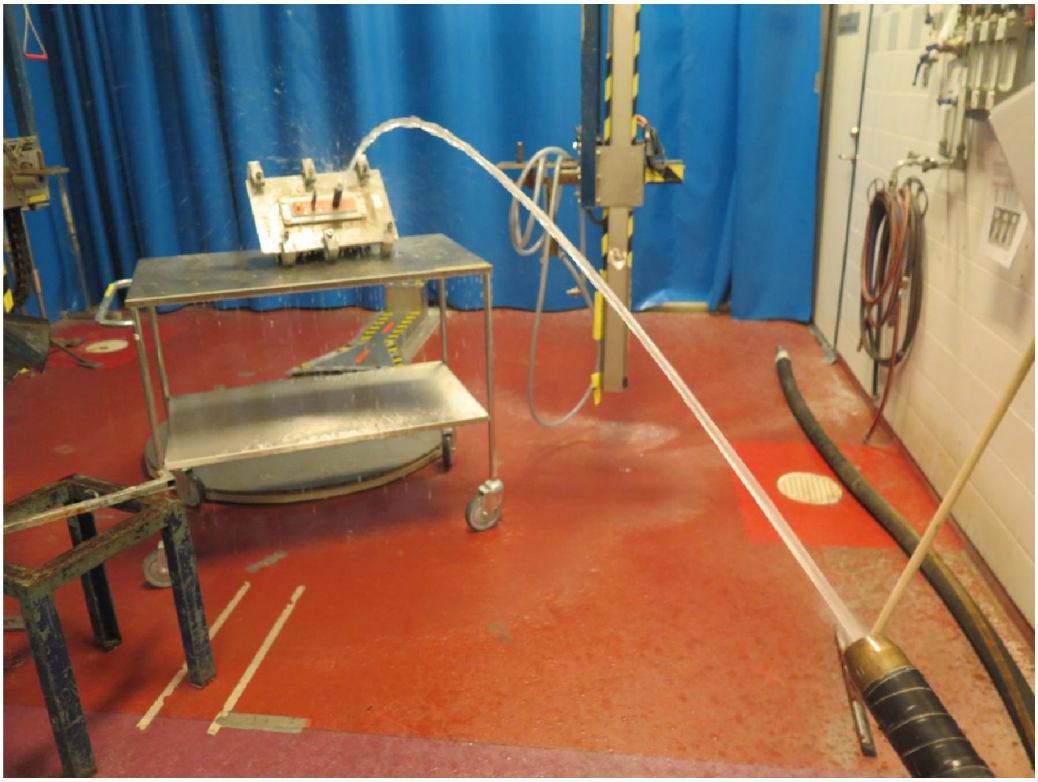


Picture 5: No trace of dust after the IP6X test



Picture 6: No trace of dust after the IP6X test

Picture 7: No trace of dust after the IP6X test

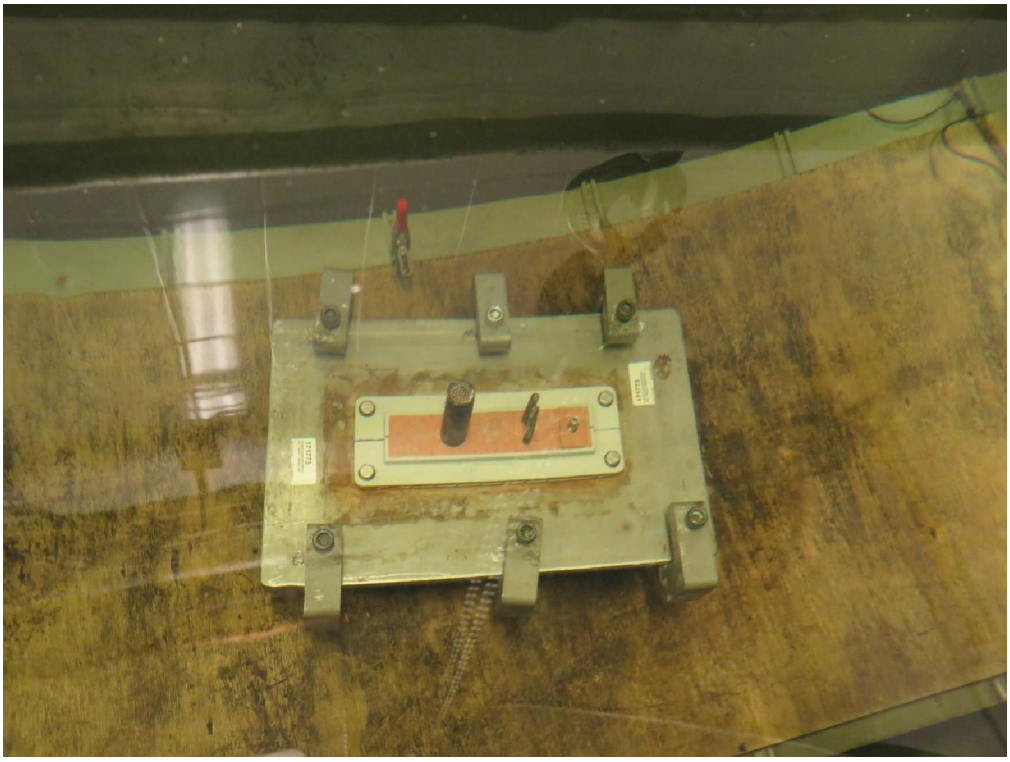


Picture 8: EUT during water jet test (IPX5)

Picture 9: No trace of water inside the EUT after the IPX5 test

Picture 10: No trace of water inside the EUT after the IPX5 test

Picture 11: Water tank used for IPX7 test



Picture 11: EUT in water tank

Picture 12: No trace of water inside the EUT after the IPX7 test

Picture 13: No trace of water inside the EUT after the IPX7 test

MAX OVERALL UNCERTAINTY

Electrical quantities			
			Max overall uncertainty k=2
Voltage	< 1000V	DC	± 1,4%
	< 1000VRMS	45Hz - 5kHz	± 2,6%
Current	< 10A	DC	± 1,3%
	< 10A	45Hz - < 5kHz	± 1,6%
Resistance	< 100mΩ		± 1%
	100mΩ - 2MΩ		± 0,1%
	> 2MΩ		± 0,2%
Electric power	100mW - 10kW	DC, 40Hz - 10kHz	± 2,7%
Oscilloscopes	peak value		± 0,4%
Earth continuity meters	10A – 25A		± 0,6%
Leakage current	< 30mA	50 - 5000Hz	± 2,8%
Non Electrical quantities			
			Max overall uncertainty k=2
Temperature	< 300°C		± 3°C
Calculation of temp raise	> 300°C		± 4,5°C
Linear dimensions			
Caliper	2 - 150mm		± 0,14mm
Micrometer			± 0,07mm
Gauge rods	< 2mm		± 0,02mm
Mass	< 10g		± 0,5%
	10g - 100g		± 1%
	> 100g		± 2%
Relative humidity	10-95%RH		± 3%
Timers	< 1ms		± 1ms
	1s - 1min		± 1s
	> 1min		± 1 s
Corrosion testing, saltmist downfall	ml		± 3,66 ml
Salt concentration	%		± 0,1 ppt
Ph value			± 0,002 ph
Flow	l/min		± 5%
Pressure	Pa		± 0,05%
Acceleration	m/s^2		± 9,79%

Revision 2015-09-11

Measurement uncertainty according to procedure 2 “Accuracy method” in IEC Guide 115 has been used.