



Product Service

**Mehr Wert.
Mehr Vertrauen.**

22.05.2023

Test Report

No. TR-713296311-00 (Revision 1)

Applicant	nVent Schroff GmbH; Langenalber Str. 96-100; 75334 Straubenhardt		
Manufacturer	nVent Schroff GmbH; Langenalber Str. 96-100; 75334 Straubenhardt		
Type of device	BGTR PRO EMC 6HE 84TE 235T; SUBR PRO EMC 6U 84HP 235D		
Type designation	19" Subrack		
Part number	24395-610		
Order No.	4502588909		
Receipt of DUT	28.04.2023	Return of DUT	04.05.2023
Test standards	EN 50155: 2022 (table 11) EN 61373: 2010 cat.1 class B EN 60068-2-27:2009 Shock EN 60068-2-64:2008 Vibration, Random		

Accredited test laboratory
Deutsche Akkreditierungsstelle
GmbH (DAkks):

Reg.Nr.
D-PL-11321-02-02

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(Germany) at www.tuvsud.com/imprint

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Germany

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Carl-Zeiss-Straße 3
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Germany



Conclusion

Test Results		Order No. 4502588909					
Tests were performed according to: EN 50155: 2022 (table 11) EN 61373: 2010 cat.1 class B EN 60068-2-27:2009 Shock EN 60068-2-64:2008 Vibration, Random							
Tests performed		Operating mode			Test result		
	Location	Operating	Non Operating	Transport/Storage	Passed	Not Passed	No Evaluation
broadband random	Mannheim	☐	☒	☐	☒	☐	☐
mechanical shock	Mannheim	☐	☒	☐	☒	☐	☐

The test results relate only to the individual item which has been tested. Without the written approval of the test laboratory this report may not be reproduced in extracts.

Date	Tested by	Checked by	Test Result
22.05.2023	 SIGN-ID 794558 Björn Laier	 SIGN-ID 795252 Uwe Marlok	
			☒ Passed ☐ Not passed ☐ No Evaluation

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1 General information

Order information

Client:	nVent Schroff GmbH; Langenalber Str. 96-100; 75334 Straubenhardt
Contact person:	Mr. Daniel Doerflinger
Order No.:	4502588909
Receipt of the DUT:	28.04.2023
Return of the DUT to customer:	04.05.2023
Date of testing:	03.05.2023 – 04.05.2023
Location:	Mannheim (further information, see Pos. 2)
Responsible for the testing:	Mr. Björn Laier
Responsible for the test report:	Mr. Björn Laier
Test report approved by:	Mr. Uwe Marlok

Test report information

Test report No.:	TR-713296311-00 (Revision 1)
Date of Issue:	22.05.2023

2 Information about the test laboratory

Information about the test laboratory located in Mannheim

Company name:	TÜV SÜD Product Service GmbH
Adress:	Dudenstraße 28 D-68167 Mannheim Germany
Accreditation:	DAkkS registration No.: D-PL-11321-02-02
Contact:	Mr. Uwe Marlok
	Phone: +49 621 395-287 Fax: +49 621 395-604

3 Information about the Device under Test (DUT)

Information about the DUT	
Type designation:	19" Subrack
Type of device:	BGTR PRO EMC 6HE 84TE 235T; SUBR PRO EMC 6U 84HP 235D
System components:	Subrack with BPL, different guide rails and different plug-in card and cassette designs. (seeBOM)
Number of DUT	1
Serial number:	24395-610
Manufacturer:	nVent Schroff GmbH; Langenalber Str. 96-100; 75334 Straubenhardt
State of the DUT:	Standards components
State of the DUT at receipt:	No visible damages

3.1 Picture of the DUT

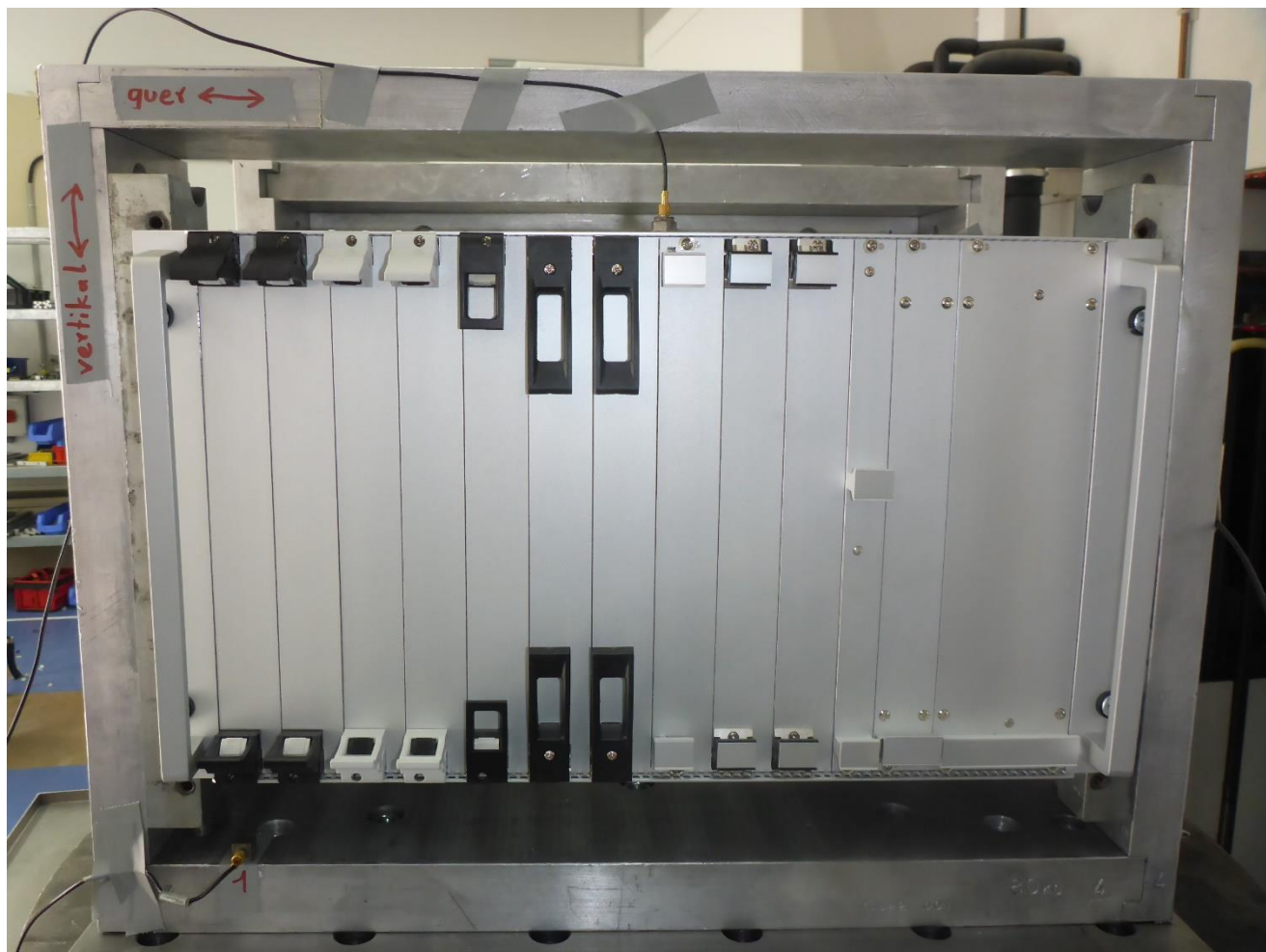


Figure 1 – DUT before test start



Figure 2 – DUT before test start (client picture)

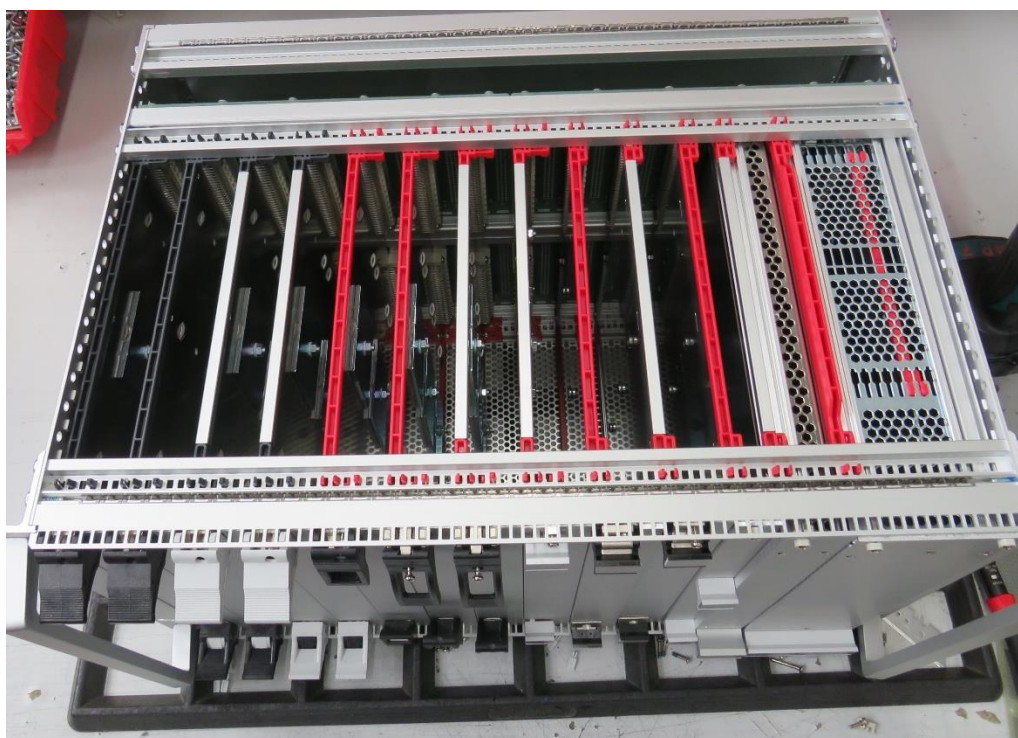
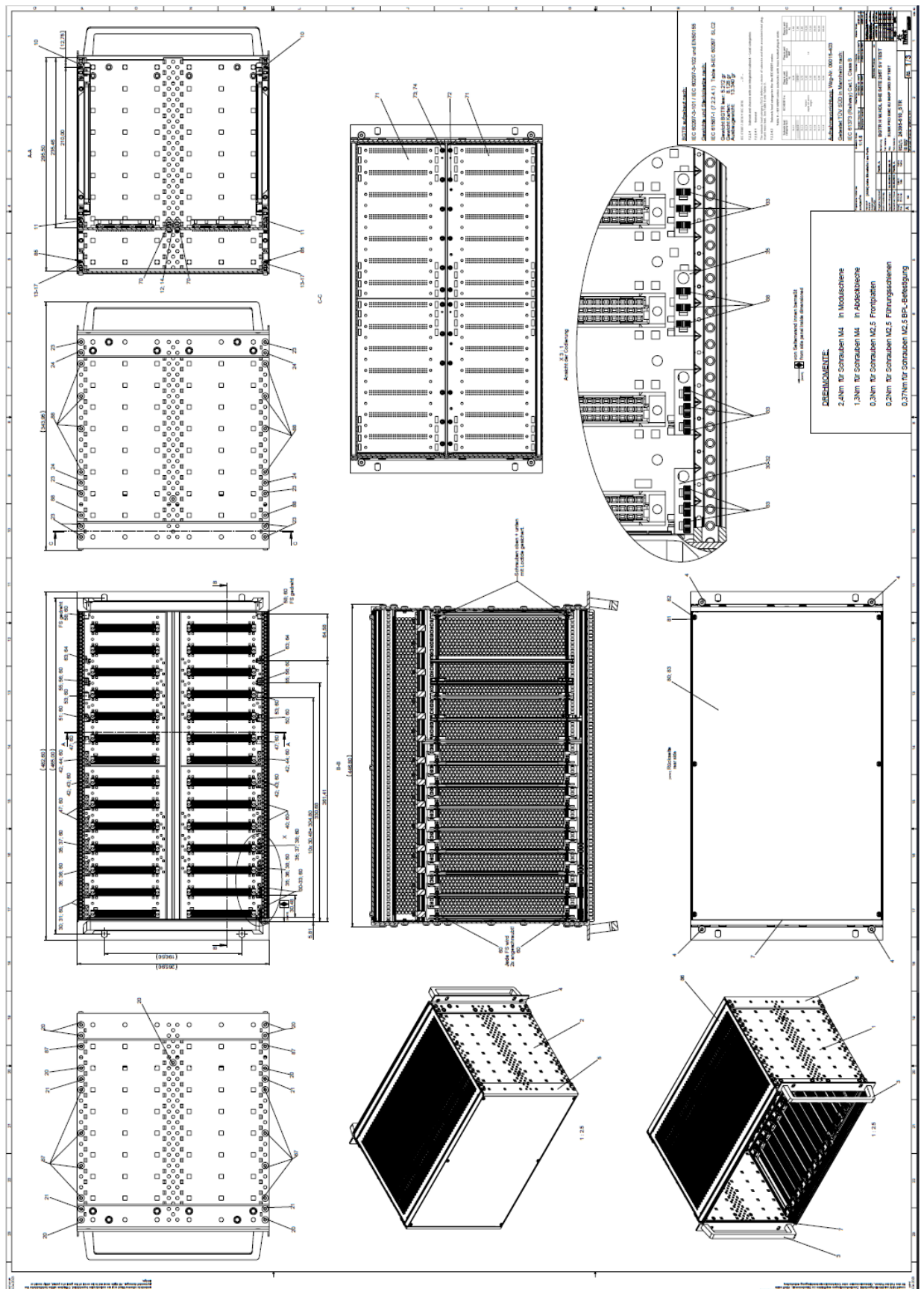


Figure 3 – DUT before test start (client picture)

3.2 Technical Drawings of the DUT



2408K410 19"-Chassisboard 6BE 4TE 2207 19"-Chassisboard Gewicht: 480 g	2408K410 19"-Chassisboard 6BE 4TE 2207 19"-Chassisboard Gewicht: 480 g	2408K410 19"-Chassisboard 6BE 4TE 2207 19"-Chassisboard Gewicht: 480 g	2408K410 19"-Chassisboard 6BE 4TE 2207 19"-Chassisboard Gewicht: 480 g
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4 Operation mode and configuration of the DUT

Operation mode(s)

passive

Mounting of the DUT / Exposition of the DUT

Mounted to test device by client.

Test device to shaker adapter plate M8 – 25Nm

5 Evaluation criteria and monitoring of the DUT

Monitoring of the DUT			
Function	Monitored parameter	Permissible criteria / limits	Monitoring method
Mechanical setup	Condition	No damages / cracks / deformations / discolorations	visual

6 Test sequence

Tests performed	Nr.	Date		Remarks
Mechanical Tests		03.05.2023 – 04.05.2023		No visible damages detected after test end.
		Run	Axis	
Random vibration – functional test	1	1	vertical	
Mechanical shock	2	2		
Random vibration – life endurance test	3	3		
Random vibration – functional test	4	4	crosswise	
Mechanical shock	5	5		
Random vibration – life endurance test	6	6		
Random vibration – functional test	7	7	longitudinal	
Mechanical shock	8	8		
Random vibration – life endurance test	9	9		

7 Uncertainty of measurement

Uncertainty of measurement environmental simulation			
Test	k_p	Extended uncertainty of measurement	Remarks
Force measurements with Almemo K25 force testing device	2	$\pm 0.52 \%$	1
Voltage measurements < 7000 V	2	$\pm 1.08 \%$	1
Current measurements	2	$\pm 1.2 \%$	1
Power measurements up to 1800 W (45 – 66 Hz)	2	$\pm 1.67 \%$	1
Time measurements	2	$\pm 0.58 \text{ s}$	1
Insulation resistance measurements	2	$\pm 3.72 \%$	1
Electro-dynamic vibration system (Shaker)	2	$\pm 9.09 \%$	2
Tempature measurements	2	$\pm 2.00 \text{ K}$	2
Temperature in temperature- / climatic test chamber	2	$\pm 1.98 \text{ K}$	2
Relative humidity in temperature test chamber	2	$\pm 2.81 \%$ r.h.	2

remark 1:

The after GUMS (1995) described extended measurement uncertainty is based on the standard measurement uncertainty multiplied by the extension factor of $k_p = 2$ for a confidence level of $p = 95,45 \%$.

8 Rule of decision

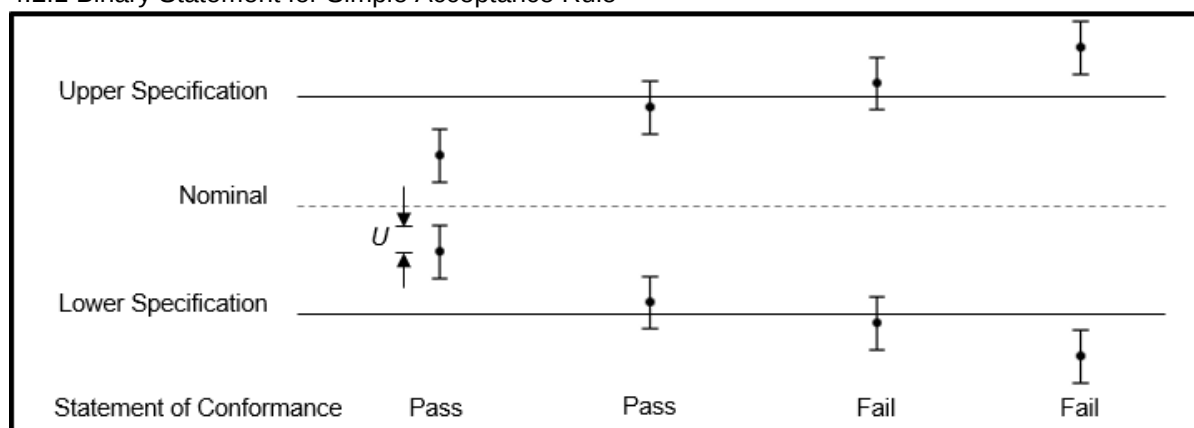
The decision rule and statements of conformity in the laboratory are based on ILAC-G8:09/2019 in clause 4.2.1 Binary Statement for Simple Acceptance Rule.

This normative regulation means that the measured value is also the value to be assessed in relation to the limit value.

ILAC-G8:09/2019

Guidelines on Decision Rules and Statements of Conformity

4.2.1 Binary Statement for Simple Acceptance Rule



U = 95% expanded measurement uncertainty

9 Referenced regulations

<i>Publication</i>	<i>Title</i>
EN 60068-2-27:2009	Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock (IEC 60068-2-27:2008); German version EN 60068-2-27:2009
EN 60068-2-64:2008	Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance (IEC 60068-2-64:2008); German version EN 60068-2-64:2008
EN 50155:2022	Railway applications - Rolling stock - Electronic equipment; German version EN 50155:2022
EN 61373:2010	Railway applications - Rolling stock equipment - Shock and vibration tests (IEC 61373:2010); German version EN 61373:2010

10 Mechanical testing

10.1 Test equipment

Location Mannheim

Type	Designation	Inv.-no.	Manufacturer
Shaker 2	SA 30-R 16A	9712	Unholtz-Dickie
Vibration controlsystem (rental system 95119ade)			
4-channel – controlsystem	VR 9500		Vibration Research
Software	VR		Vibration Research
Acceleration sensor			
Acceleration sensor	4507-B-001	38387	Brüel & Kjaer
Acceleration sensor	4507-B-001	46855	Brüel & Kjaer
Acceleration sensor	4508-B-001	39371	Brüel & Kjaer
Acceleration sensor	2256A-10	8109	Brüel & Kjaer

10.2 Test setup

Test setup vertical-axis

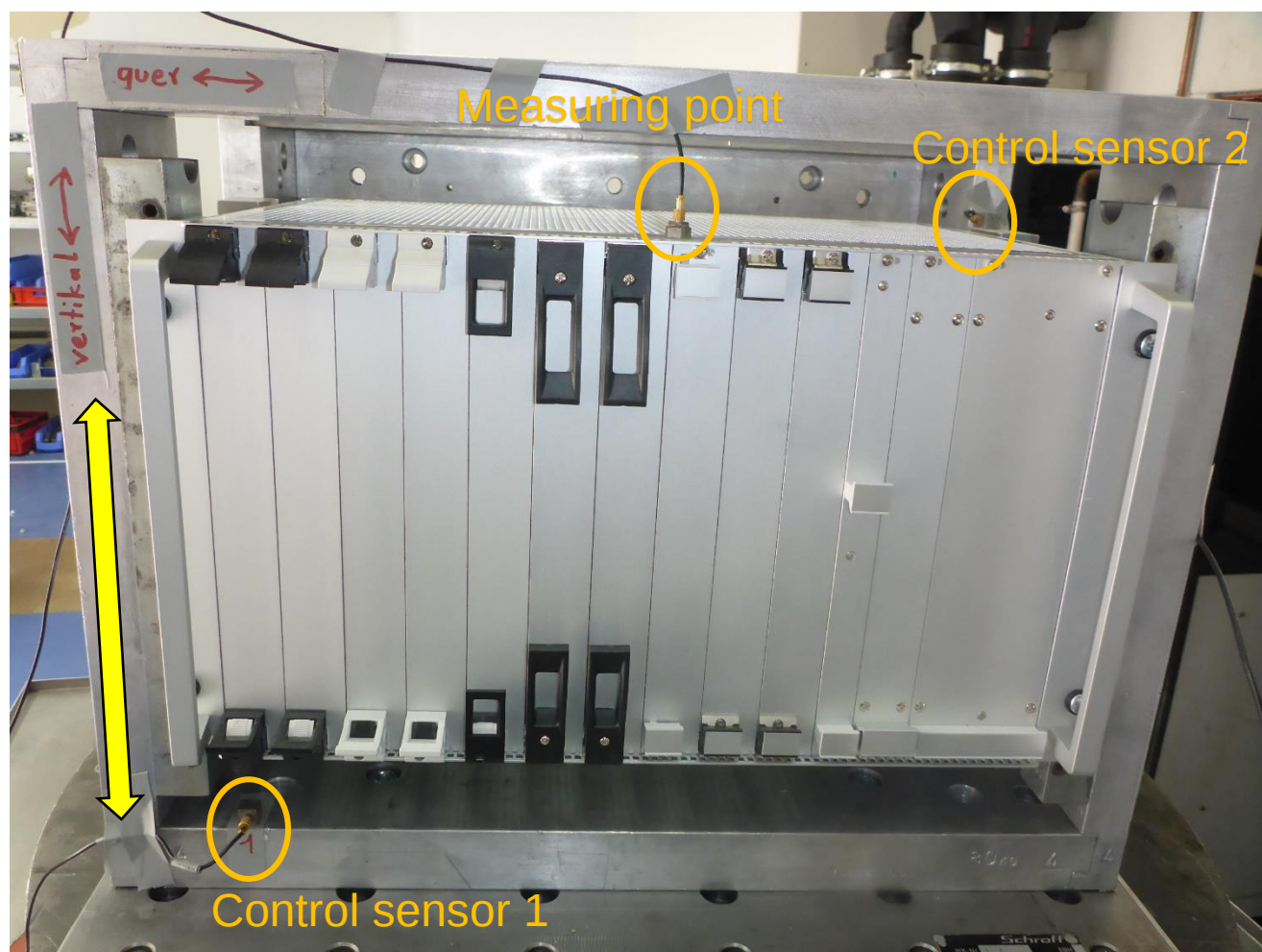


Figure 4

Test setup crosswise-axis



Figure 5

Test setup longitudinal-axis

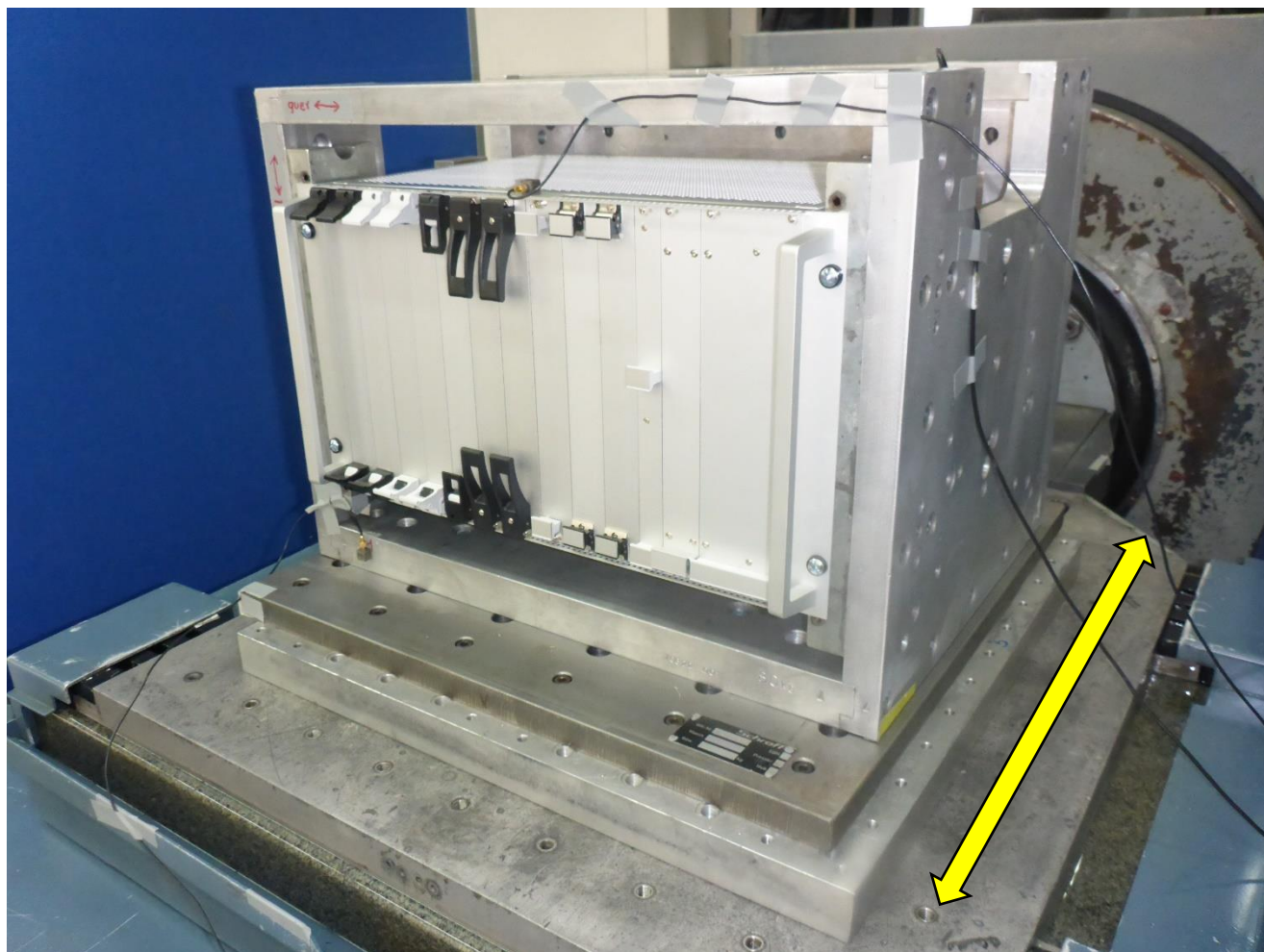


Figure 6

10.3 Executed testing

10.3.1 Broadband random vibration – functional test

EN 60068-2-64 Vibration, broadband random and guidance			
Ambient conditions	18 °C – 25 °C 40 % r.h. – 65 % r.h. 960 hPa – 1015 hPa		
Operation mode	no operation		
Test period	03.05.2023 – 04.05.2023		
No. of Test sample(s)	1	Test result	Notes
Test profile vertical 5 Hz - 0,0301 (m/s ²) ² /Hz 20 Hz - 0,0301 (m/s ²) ² /Hz 150 Hz - -6dB Test profile crosswise 5 Hz - 0,006 (m/s ²) ² /Hz 20 Hz - 0,006 (m/s ²) ² /Hz 150 Hz - -6dB Test profile longitudinal 5 Hz - 0,0144 (m/s ²) ² /Hz 20 Hz - 0,0144 (m/s ²) ² /Hz 150 Hz - -6dB		Test passed	---
Effective acceleration vertical	1,01 A _{rms}		
Effective acceleration crosswise	0,45 A _{rms}		
Effective acceleration longitudinal	0,70 A _{rms}		
Test duration per axis	10 min		
Degrees of freedom	120		
Standard deviation σ	3		
Test sequence	vertical → crosswise → longitudinal		

10.3.2 Broadband random vibration – life endurance test

EN 60068-2-64 Vibration, broadband random and guidance			
Ambient conditions	18 °C – 25 °C 40 % r.h. – 65 % r.h. 960 hPa – 1015 hPa		
Operation mode	no operation		
Test period	03.05.2023 – 04.05.2023		
No. of Test sample(s)	1	Test result	Notes
Test profile vertical 5 Hz - 0,964 (m/s ²) ² /Hz 20 Hz - 0,964 (m/s ²) ² /Hz 150 Hz - -6dB Test profile crosswise 5 Hz - 0,192 (m/s ²) ² /Hz 20 Hz - 0,192 (m/s ²) ² /Hz 150 Hz - -6dB Test profile longitudinal 5 Hz - 0,461 (m/s ²) ² /Hz 20 Hz - 0,461 (m/s ²) ² /Hz 150 Hz - -6dB		Test passed	---
Effective acceleration vertical	5,72 A _{rms}		
Effective acceleration crosswise	2,55 A _{rms}		
Effective acceleration longitudinal	3,96 A _{rms}		
Test duration per axis	5 h		
Degrees of freedom	120		
Standard deviation σ	3		
Test sequence	vertical → crosswise → longitudinal		

Test protocol vertical-axis

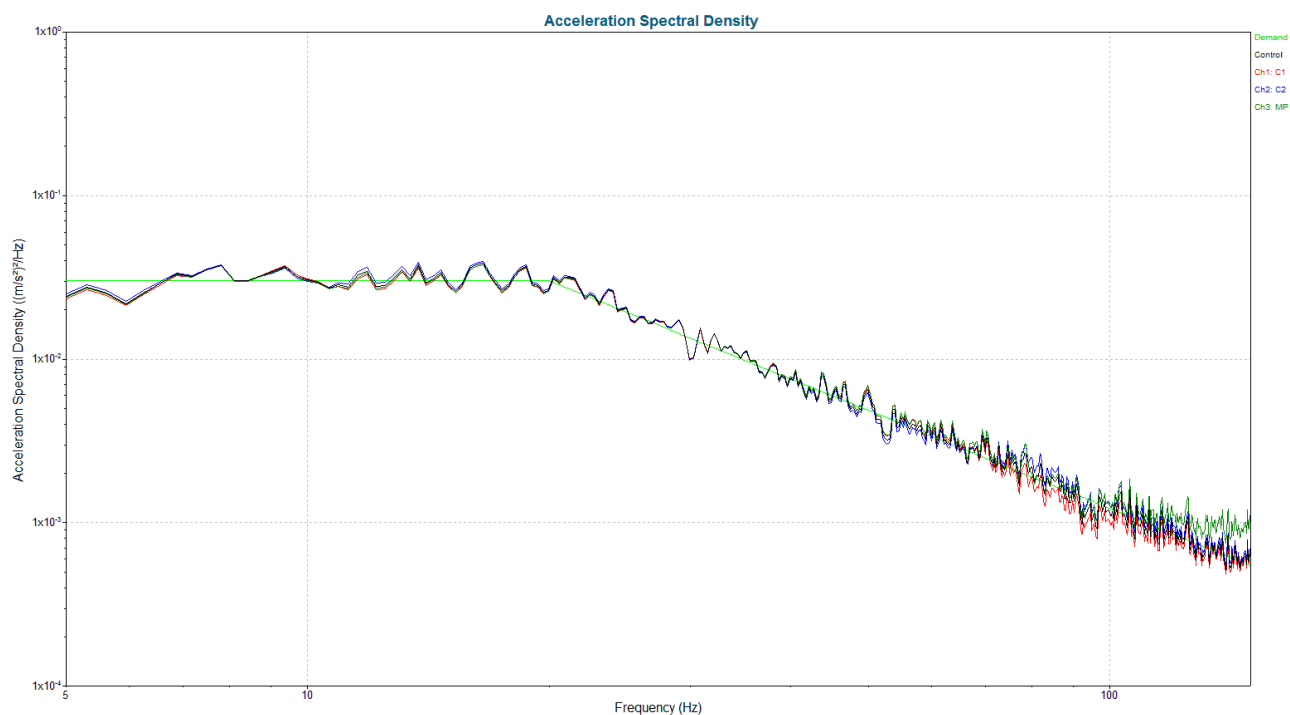


Figure 7 – functional test

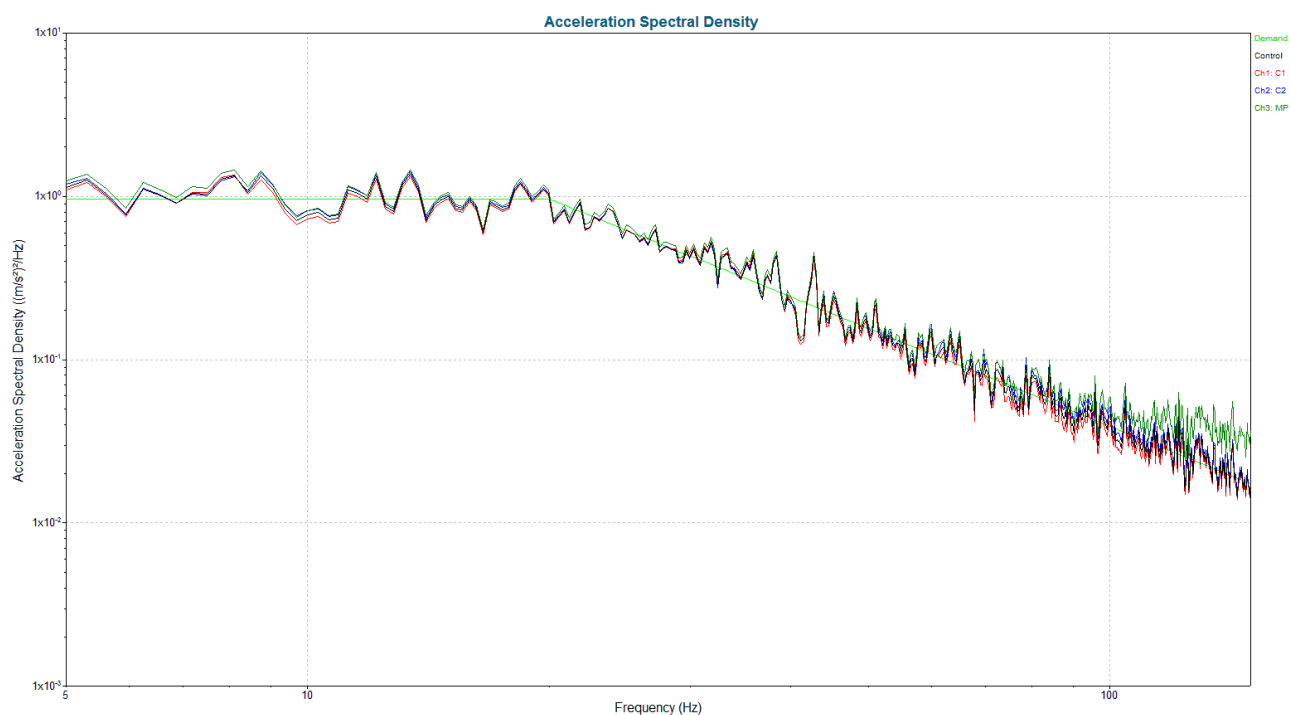


Figure 8 – life endurance test

Test protocol crosswise-axis

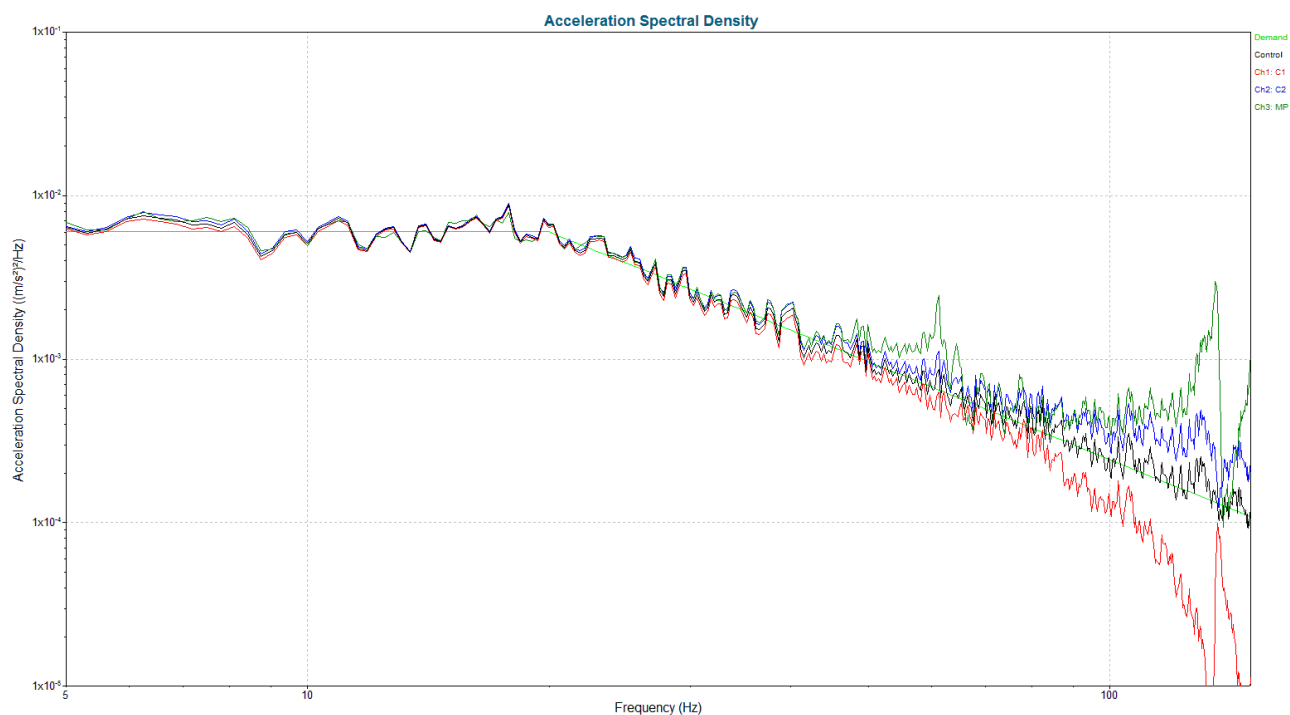


Figure 9 – functional test

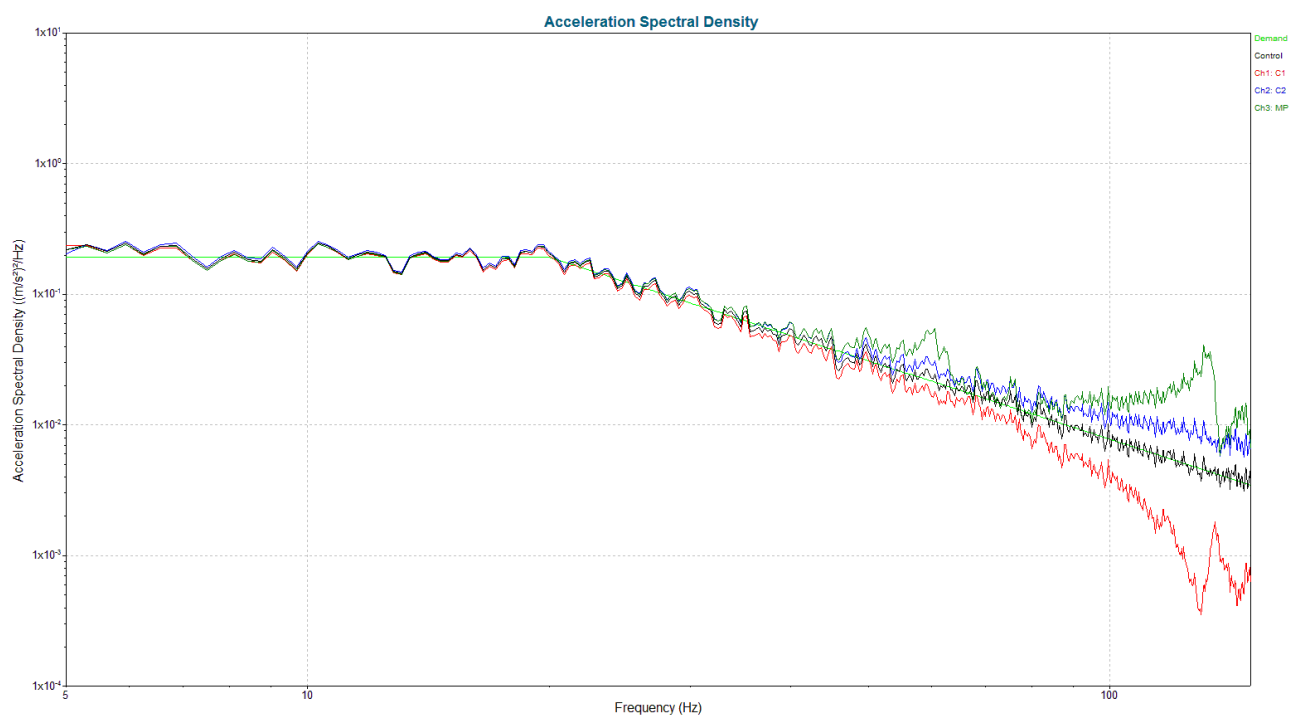


Figure 10 – life endurance test

Test protocol longitudinal-axis

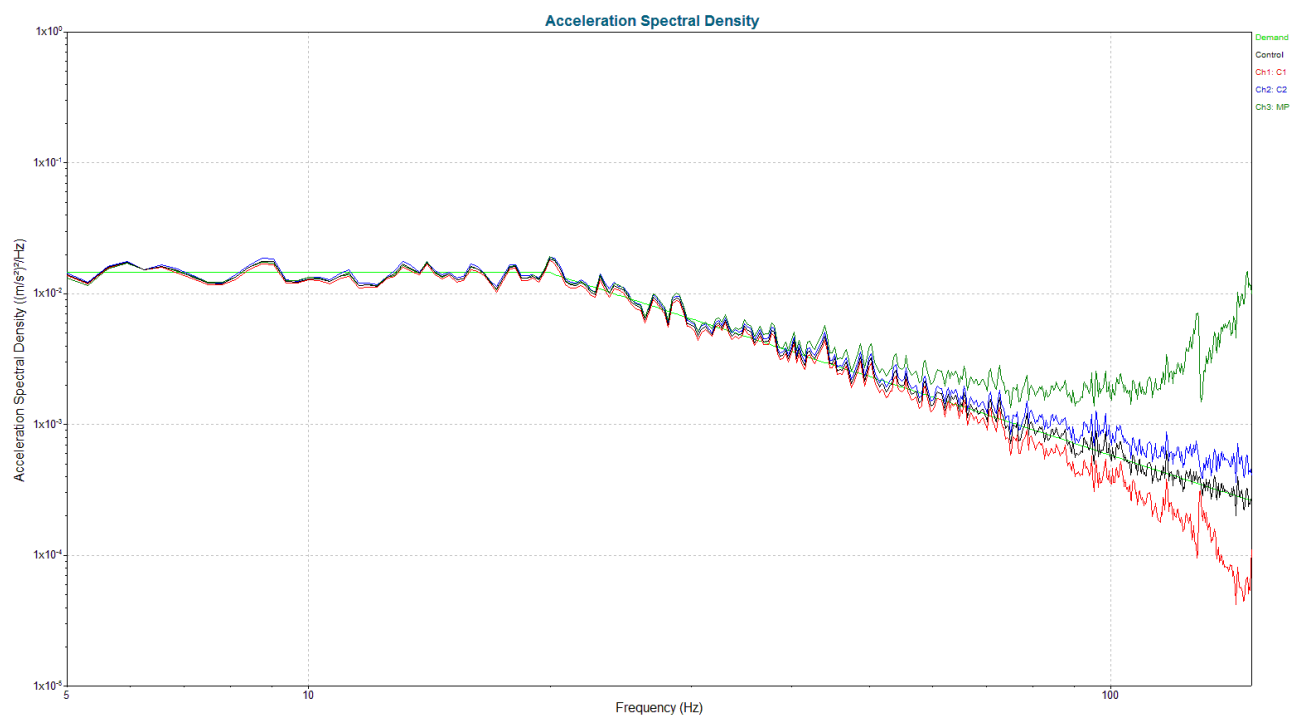


Figure 11 – functional test

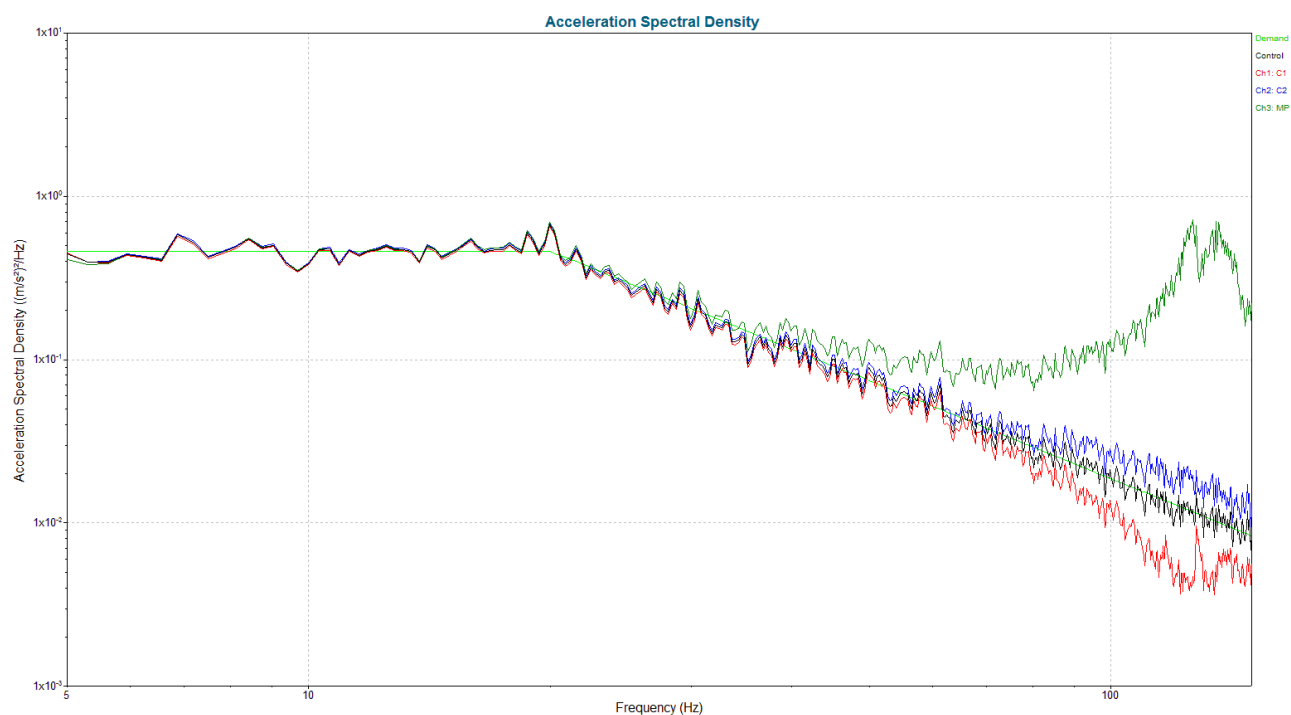


Figure 12 – life endurance test

10.3.3 Mechanical shock

EN 60068-2-27 Shock			
Ambient condition	18 °C – 25 °C 40 % r.h. – 65 % r.h. 960 hPa – 1015 hPa		
Operation mode	no operation		
Test period	03.05.2023 – 04.05.2023	Test result	Notes
No. of Test sample(s)	1		
Acceleration	Vertical and crosswise: 30 m/s ² Longitudinal: 50 m/s ²	Test passed	---
Shock duration	30 ms		
Number of shocks	3 per axis and direction		
Interval of shocks	1 s		
Type of shock	halfsine		
Test sequence	vertical → crosswise → longitudinal		

Test protocol vertical-axis and crosswise-axis - positive

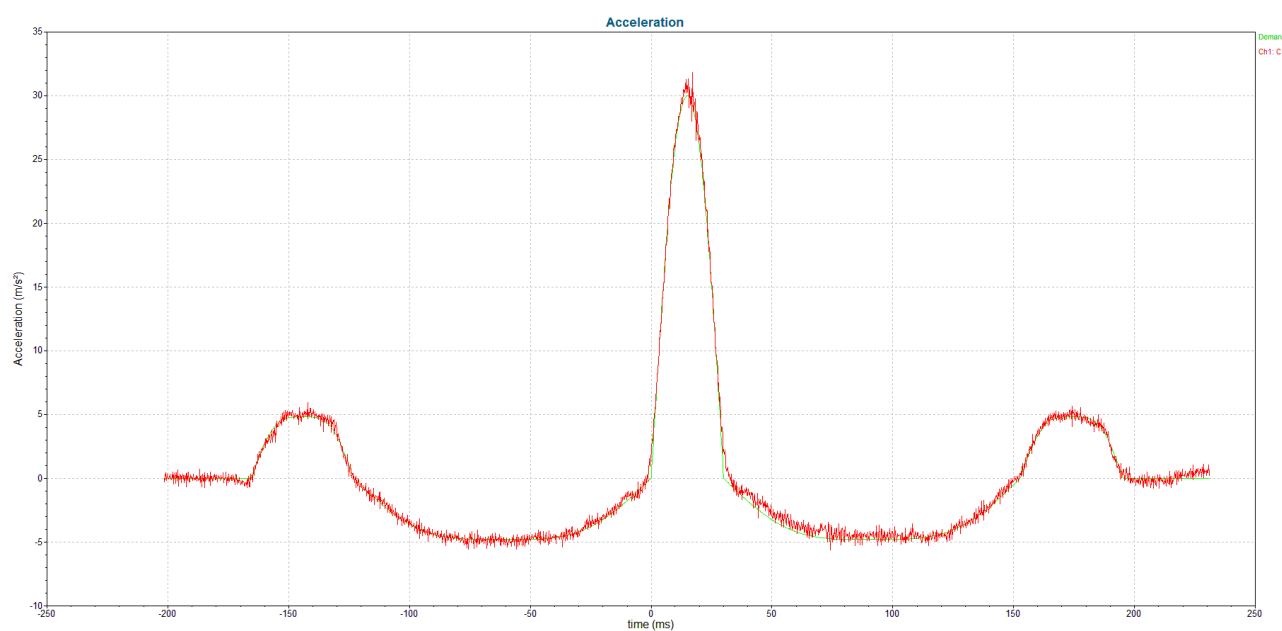


Figure 13 – exemplary positive shock

Test protocol vertical-axis and crosswise-axis - negative

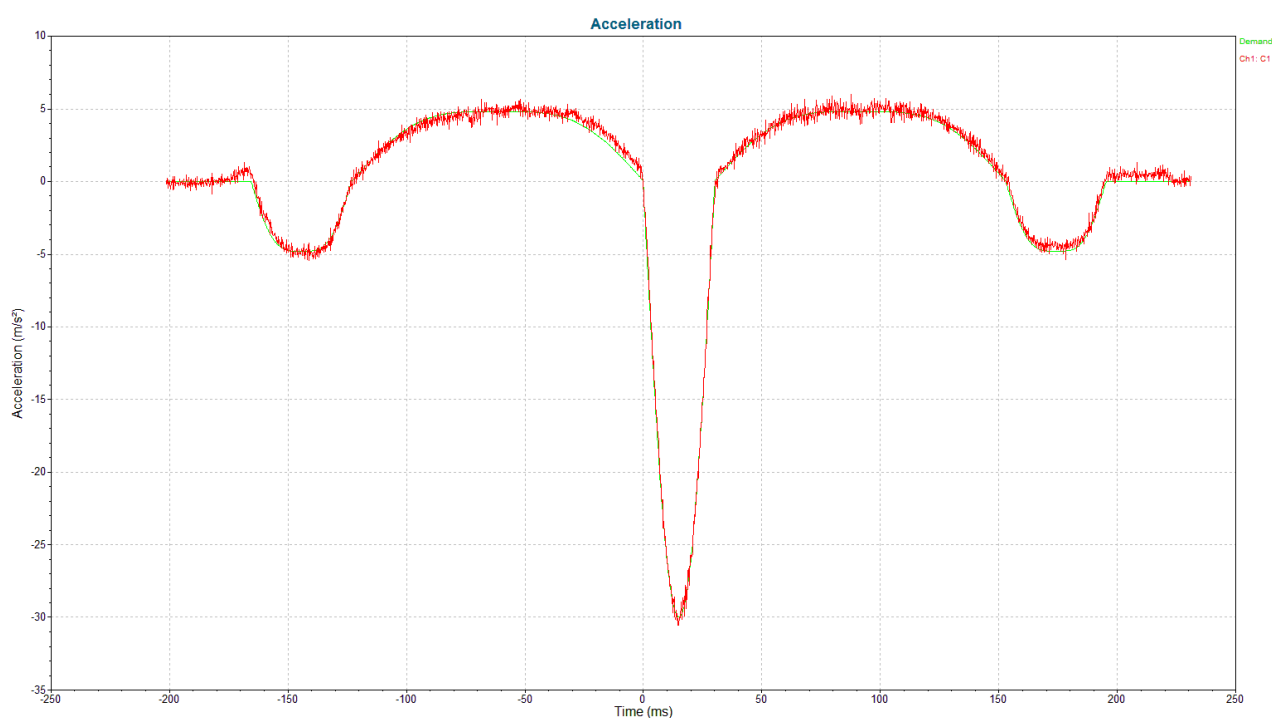


Figure 14 – exemplary negative shock

Test protocol longitudinal-axis - positive

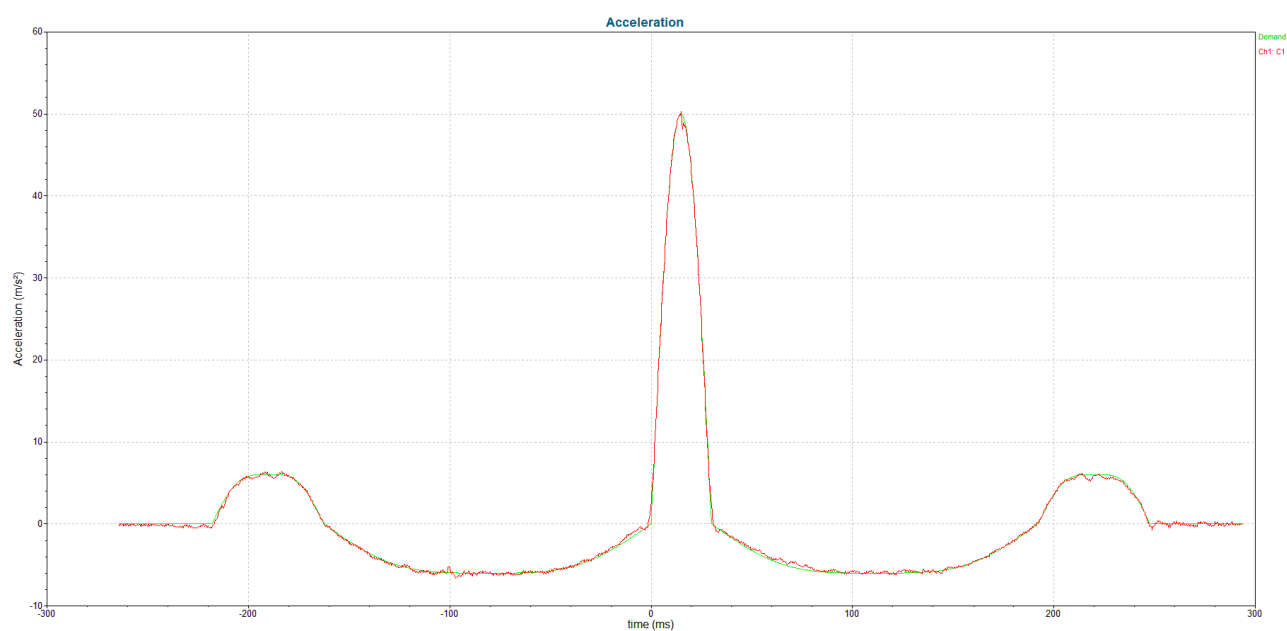


Figure 15 - exemplary positive shock

Test protocol longitudinal-axis - negative

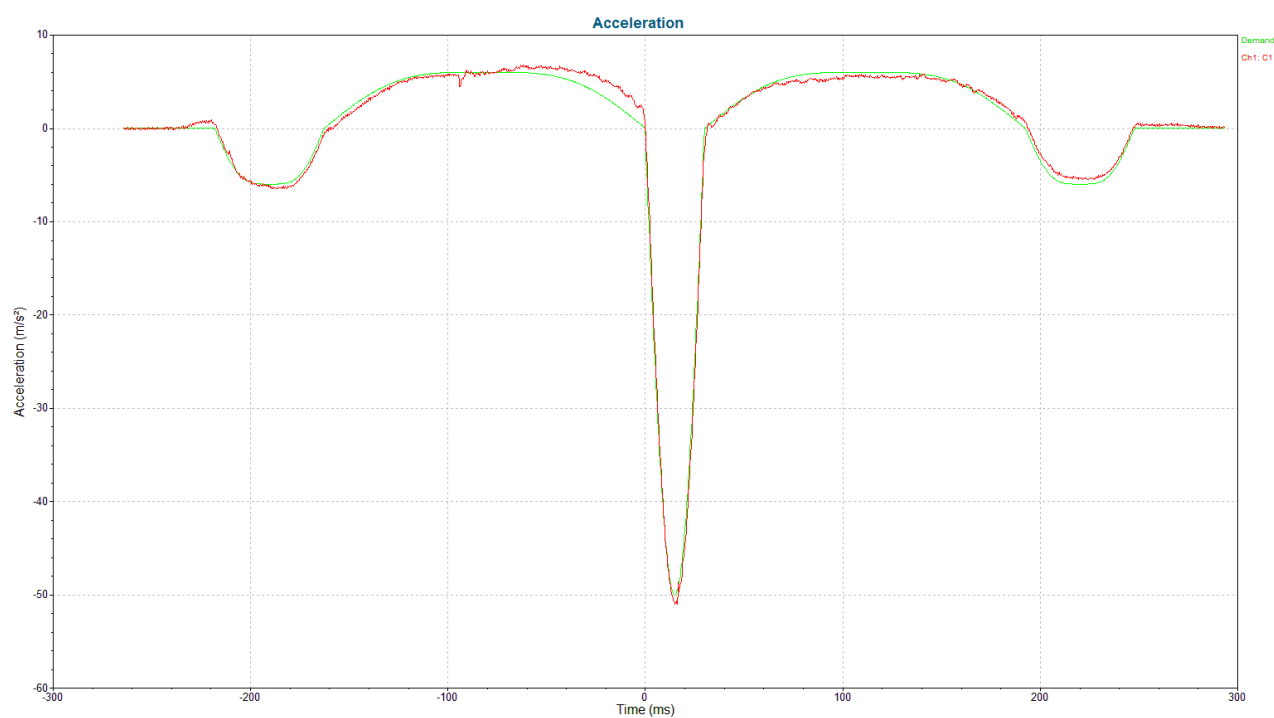


Figure 16 – exemplary negative shock

11 Internal visual inspection at nVent Schroff

In the Schroff the internal inspection by nVent SCHROFF that followed the test, in which the subrack was dismantled again and all components were inspected by our team of experts, no complaints or anomalies were found either, tests passed.

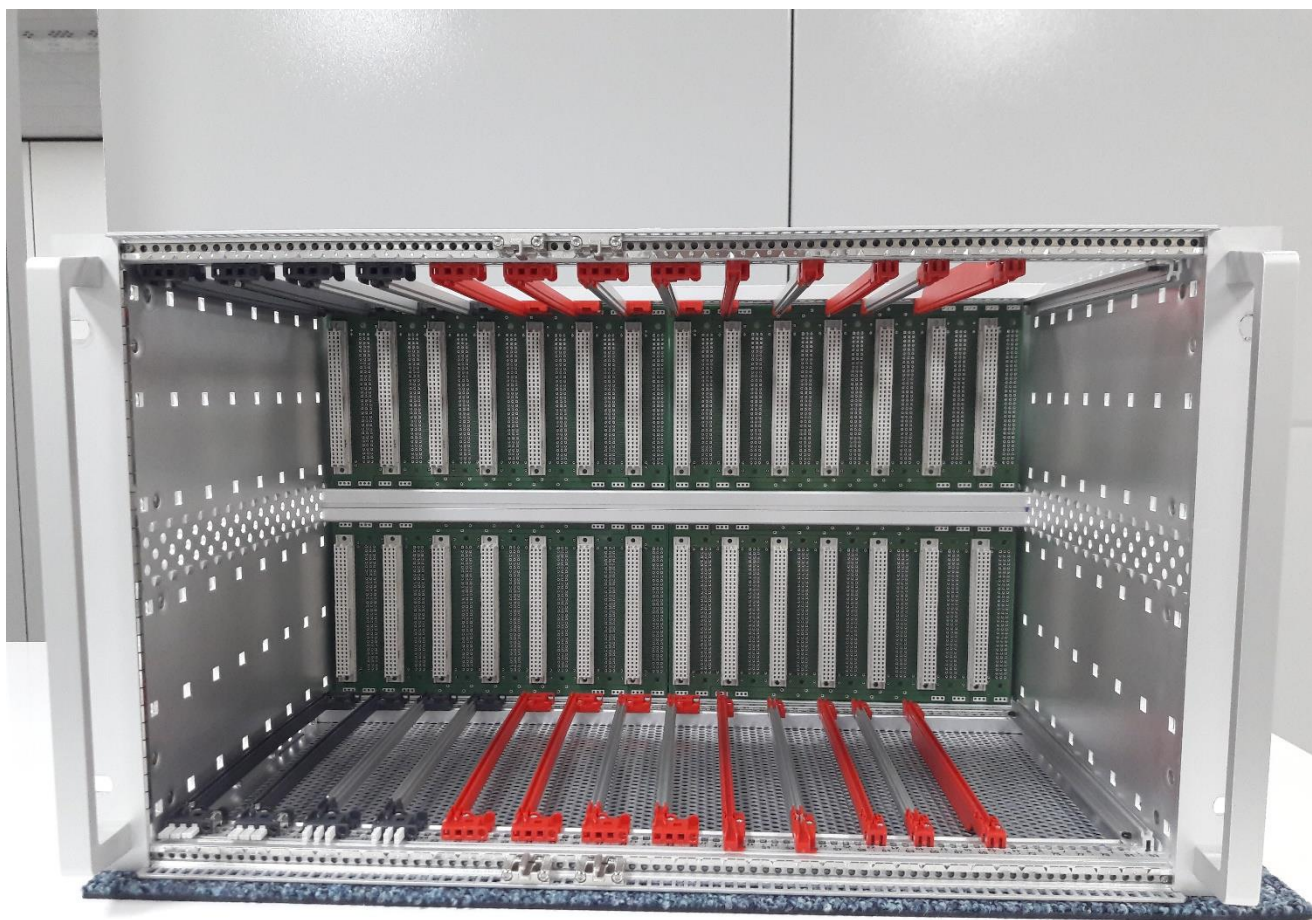


Figure 17 – picture after test end

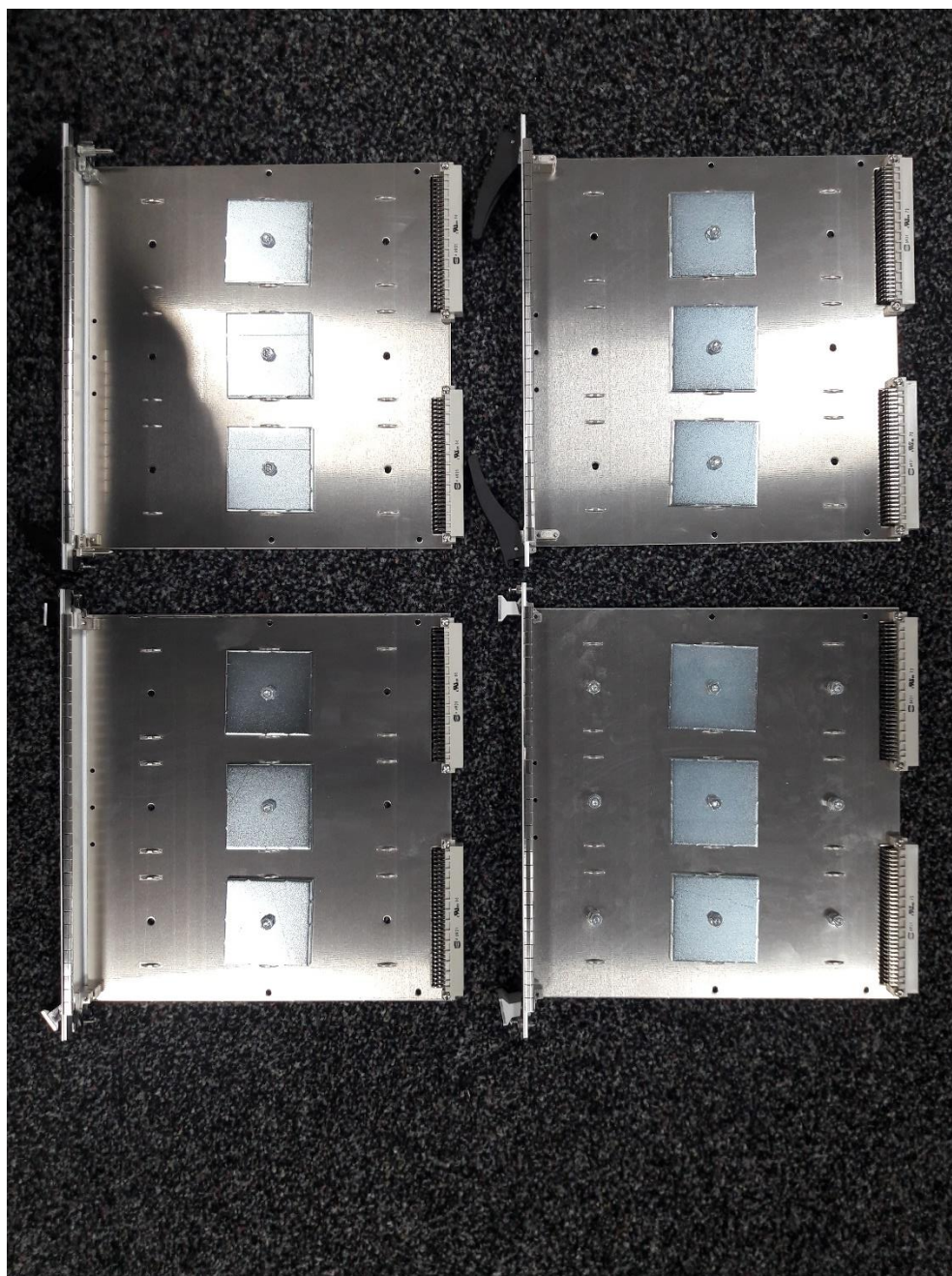


Figure 18 – picture after test end



Figure 19 – picture after test end

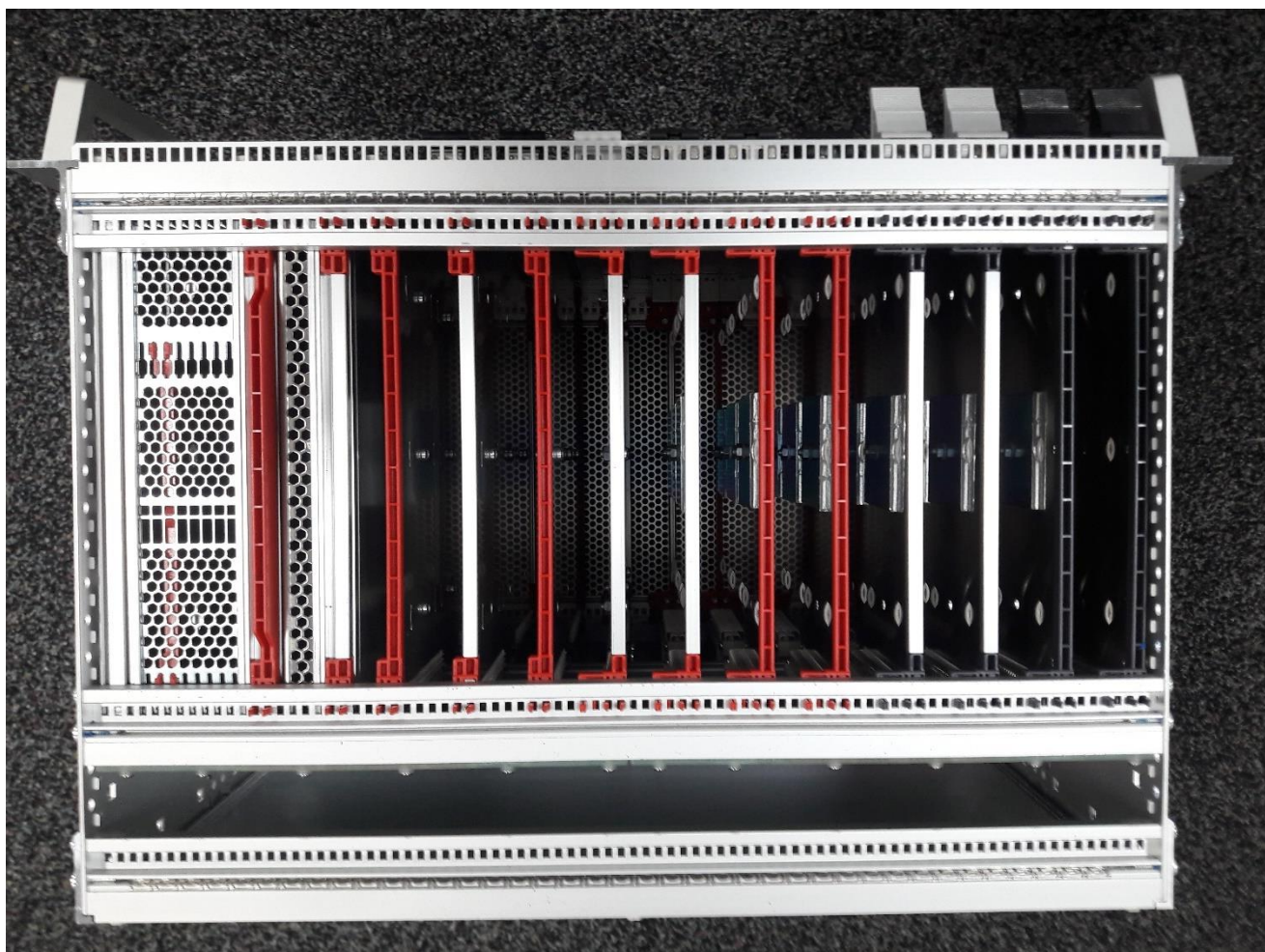


Figure 20 – picture after test end

12 Revision history

Revision history			
Version	Date	Author	Modifications
0	15.05.2023	Björn Laier	First Edition
1	22.05.2023	Björn Laier	Spelling mistakes at page 9 and 26; Client Adress