Prüfbericht / Test Report
TA-B-001479-V1

IABG Tests und Analysen

Projekt/Project: Seismic test on Cabinet Varistar CP			
Verantwortliche Abteilung: **Responsible Department:**	**TACC05**	**IABG-Projektleiter:** **IABG Project Manager:**	**N.M. Bektas**
Auftraggeber: **Customer:**	**Schroff SAS**	**IABG-Auftragsnummer:** **IABG Contract No:**	**K-15460:01**
Ansprechpartner AG : **Customer Contact :**	**Daniel Thomas**	**IABG-Angebotsnummer:** **IABG-Proposal no.:**	**TAPC01_22040009_V01**
Seitenanzahl / Total pages :	**17**	**Bestell-Nummer Kunde** **Order no.:**	**4502560681**

Projektinhalt: Project content:	Uniaxial sine sweep tests and uniaxial seismic tests
Prüfumgebung: Test equipment:	Test bench LiMAS (Light Multi-Axis Shaker)
Normen: Standards:	• DIN EN 60068-2-6 (2008); Environmental testing – Part 2-6: Tests - Test Fc: Vibration (sinusoidal) • GR-63-core (2017); NEBS™ Requirements Physical Protection; chapter 5.4.1 Earthquake Test Methods
Prüfling: Equipment under Test EuT:	• Varistar CP Seismic Cabinet (see Figure 1 and Annex) • Identification no: “VCP Seismic EMC 42U 2000H 600W 600D” • Drawing no: “10630-050_BET.pdf” • IABG-identification no: 221011-TAF4-as-01
Hersteller: Manufacturer:	Schroff SAS
Prüfungen: Tests:	Uni-axial sine sweep according GR-63-Core: 5.4.1.5 (2017) and DIN EN 60068-2-6 • Excitation Amplitude: 1 m/s^2 (X/Y/Z directions) • Frequency range: 1 - 50 Hz • Directions: successively in X, Y and Z • Reference Point: Shake Table Sensor • Sweep Velocity: 1 oct./min Uniaxial seismic test according GR-63-Core; 5.4.1 (2017) • Excitation: uniaxial • Signalform: VERTEQII, Zone 4 “highest risk areas” • Frequency range: 2 to 50 Hz (due to shaker limits) • Zero Point Accelaration: 1.6 g (1 g = 9.81 m/s^2) • Test configuration: Frame Level • Test directions: X; Y; Z • Reference Point: Shake Table Sensor
Prüfaufbau: Test setup:	• The EuT is mounted onto the ground plate similar to its normal use, with 4 screws (M12; 120Nm, class 10.9). The ground plate is fixed to the shake table with 9 screws (M16; 190 Nm, class 10.9). • Pictures from the test setup are listed on page 2. • Load washer application on M12 screw and string pots on the top of EuT in x-y directions.
Ergebnisse: Results**:**	• No functional tests were required. • There were no deformations / cracks observed. • Max. displacement X-direction: 17.2 mm; Y-direction: 18.4 mm

Head Of Component Center		**Teamleiter (Team leader)**		**Projektleiter (Project manager)**	
Dr. S. Rödling	**Date/Datum** 21.11.2022	**A. Simon**	**Date/Datum** 21/Nov/2022	**N.M Bektas**	**Date/Datum** 21.11.2022

Bilder vom Prüfaufbau / Pictures from the test setup

Figure 1: Test Setup and Measurement Points A-B; EuT rear view

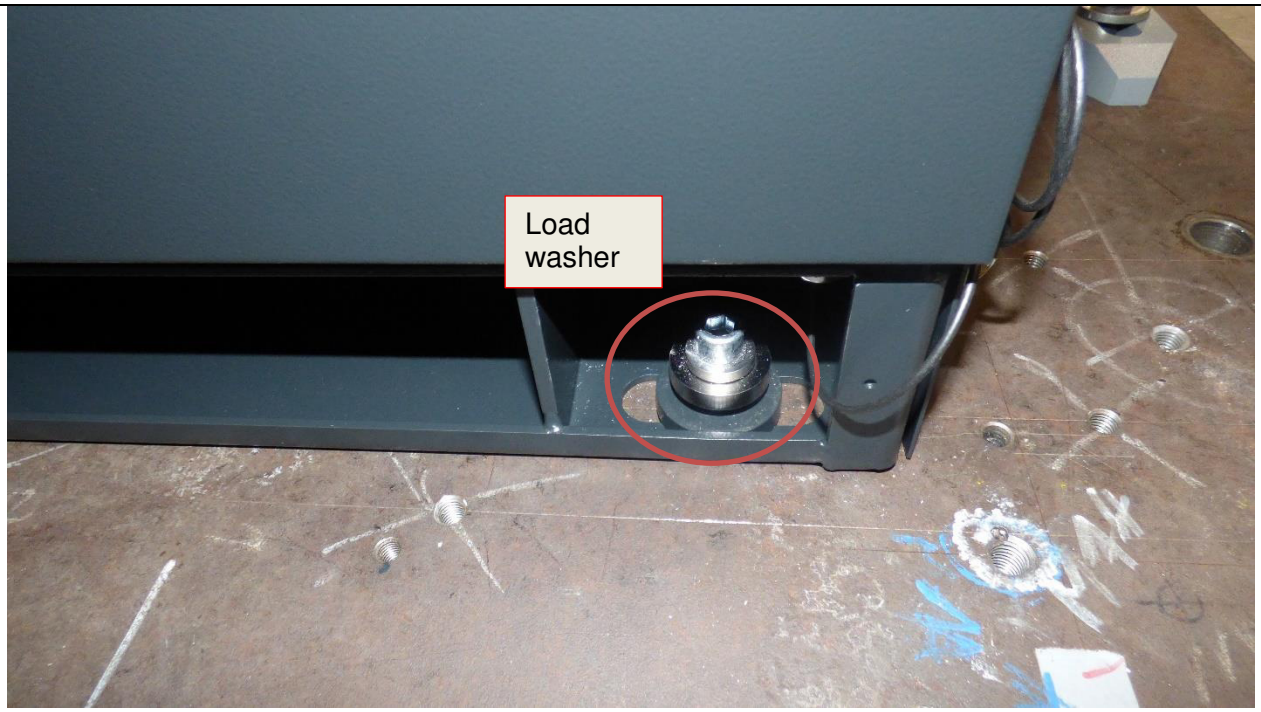


Figure 2: Load washer application

Figure 3:String-Pot Application in X-Y directions

Figure 4: The cabinet with dummy weights (see Annex for weight distribution)

Ergebnisse / Results:

- Time histories of sine sweep tests
- TRS-RRS-comparison in x-y-z-directions
  - Blue-curve: RRS X/Y/Z 130%
  - Red-curve: RRS X/Y/Z 100%
- Time histories of seismic tests in x-y-z directions; min./max. values; STS, sensor A and B, load washer and string pots

Bemerkung / Remark: Uni-axial seismic test X (test #04) is not valid, due to the malfunction of the sensor channel. This was solved, and the test was repeated, see test #05.

Sensoren und Kalibrierung / Sensors and calibration :

Serial Number	Definition	Range	Measuring Point	Next calibration
20-40440 X/Y/Z	Shake table sensor	± 100 m/s^2	Below table surface	01.2023
13-01580 X/Y/Z	Acc. Sensor “A”	± 500 m/s^2	Top left rear	01.2023
13-01581 X/Y/Z	Acc. Sensor “B”	± 500 m/s^2	Middle left rear	01.2023
20015190303	String pot SP_X	± 250 mm	Top of frame	06.2024
20015090297	String pot SP_Y	± 250 mm	Top of frame	06.2024
252610863	Load washer KMR/100 kN	0-100 kN	M12 screw between adapter plate and frame	11.2022

Anhänge (12 Seiten) / Annex (12 pages):

- Transfer functions calculated out of the sine sweep tests
- Time-history-plots of the sine sweep tests
- TRS-RRS comparison incl. time-history-plot of the shake table sensor from the seismic loads
- Time-history-plots from the seismic loads
- Customer documentation

Transfer function

Client: Schroff SAS **Test #: 01**

excitation: sine sweep X direction of measurement: X

measuring points: MP A and B

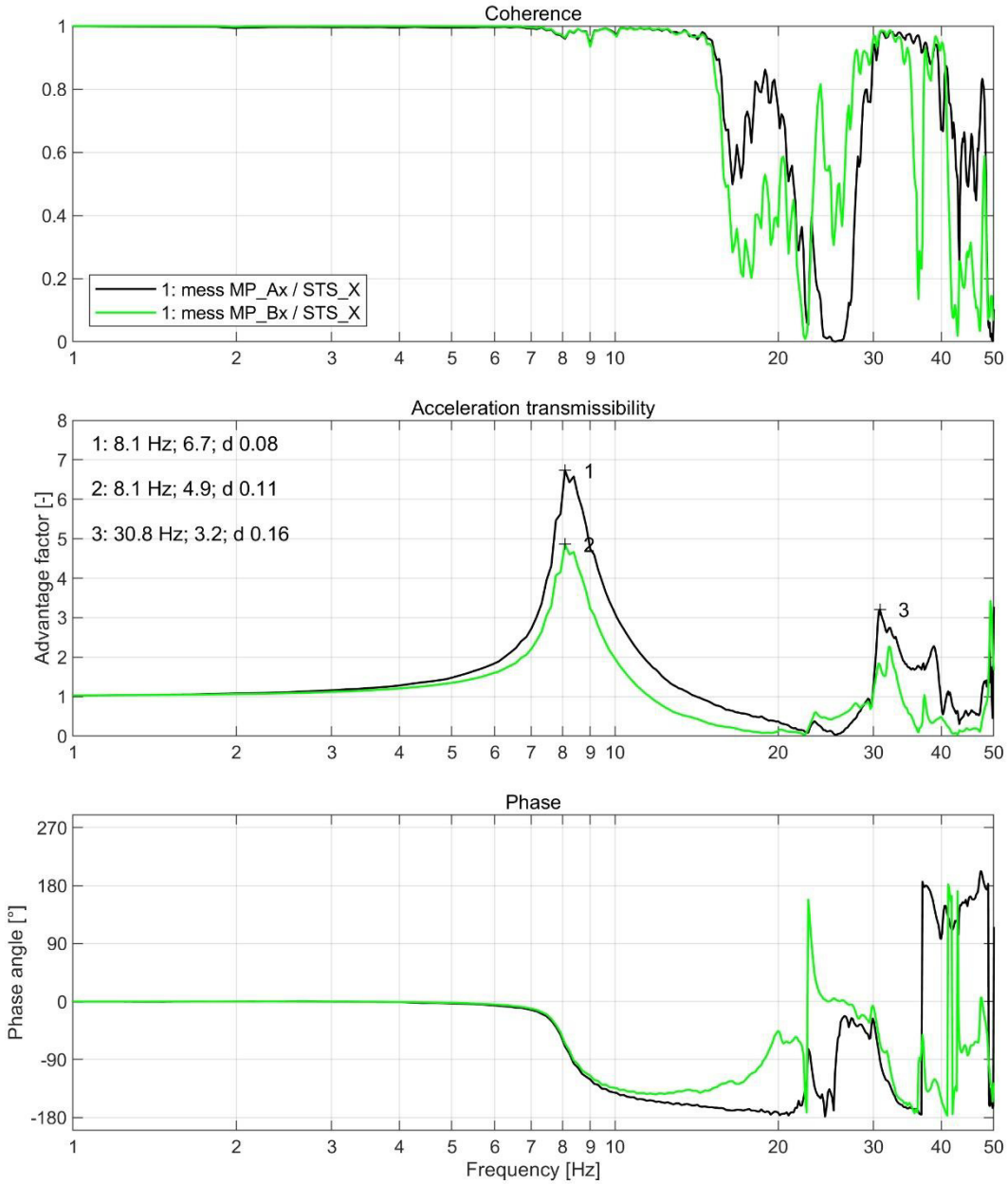


Figure 5: Transfer functions; sine sweep X; MP A and B; #01

Transfer function

Client: Schroff SAS **Test #: 02**

excitation: sine sweep Y direction of measurement: Y

measuring points: MP A and B

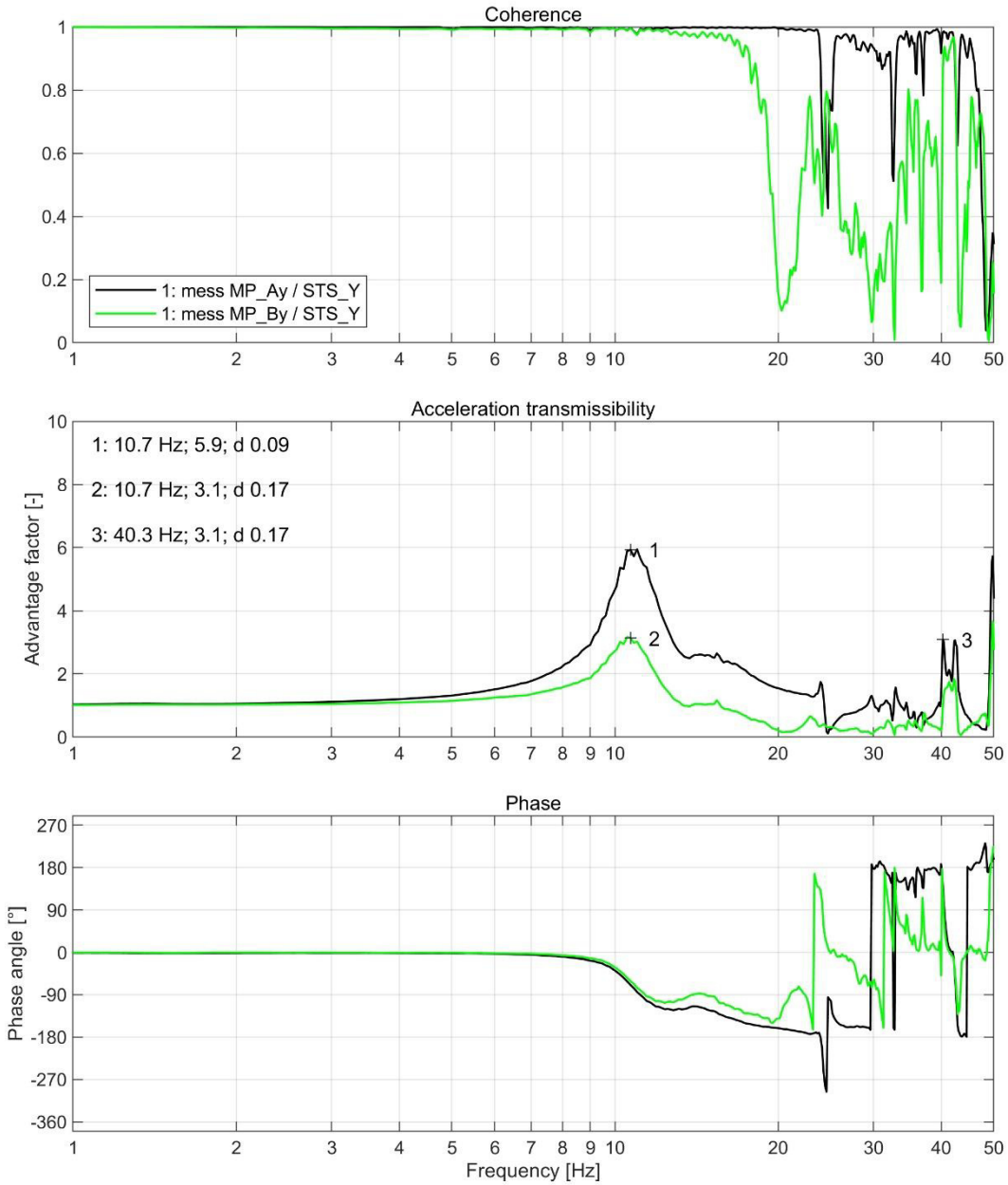


Figure 6: Transfer functions; sine sweep Y; MP A and B; #02

Transfer function

Client: Schroff SAS **Test #: 03**

excitation: sine sweep Z direction of measurement: Z

measuring points: MP A and B

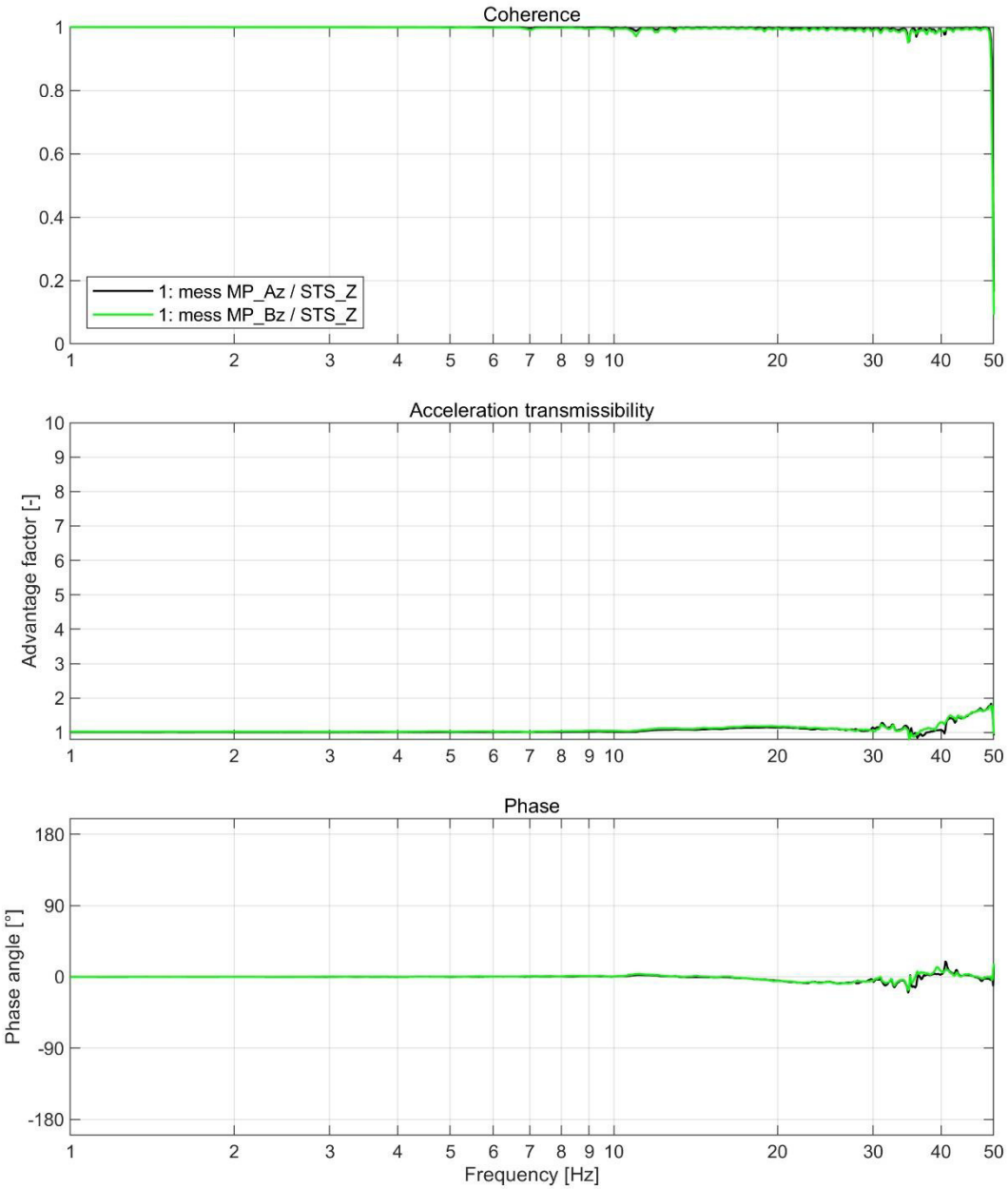


Figure 7: Transfer functions; sine sweep Z; MP A and B; #03

Measurement

Client: Schroff SAS **Test #: 01**

excitation: sine sweep test X direction of measurement: X

measuring points: STS, MP A-B

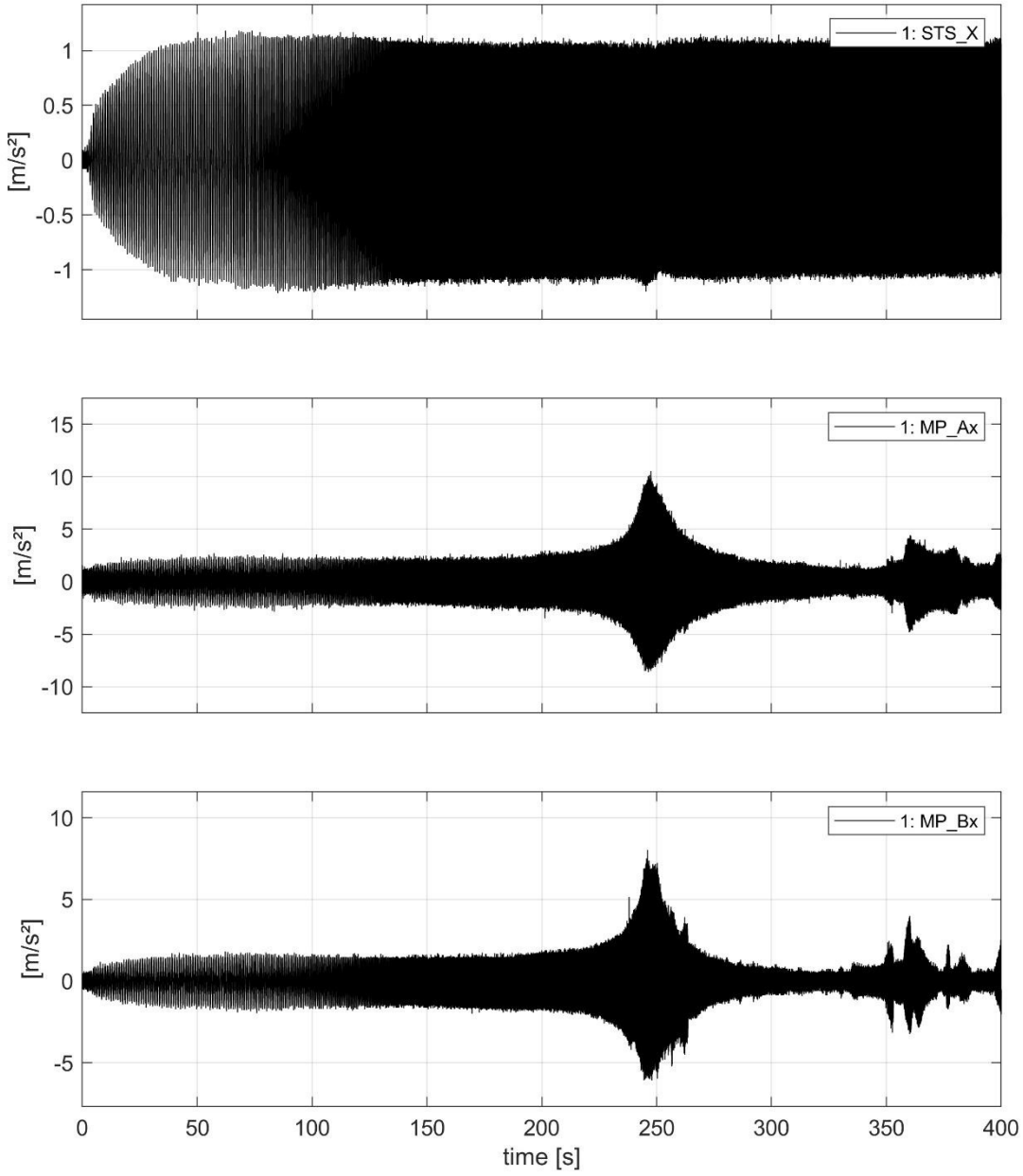


Figure 8: Sine sweep X direction; time-histories; STS and MP A and B; #01

Measurement

Client: Schroff SAS **Test #: 02**

excitation: sine sweep test Y direction of measurement: Y

measuring points: STS, MP A-B

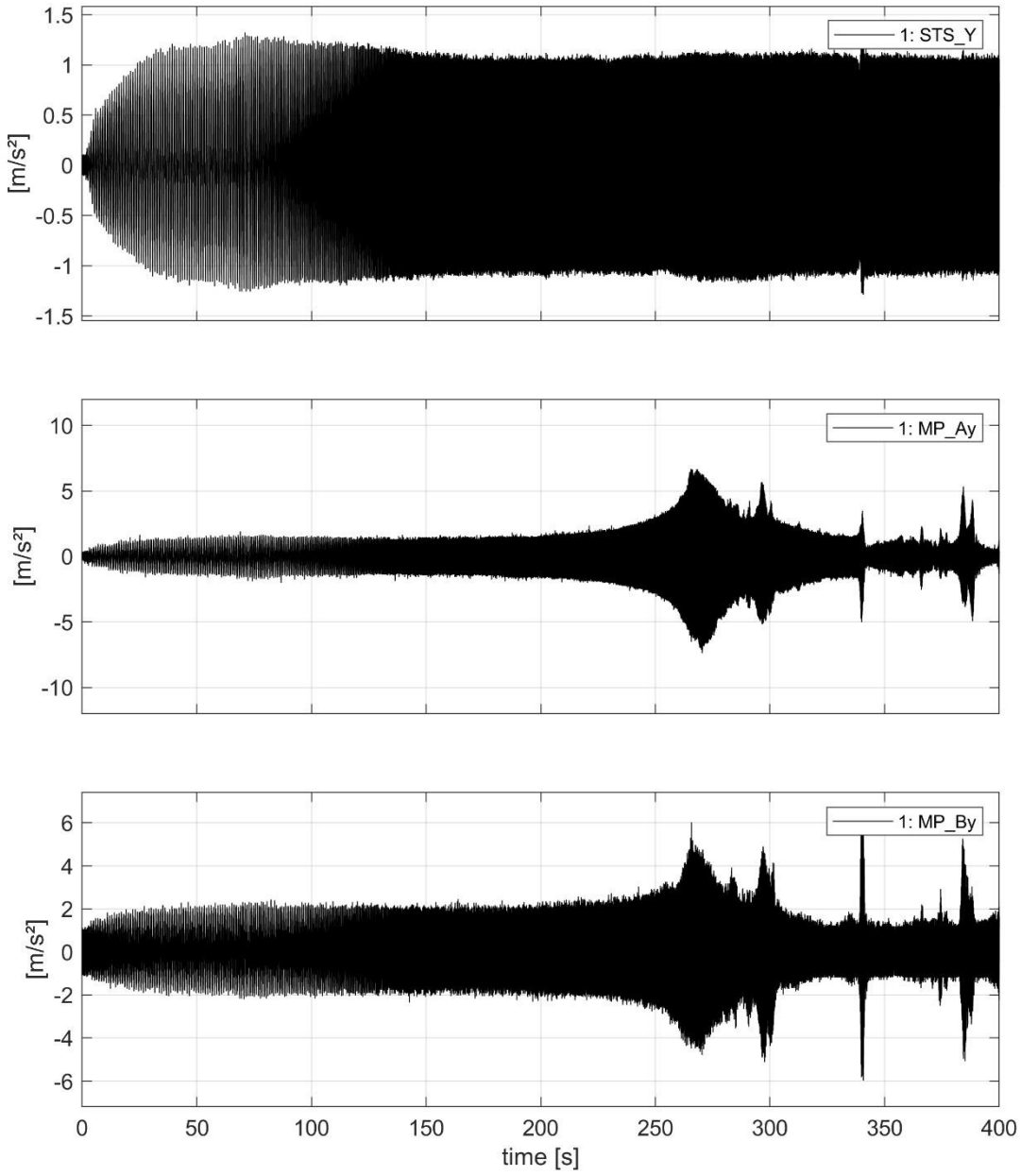


Figure 9: Sine sweep Y direction; time-histories; STS and MP A and B; #02

Measurement

Client: Schroff SAS **Test #: 03**

excitation: sine sweep test Z direction of measurement: Z

measuring points: STS, MP A-B

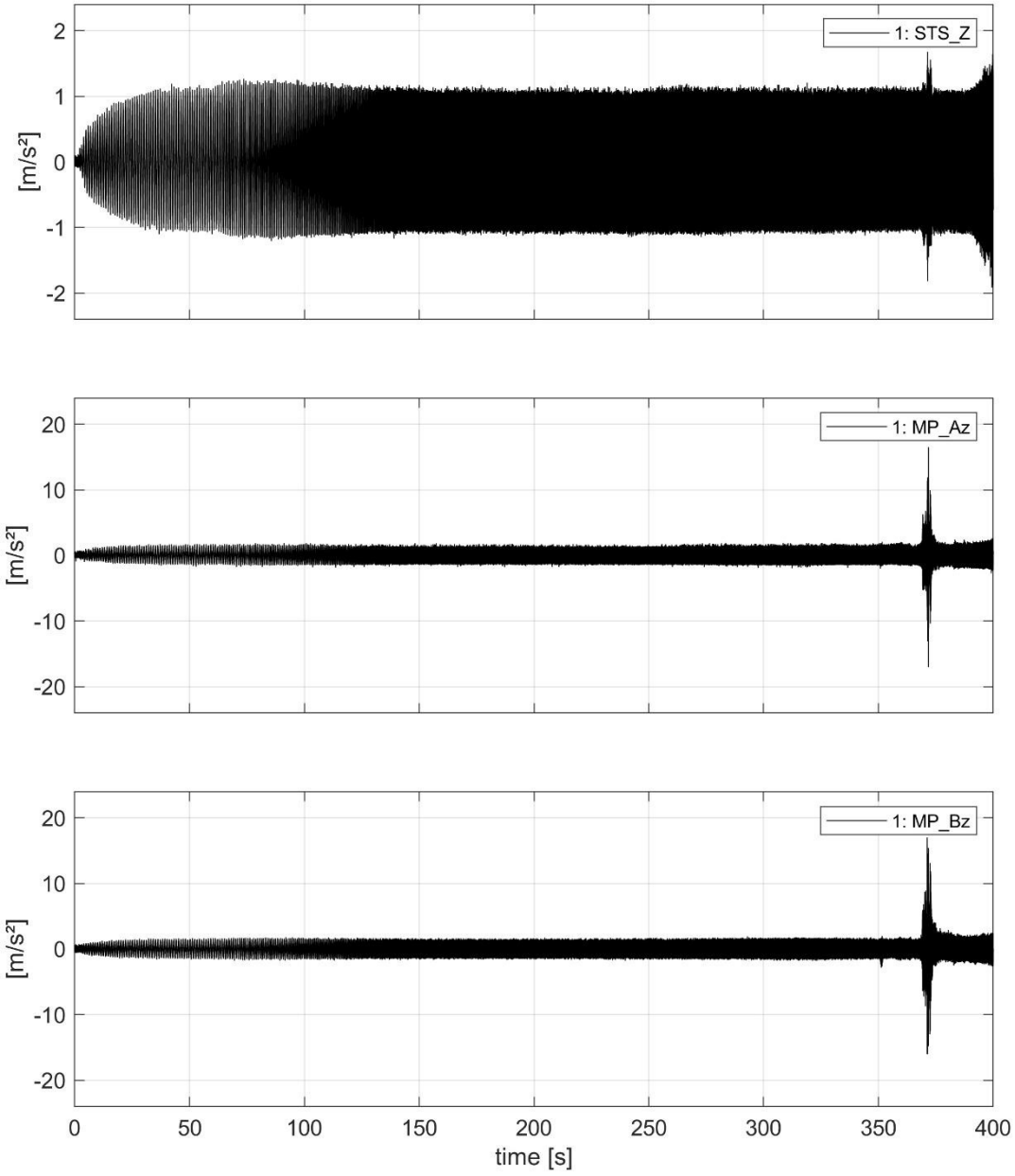


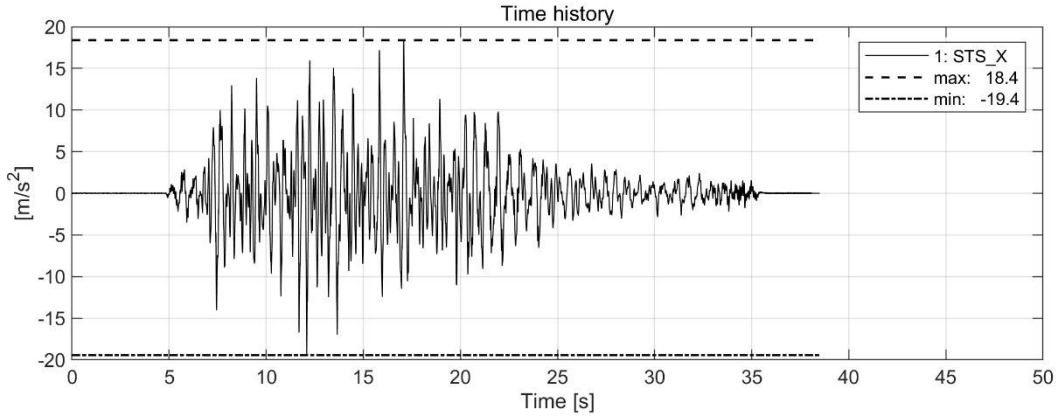
Figure 10: Sine sweep Z direction; time-histories; STS and MP A and B; #03

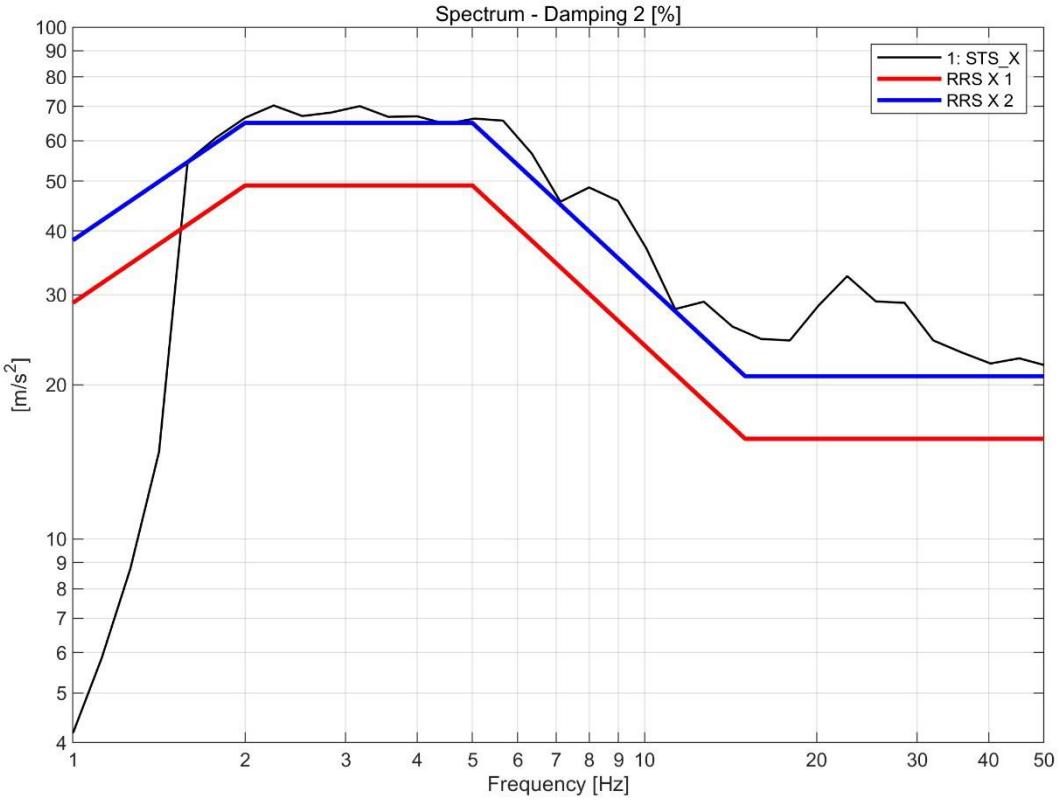
Responsespectrum

Client: Schroff SAS **Test #: 04**

excitation: uni-axial seismic X direction of measurement: X

measuring points: STS invalid





Filename: 20221011-100415_Seismik_110p_X.rpc

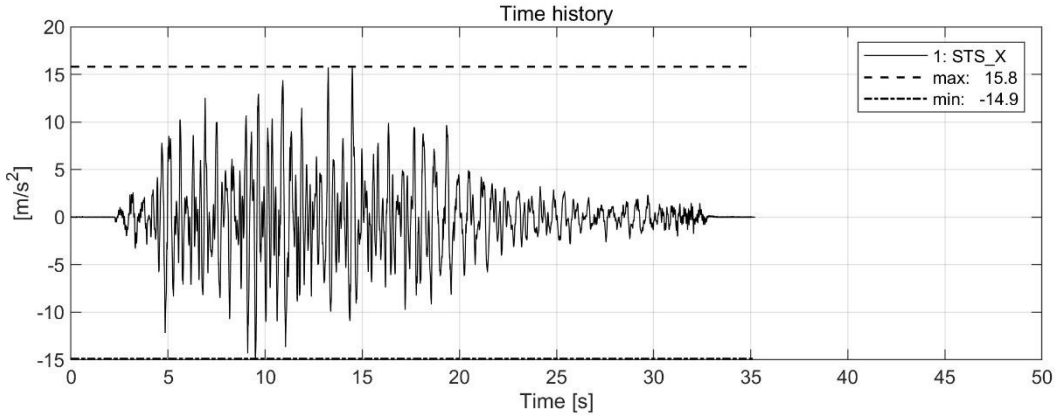
Figure 11: Seismic test X, Time-histories, min/max values and TRS-RRS; STS_X; #04, not valid

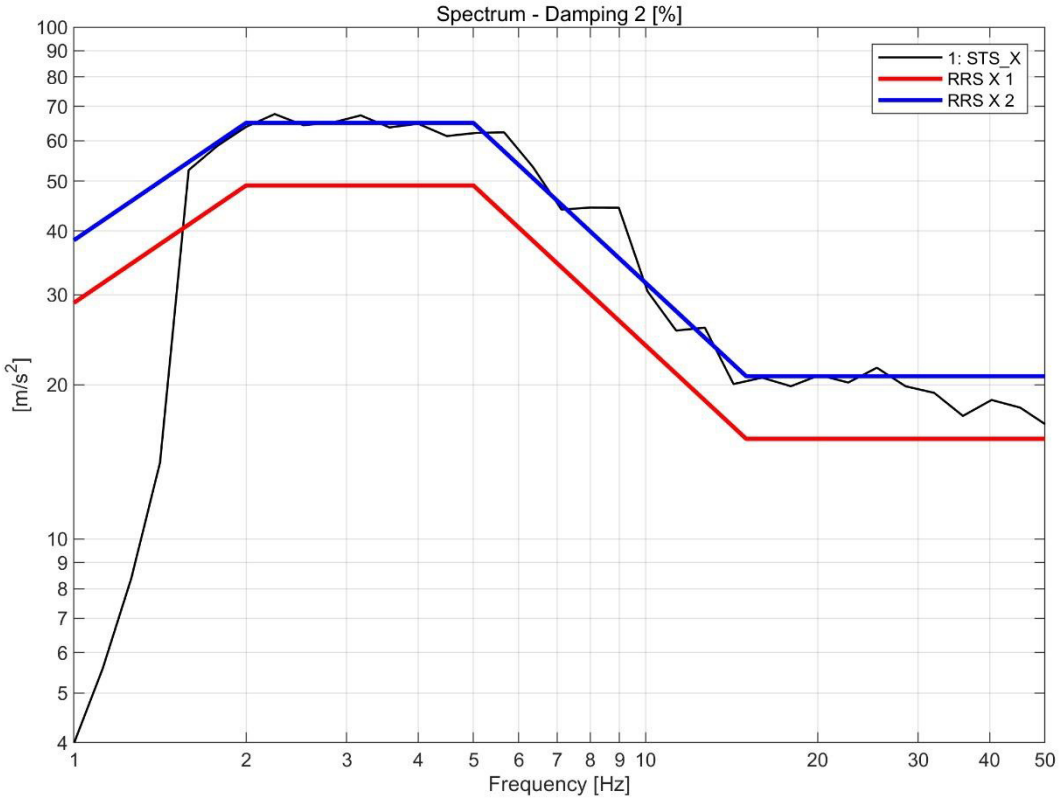
Responsespectrum

Client: Schroff SAS **Test #: 05**

excitation: uni-axial seismic X direction of measurement: X

measuring points: STS





Filename: 20221011-102758_Seismik_105p_X.rpc

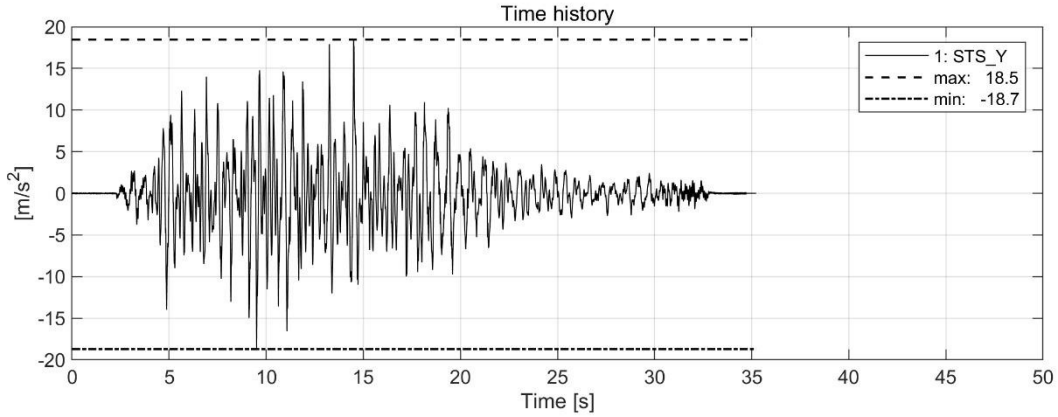
Figure 12: Seismic test X, Time-histories, min/max values and TRS-RRS; STS_X; #05

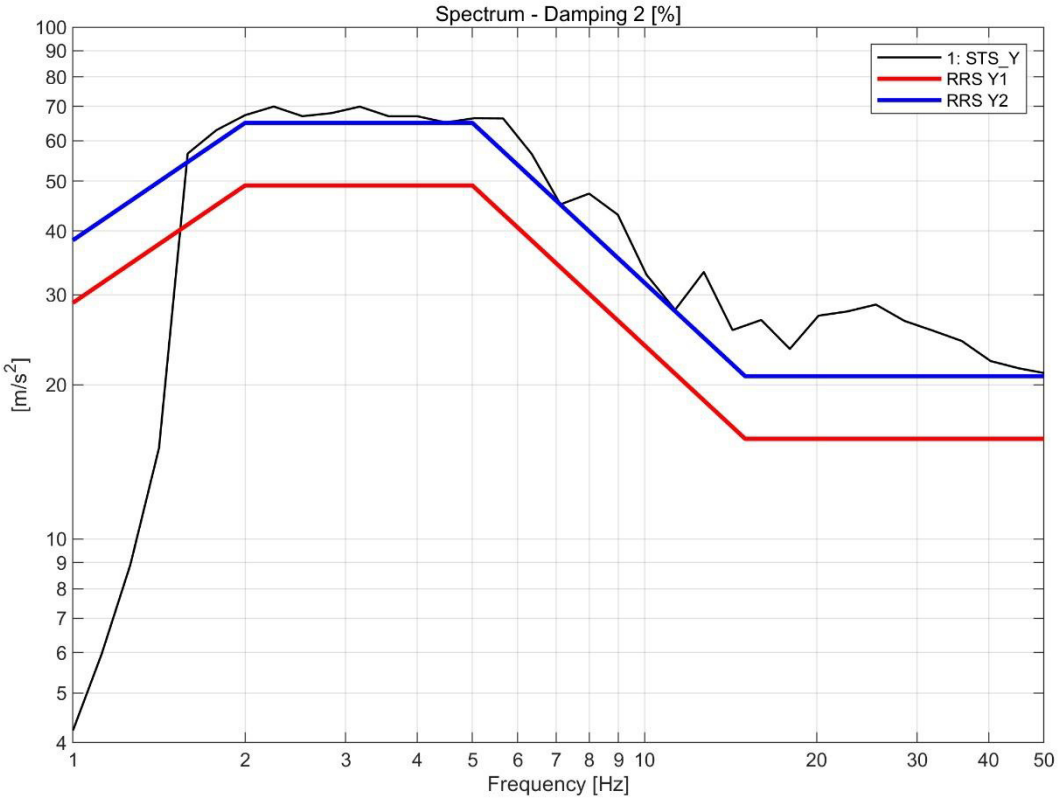
Responsespectrum

Client: Schroff SAS **Test #: 06**

excitation: uni-axial seismic Y direction of measurement: Y

measuring points: STS





Filename: 20221011-103258_Seismik_110p_Y.rpc

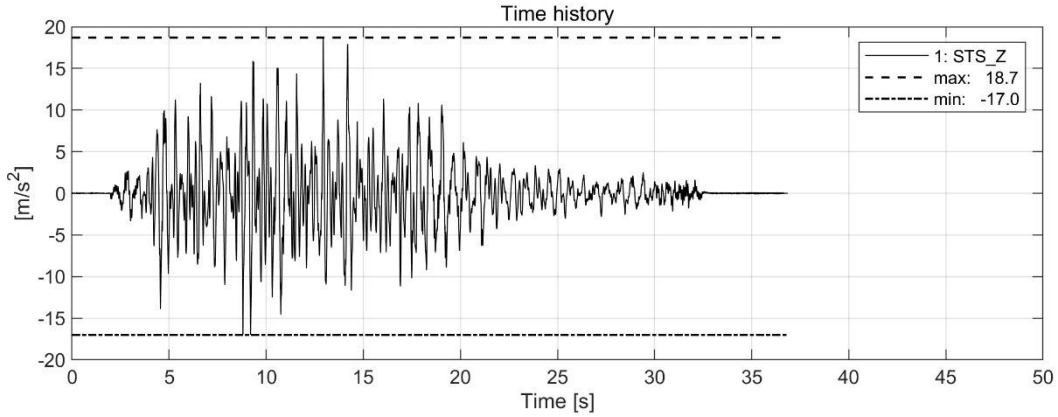
Figure 13: Seismic test Y, Time-histories, min/max values and TRS-RRS; STS_Y; #06

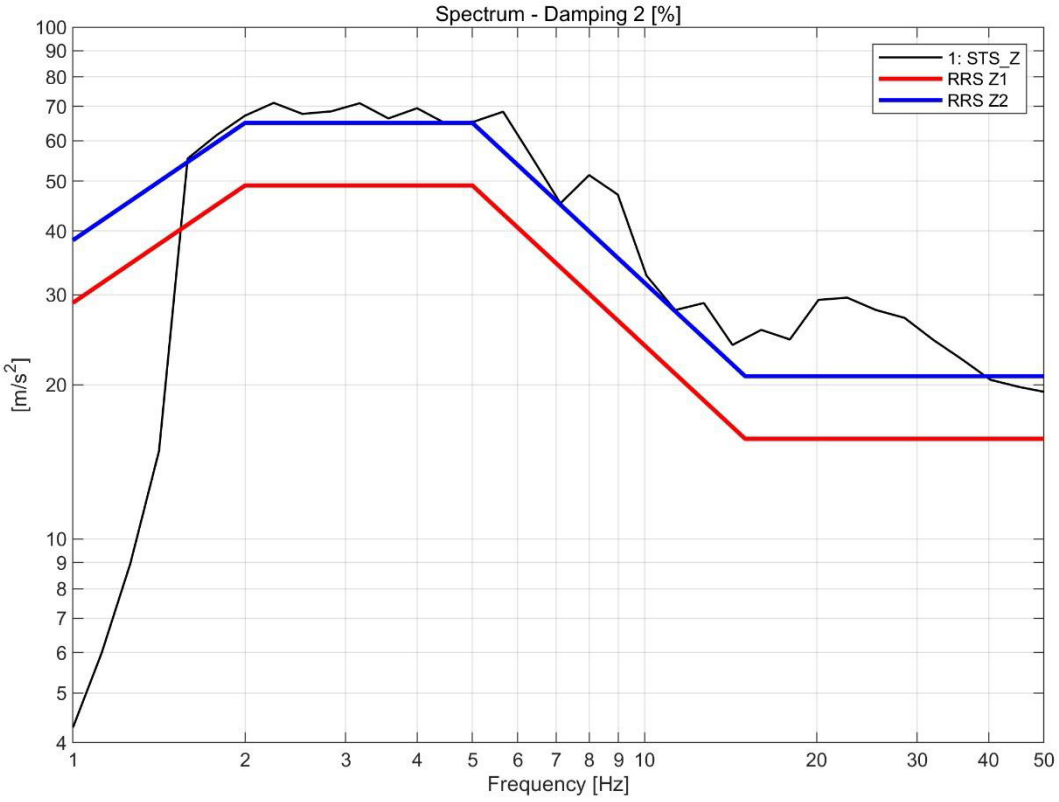
Responsespectrum

Client: Schroff SAS **Test #: 07**

excitation: uni-axial seismic Z direction of measurement: Z

measuring points: STS





Filename: 20221011-104304_Seismik_110p_Z.rpc

Figure 14: Seismic test Z, Time-histories, min/max values and TRS-RRS; STS_Z; #07

Measurement

Client: Schroff SAS **Test #: 05/06/07**

excitation: uni-axial seismic tests X-Y-Z direction of measurement: X-Y-Z

measuring points: STS, MP A-B, Load washer and string pots

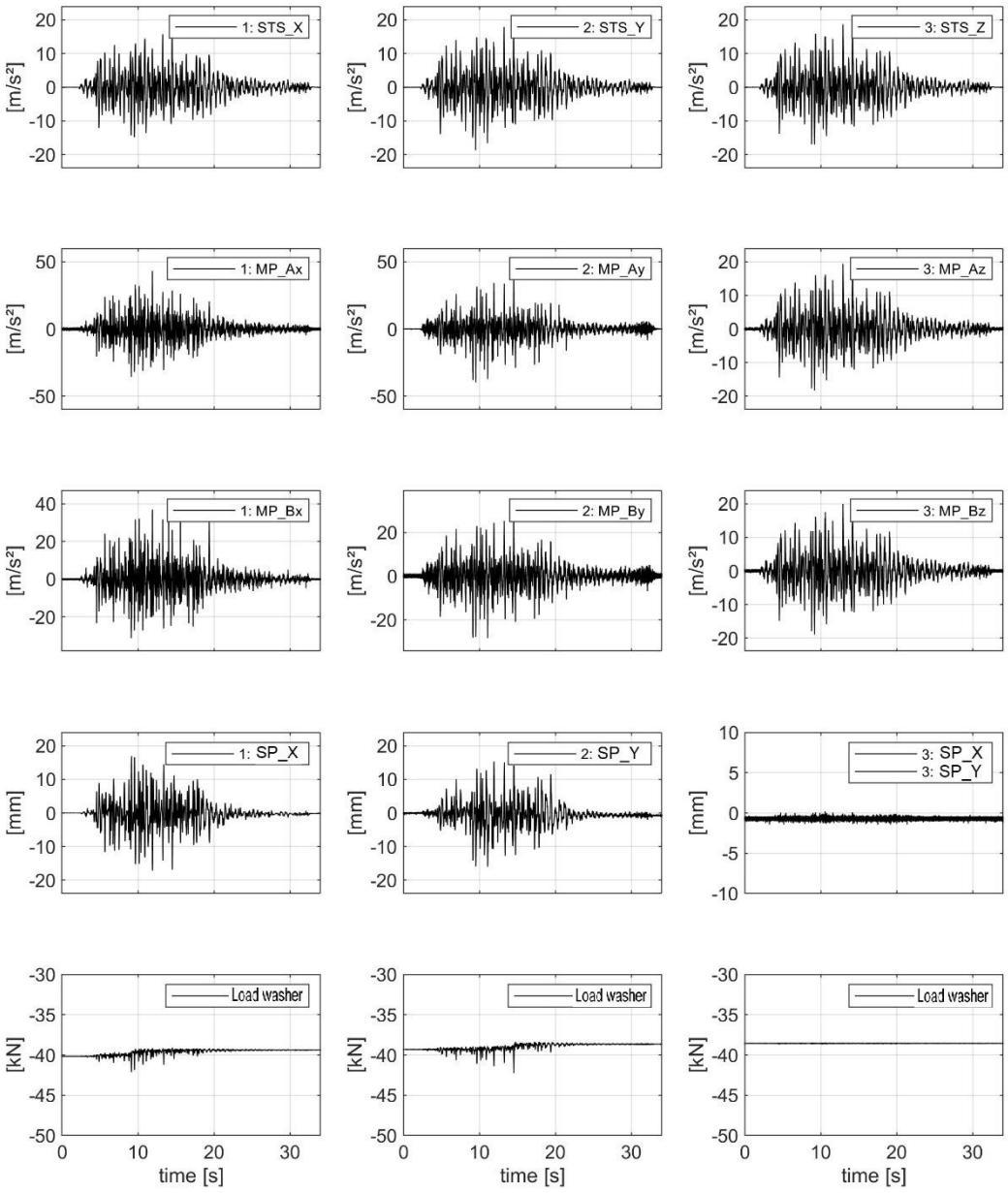
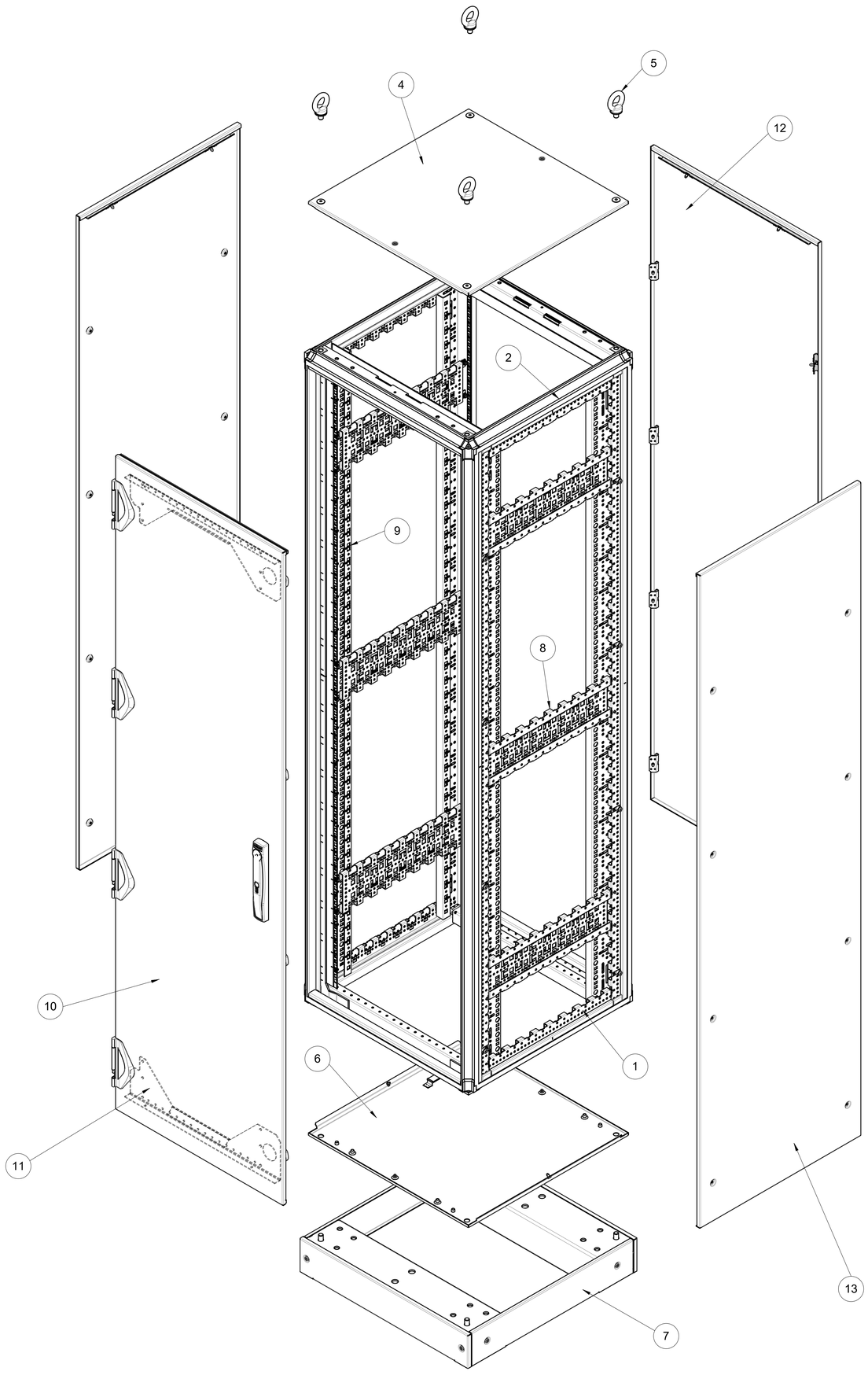
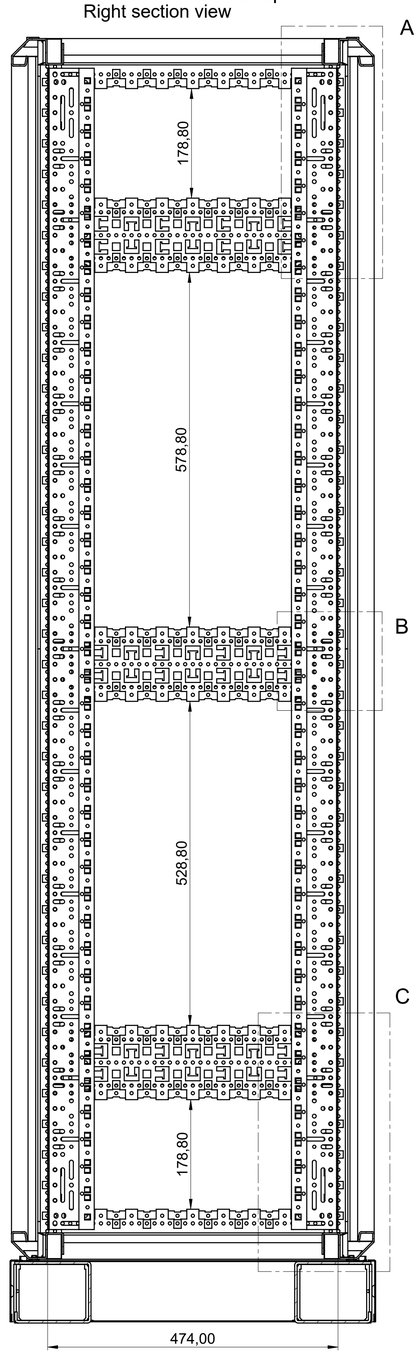


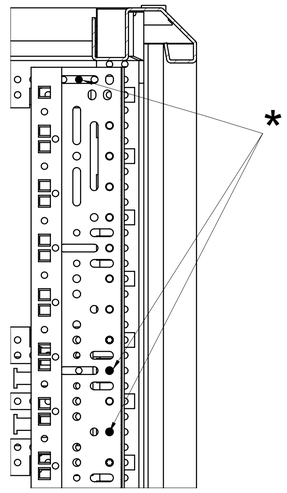
Figure 15: Seismic test X,Y and Z time-histories; STS and MP Aand B; String-pot X-Y and load washer; #05 to 07



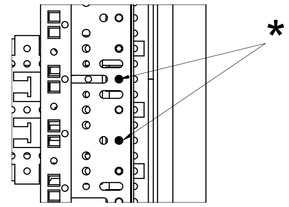
Vue de droite en coupe
Right section view



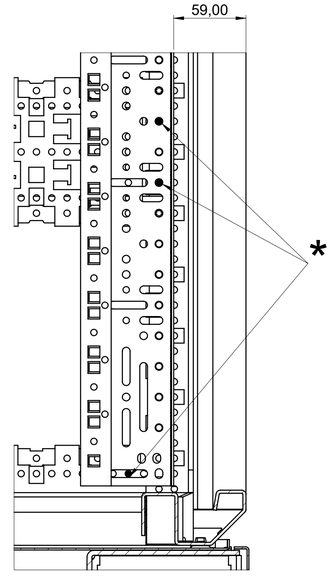
A (2 : 5)



B (2 : 5)



C (2 : 5)



NOMENCLATURE / BILL OF MATERIAL			
POS	REFERENCE	DESIGNATION / DESCRIPTION	QTE / QTY
1	2063036605	FRAME SEISMIC 42U 2000H 600W 600D	1
2	2163046405	EMC GASKETING KIT EN45545	1
3 (NON REPRÉSENTÉ / NOT SHOWN)	2463000105	EARTHING KIT 4MM²	1
4	2163055805	TOPCOVER 600W600D EMC	1
5	2463003005	LIFTING EYES M12	1
6	2163062905	BOTTOM PLATE 600W600D EMC	1
7	2163011005	PLINTH SEISMIC COVER 600W 600D	1
8	2313008105	DEPTH MEMBER 3-ROW 600D	3
9	2313003505	PAN/SLIDE MOUNT 19"42U ALZ	2
10	2163052905	FULL DOOR 2000H600W CEM	1
11	2463014305	DOOR REINFORCEMENT KIT 600W	1
12	2163055305	REAR PANEL 2000H 600W EMC	1
13	2163047405	SIDE PANEL 2000H600 EMC	1

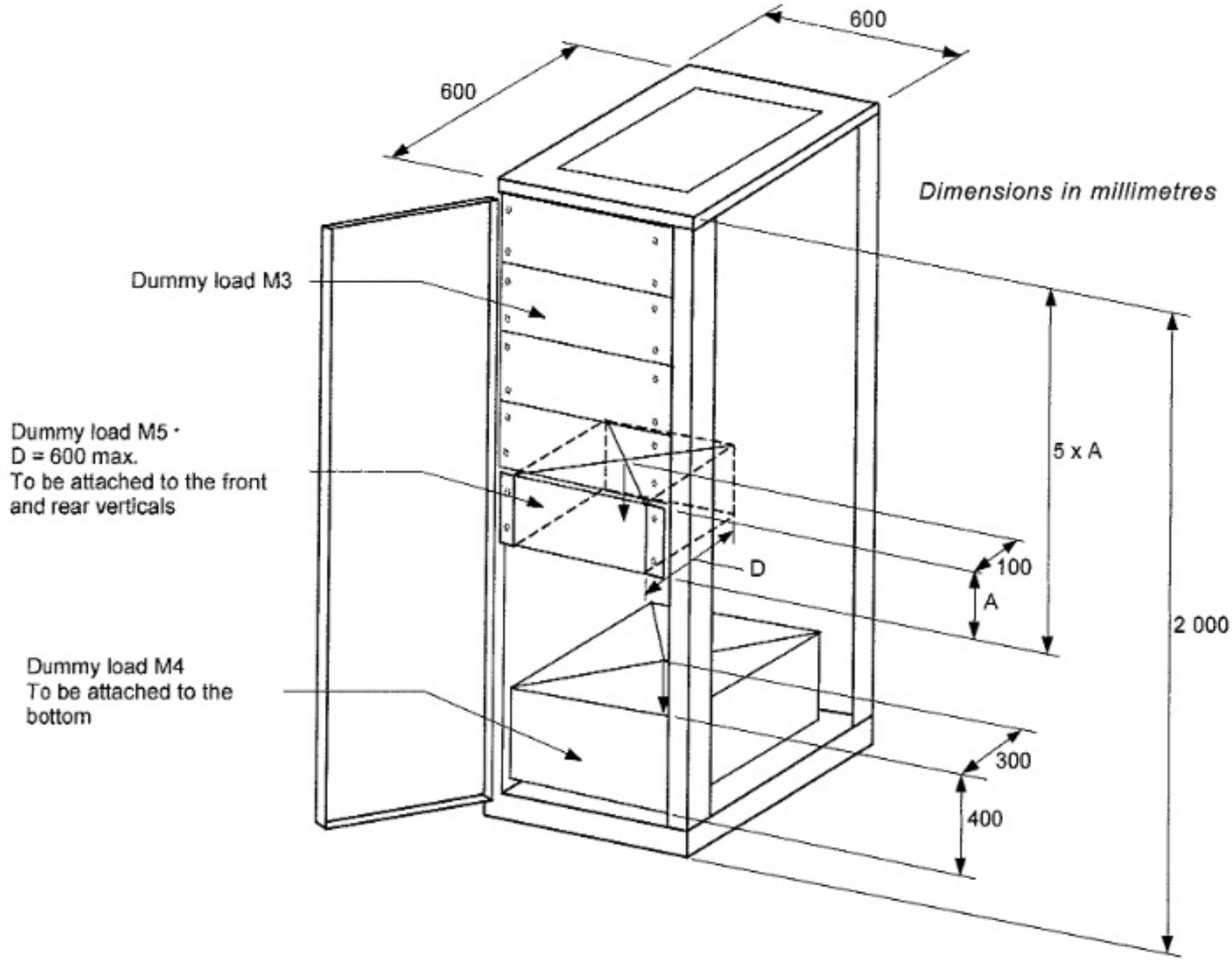
* : Points de fixation des montants 19"
: Fixing points of the 19" panel mounts

Utilisation initiale / Initial use	VARISTAR CP	Echelle / Scale	1:5	Surface / Surface	mm²	Volume / Volume	mm³
Matière / Material						Masse / Mass	- 9
Pièce de base / Basic-part					Epaisseur /Thickness		

Tolérance générale / General Tolérance ISO 2768-mK

Concep. Tol. / General tool range	Tolérances / Tolerance in mm
0.5 < X ≤ 3 mm	±0.1 mm
3 < X ≤ 6 mm	±0.1 mm
6 < X ≤ 30 mm	±0.2 mm
30 < X ≤ 120 mm	±0.3 mm
120 < X ≤ 400 mm	±0.5 mm
400 < X ≤1000 mm	±0.8 mm
1000 < X ≤2000 mm	±1.2 mm

Libérer / Approved	19/10/2022	MARCINKOW.	Désignation	VCP 42U 2000H 600W 600D CEM SISMIQUE	Dimensions en mm / Dimensioning in mm	
Norme / Conformity			Tab variante			
Vérifier / Checked	19/10/2022	MARCINKOW.	Title	VST CP 42U 2000H 600W 600D EMC SEISMIC		
Dessiner / Drawn	19/10/2022	FOJT	Tab.variants			
Index Rev.	ECO-No ECO-No	Date Date	Nom Name	No du plan Drawing no. 10630-050_BET	Page Sheet 1/1	nVent SCHROFF
A	NA			Taille du tab. Tab. Range		
				Modèle 3D / 3D-Model 10630-050_BET		
				Std Origin Item: 10630-050_BET		



A (mm)	M3 (kg)	M4 (kg)	M5 (kg)	Total load (kg)
265,9	25 × 4 positions	90	60	250