



LCIE

TEST REPORT

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Version : 01

Subject	Measurement of electromagnetic shielding effectiveness IEC 61587-3 (2013)
Issued to	Schroff SAS 4 rue du Marais 67660 BETSCHDORF France
Apparatus under test	
↳ Product	VARISTAR CP
↳ Trade mark	SCHROFF
↳ Manufacturer	nVent / SCHROFF
↳ Model under test	Varistar CP EMC Cabinet
↳ Serial number	CAB 1
Test date	July 25, 2022 to August 1, 2022
Test location	PULVERSHEIM
Composition of document	12 pages
Document issued on	August 12, 2022

Technician :
Thomas SUTTER
Tests operator

Approved by :
Thomas SUTTER
Technical manager



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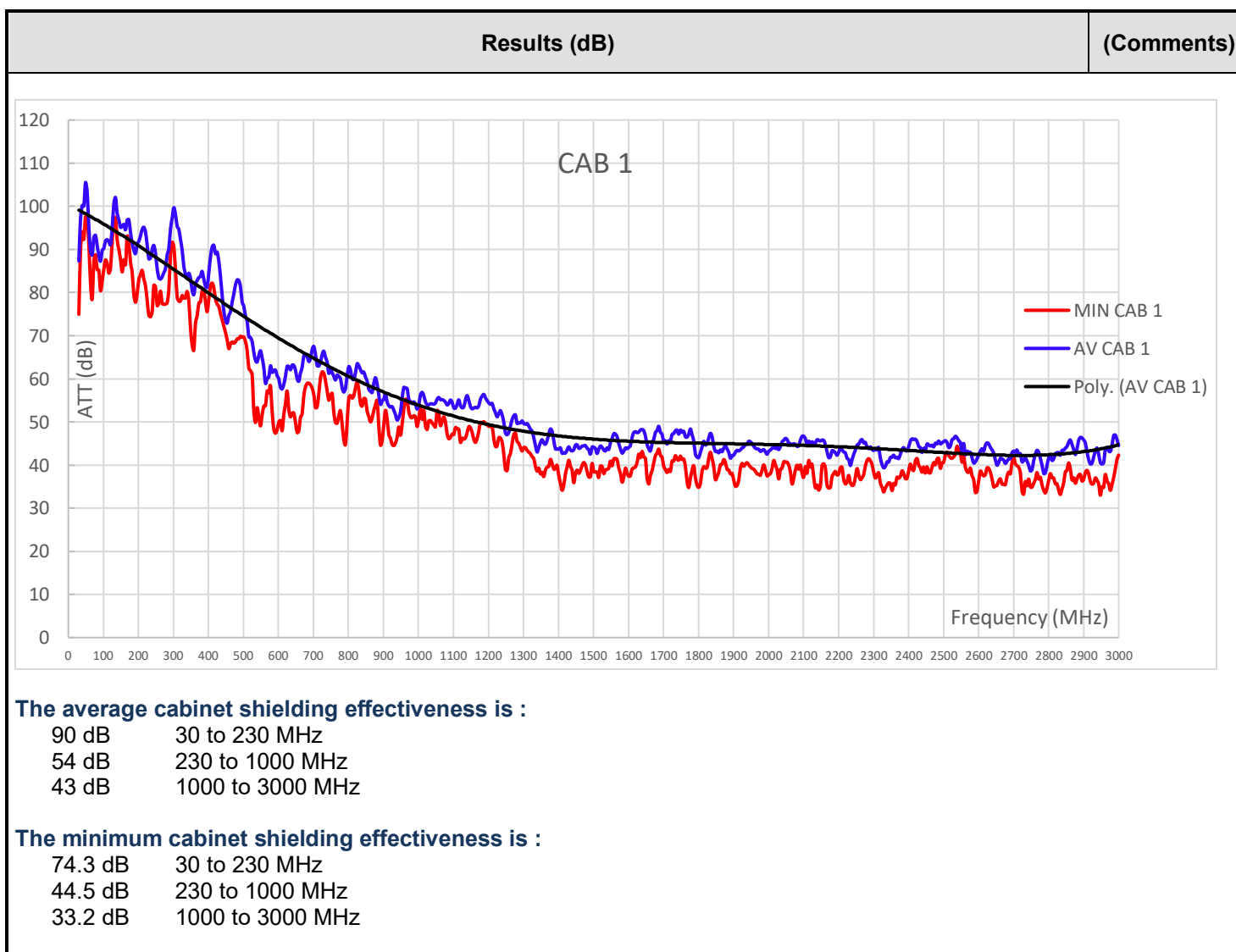
SUMMARY

1.	TEST PROGRAM	4
1.1.	Requirements for shielding effectiveness.....	4
2.	EQUIPMENT UNDER TEST : CONFIGURATION.....	5
2.1.	Information.....	5
2.2.	Hardware identification:.....	5
3.	MEASUREMENT SETUPS	6
3.1.	Environmental conditions.....	6
3.2.	Test setup.....	6
3.3.	Reference measurements	7
3.4.	Cabinet measurements	8
3.5.	Tests requirements	9
3.1.	Test equipment list	9
3.2.	EMC Laboratory uncertainty.....	9
4.	TESTS RESULTS	10
4.1.	Vertical shielding effectiveness values	10
4.2.	Horizontal shielding effectiveness values.....	11
4.3.	Combinated shielding effectiveness values.....	12

1. TEST PROGRAM

1.1. REQUIREMENTS FOR SHIELDING EFFECTIVENESS

Standard: IEC 61587-3 (2013)



2. EQUIPMENT UNDER TEST : CONFIGURATION

2.1. INFORMATION

Customer:

Name	Company
Daniel THOMAS	Schroff SAS
Christophe MARCINKOWSKI	Schroff SAS

2.2. HARDWARE IDENTIFICATION:

Equipment under test (EUT):

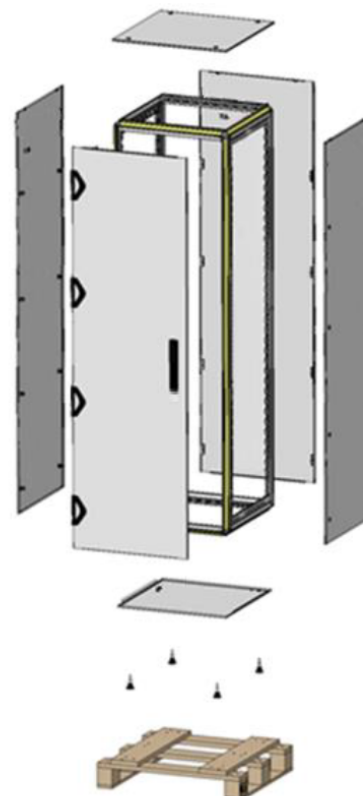
Varistar CP EMC Cabinet

Serial Number: CAB 1

CAB 1 : Varistar CP EMC cabinet

2000H600x600 cabinet as following :

- 20630-099 : Frame 2000H600x600
- 24630-016 : Levelling feet
- 21630-464 : EMC gasket kit
- 21630-474 : Side panels
- 21630-529 : Steel door
- 21630-553 : Rear panel
- 21630-558 : Flat top cover
- 21630-629 : Base plate



Equipment Under Test



3. MEASUREMENT SETUPS

3.1. ENVIRONMENTAL CONDITIONS

Date of test : July 25, 2022 to August 1, 2022
Test performed by : Thomas SUTTER
Atmospheric pressure (hPa) : 990 to 1005
Relative humidity (%) : 30 to 60
Ambient temperature (°C) : 22 to 25

3.2. TEST SETUP

The measurements are carried out in a 3 meters semi-anechoic chamber.

The transmitting antenna is in VERTICAL polarization a calibrated POD, and in HORIZONTAL polarization a double little conical antenna. The transmitting antenna is connected to the outside transmitting equipment : tracking generator out of the spectrum analyser.

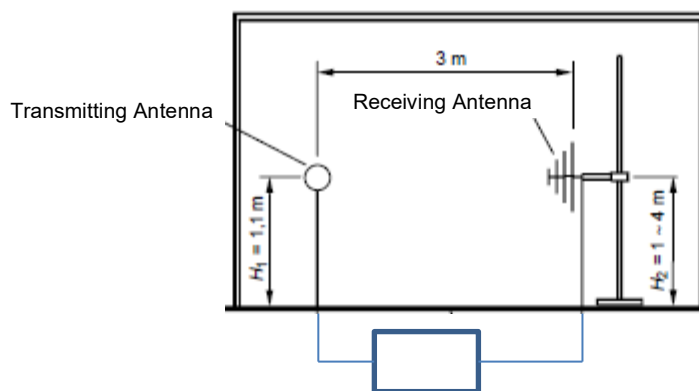
The receiving antenna is a biconical / logarithmic-periodic combined antenna for the frequency range 30 to 3 000 MHz. The signal is preamplified and sent to the input of the spectrum analyser.

3.3. REFERENCE MEASUREMENTS

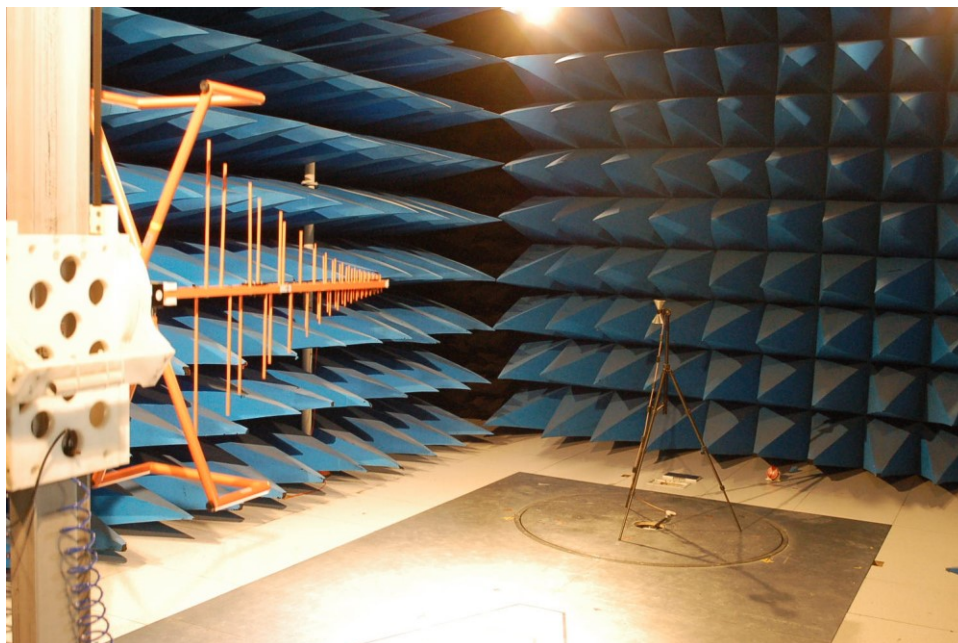
Reference measurements E1 (dB μ V) are performed without the test specimen. The antenna must be placed in the position in which it will be when the test specimen will be present. The transmitting antenna must be positioned at a distance of 3 m from the antenna of reception and the two antennas face each other in the same direction as the one for calibration.

Measurements use both horizontal and vertical polarities.

The receiving antenna is polarized in the same way. Scans in frequency follow increments not exceeding 5 MHz between 30 MHz and 3000 MHz. The receiving antenna is scanned at heights of 1 m to 4 m. The value higher E1 signal for each frequency should be recorded.

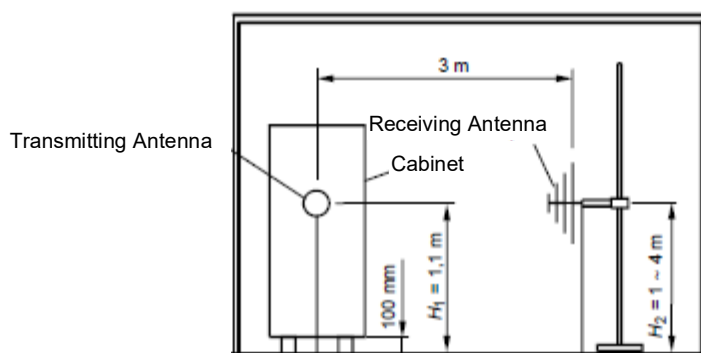


spectrum analyser in VNA mode + HF sweeper



3.4. CABINET MEASUREMENTS

The cabinet is set 10 cm above the ground on its isolating palett.
The transmitting antenna is placed centrally inside the test specimen in the same direction than that of the reference measurement and suspended by a non-conductive material.





3.5. TESTS REQUIREMENTS

Measurements are made using both horizontal and vertical antenna polarities. The transmitting antenna and the receiving antenna are polarized of the same way. Measurements of the frequency increment are made. The equipment under test is rotated 360 ° on its vertical axis (by means of a table) and the maximum value of the signal is determined by increments of 90 ° in the frequency range 30 MHz to 3000 MHz. Frequency sweeps follow increments not exceeding 5 MHz between 30 MHz and 3000 MHz. The receiving antenna is scanned at heights of 1 m to 4 m. The highest value of E2 signal (dBµV) from the combined sweep of the turntable and the antenna height is recorded for each frequency.

3.1. TEST EQUIPMENT LIST

Apparatus	Trade Mark	Type	Registration number
Semi-Anechoic room	SIEPEL	--	D3044022
Spectrum Analyzer	ROHDE & SCHWARZ	FSU26 B10	A2642063
RF Sweeper	ROHDE & SCHWARZ	SMB100A12	B2163024
Antenna	Seibersdorf Laboratories	PCD8250	C2040204
BILOG antenna	SCHAFFNER	CBL6143	C2040217
Cable	Flex	SMA 2m	A5329567
Cable	TMS	SMA 2m	A5329470
Cable	Rohde & Schwarz	N 7m	A5329474
Cable	Megaphase	N 1m	A5229722
RF Preamplifier	Mitec	0.01-6 GHz	A7085019

3.2. EMC LABORATORY UNCERTAINTY

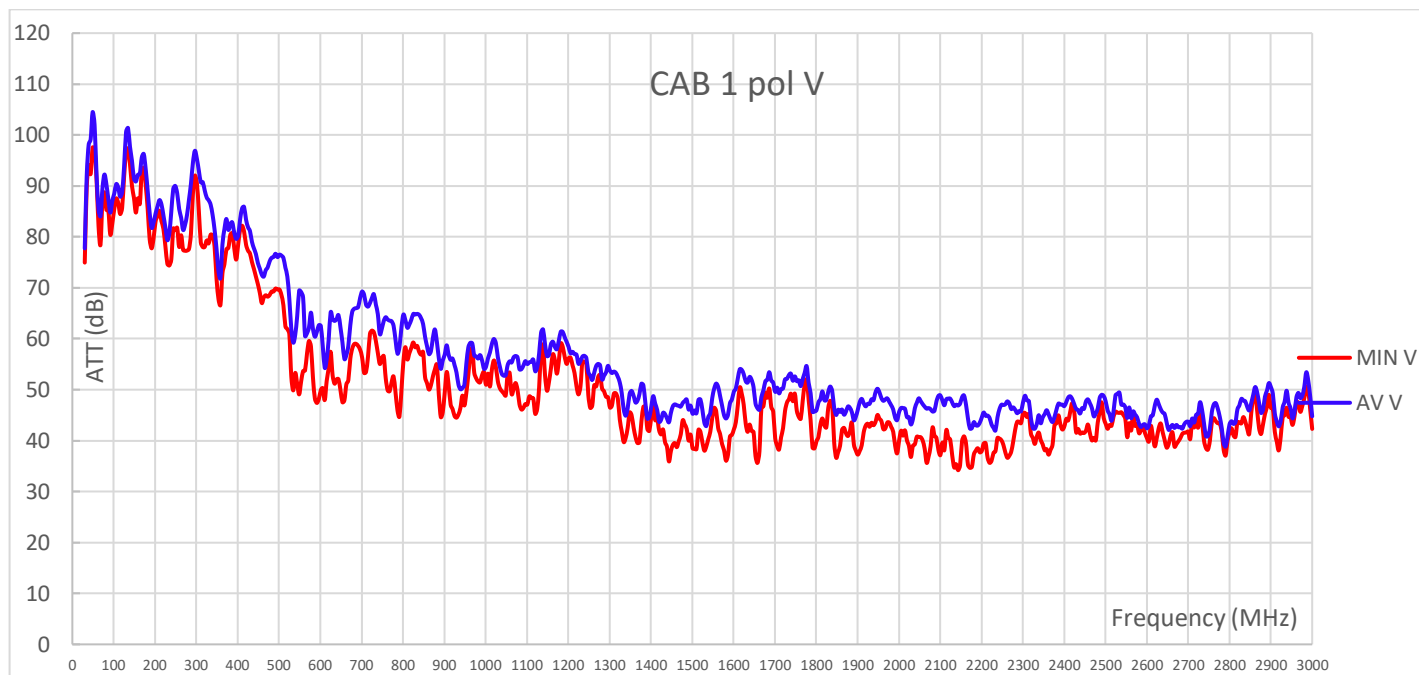
Kind of measurement	Wide uncertainty laboratory (k=2) ±x(dB)	CISPR uncertainty limit ±y(dB)
Measurement of radiated electric field from 30 to 1000MHz in horizontal position in SAC	5.26	6.3
Measurement of radiated electric field from 30 to 1000MHz in vertical position in SAC	5.33	6.3
Measurement of radiated electric field from 1 to 6 GHz cage 1 : D3044020	4.90	5.2
Measurement of radiated electric field from 1 to 6 GHz cage 2 : D3044022	5.12	5.2
Measurement of radiated electric field from 6 to 18 GHz cage 1 : D3044020	5.45	5.5
Measurement of radiated magnetic field from 10kHz to 30MHz on the OATS	4.41	/

If the wide uncertainty of the laboratory is lower or equal to CISPR limits (CISPR 16-4-2:2014), conformity or nonconformity with a limit of disturbance is thus in the following way given:

- conformity is considered reached if no measured disturbance exceeds the limit of disturbance.
- nonconformity is considered reached if any measured disturbance exceeds the limit of disturbance.

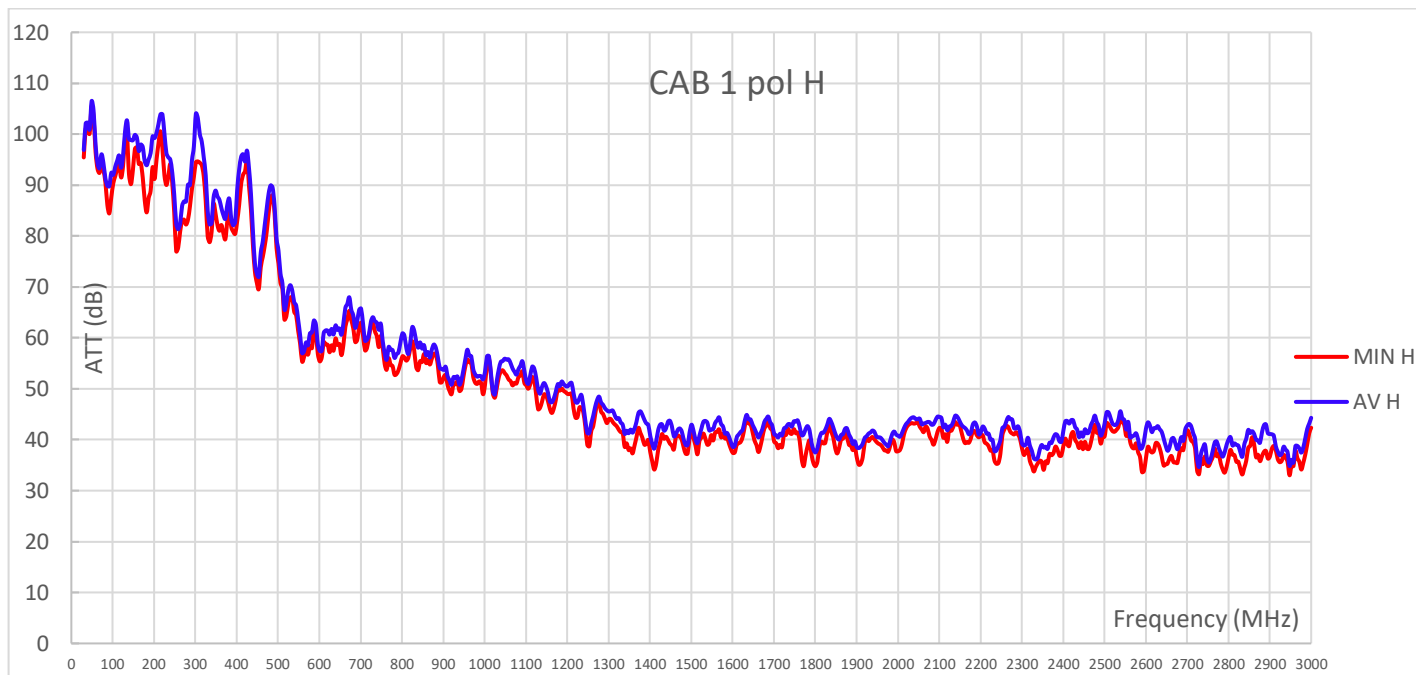
4. TESTS RESULTS

4.1. VERTICAL SHIELDING EFFECTIVENESS VALUES



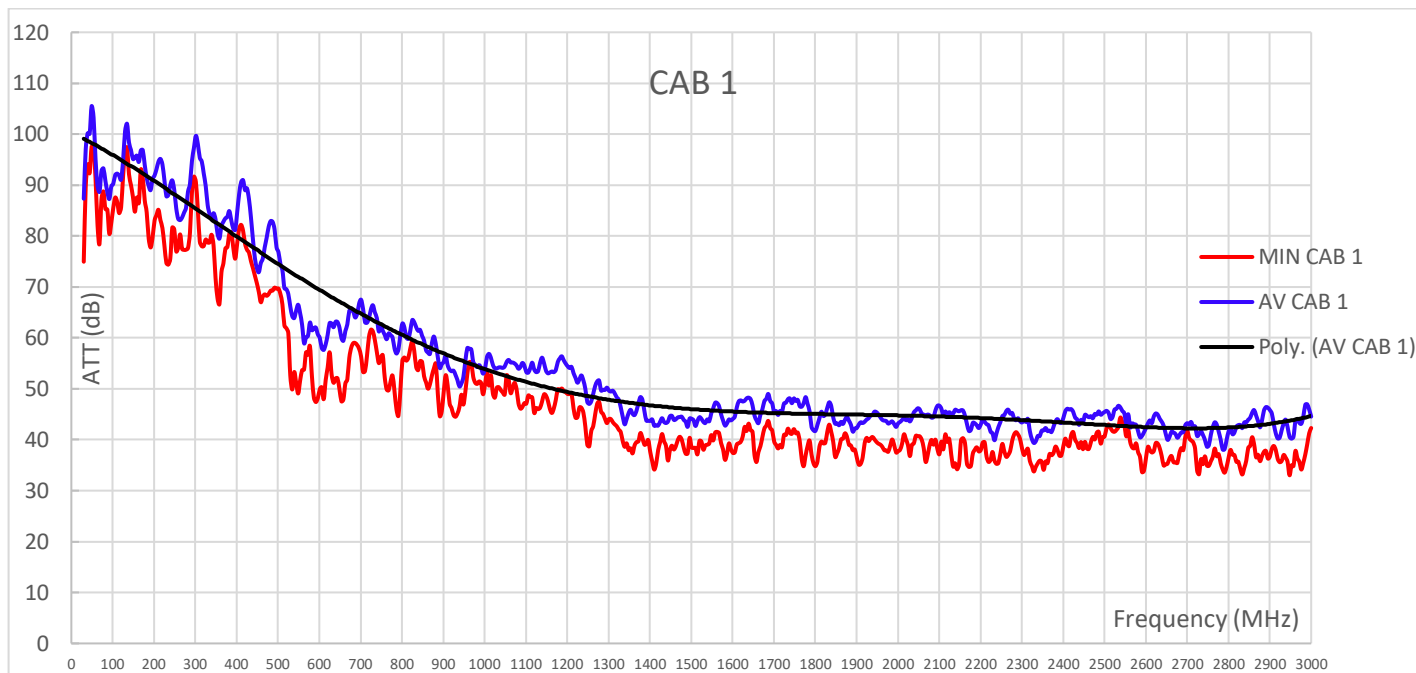
Freq. (MHz)	MIN V	AV V
30-230	74.3	77.7
230-1000	44.5	50.0
1000-3000	34.2	38.8

4.2. HORIZONTAL SHIELDING EFFECTIVENESS VALUES



Freq. (MHz)	MIN H	AV H
30-230	84.4	89.8
230-1000	48.9	50.8
1000-3000	33.2	34.6

4.3. COMBINATED SHIELDING EFFECTIVENESS VALUES



The average cabinet shielding effectiveness is :

90 dB	30 to 230 MHz
54 dB	230 to 1000 MHz
43 dB	1000 to 3000 MHz

The minimum cabinet shielding effectiveness is :

74.3 dB	30 to 230 MHz
44.5 dB	230 to 1000 MHz
33.2 dB	1000 to 3000 MHz