

## Center for Quality Engineering

### Test Report No.: T1630001

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**Order No.:** T163

**Pages:** 18

**Munich,** Sep 29, 2005

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**Client:** Schroff SAS  
R&D Cabinets and Cases

**Equipment Under Test:** Cabinet Varistar SL  
Bellcore4 - 3xATCA

**Manufacturer:** Schroff SAS

**Task:** Earthquake-Testing

**Test Specification(s):** ETSI EN 300 019-2-3 V2.2.2 (2003-04)  
[covered by accreditation] Earthquake

**Result:** The EUT was subject to the tests listed in detail in ch. 6 of this report and complies with the corresponding requirements.

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The results relate only to the items tested as described in this test report.

**approved by:**

**Date**

**Signature**

Alt  
Director 'Environmental Engineering'

Oct 11, 2005



This document was signed electronically.

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COMPONENTS TESTING ENVIRONMENTAL ENGINEERING ELECTROMAGNETIC COMPATIBILITY PRODUCT SAFETY  
TELECOM CONFORMANCE TESTS

**CONTENTS**

<b>1 Summary .....</b>	<b>4</b>
<b>2 References .....</b>	<b>4</b>
2.1 Specifications .....	4
<b>3 General Information .....</b>	<b>5</b>
3.1 Identification of Client .....	5
3.2 Test Laboratory .....	5
3.3 Time Schedule .....	5
3.4 Participants .....	5
<b>4 Equipment Under Test .....</b>	<b>6</b>
<b>5 Test Equipment .....</b>	<b>7</b>
5.1 Test Facility .....	7
5.2 Measuring Equipment .....	7
<b>6 Test Specifications and Results .....</b>	<b>8</b>
6.1 Earthquake (indoor) .....	8
6.1.1 Vibration Response Investigation .....	8
6.1.2 Earthquake Test .....	8
6.2 Test Performance .....	9
6.2.1 Vibration Response Investigation .....	9
6.2.2 Earthquake test .....	10
6.3 Test Results .....	12
6.3.1 Results Vibration Response Investigation .....	12
6.3.2 Results Earthquake Test .....	15
6.3.3 Results of Displacement measurement .....	18
6.4 Evaluation .....	18

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**LIST OF PHOTOS**

Pic. 1: Cabinet Varistar SL      Bellcore – 3xATCA .....	6
Pic. 2      Mounting of EUT Z-Axis (Vibration Response Investigation)e .....	9
Pic. 3      Mounting of EUT X-Axis (Vibration Response Investigation) .....	10
Pic. 4      Mounting of EUT X-Axis (Vibration Response Investigation)Example .....	10
Pic. 5      Measuring point – earthquake table .....	10
Pic. 6      Measuring equipment LVTD for displacement .....	11
Pic. 7      EUT mounted on the earthquake table .....	11

**LIST OF FIGURES**

Figure 6.1: Acceleration at Vibration Table (X-Axis) ..... 12  
Figure 6.2: Vibration Response at the Top of EUT (X-Axis)..... 13  
Figure 6.3: Acceleration at Vibration Table (Y-Axis) ..... 13  
Figure 6.4: Vibration Response at the Top of EUT (Y-Axis)..... 14  
Figure 6.5: Acceleration at Vibration Table (Z-Axis) ..... 14  
Figure 6.6: Vibration Response at the Top of EUT (Z-Axis)..... 15  
Figure 6.7: Acceleration at Earthquake Table (X-Axis) ..... 16  
Figure 6.8: Test Response Spectrum (X-Axis) ..... 16  
Figure 6.9: Acceleration at Earthquake Table (Y-Axis) ..... 16  
Figure 6.10: Test Response Spectrum (Y-Axis)..... 17  
Figure 6.11: Acceleration at Earthquake Table (Z-Axis) ..... 17  
Figure 6.12: Test Response Spectrum (Z-Axis)..... 17  
Figure 6.13: illustrates the displacement at top of EUT X-axis..... 18  
Figure 6.14: illustrates the displacement at top of EUT Y-axis..... 18

**LIST OF TABLES**

Table 6.1: Results - Resonance Frequencies ..... 12

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## 1 Summary

Testing was performed to determine if the EUT meets the requirements of

ETSI EN 300 019-2-3 V2.2.2 (2003-04)  
Earthquake

The table below contains a detailed list of tests performed.

Requirement acc. to ETSI 300 019	Criteria met (yes/no)	Remark
Earthquake indoor	y	

## 2 References

### 2.1 Specifications

- [1] **ETSI EN 300 019-2-3 V2.2.2 (2003-04)**  
Environmental Engineering (EE);  
Environmental conditions and environmental tests for telecommunications equipment;  
Part 2-3: Specification of environmental tests;  
Stationary use at weatherprotected locations
- [2] **IEC 60068-2-57 : 1999-11**  
Environmental testing  
Part 2-57: Tests , Test Ff: Vibration –Time-history method
- [3] **IEC 60068-2-6 : 1995-03**  
Environmental testing  
Part 2 : Tests , Test Fc: Vibration (sinusoidal)

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### 3 General Information

#### 3.1 Identification of Client

Schroff SAS  
R&D Cabinets and Cases  
Z.I.-4.Rue du Marais  
F-67660 Betschdorf  
Jacques Fischer

#### 3.2 Test Laboratory

Center for Quality Engineering  
Siemens AG  
Hofmannstraße 51  
81359 München

#### 3.3 Time Schedule

Delivery of EUT: Sep 15, 2005  
Start of test: Sep 16, 2005  
End of test: Sep 16, 2005

#### 3.4 Participants

Name	Function	Phone	E-Mail
Alfred Knier	Accredited testing	+49 89 722-48726	alfred.knier@siemens.com
Jacques Fischer	Client	0033 3 88 90 65 09	Jacques_Fischer@schroff.fr

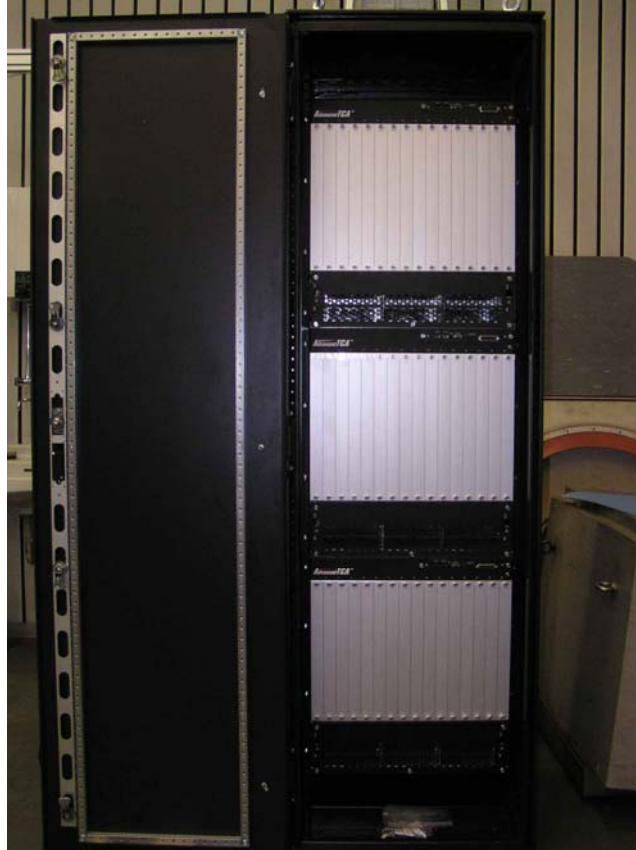
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## 4 Equipment Under Test

Cabinet Varistar SL    Bellcore – 3xATCA

Completed with 3 ATCA-shelves as dummy weights

Weight: 444Kg



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Pic. 1: Cabinet Varistar SL    Bellcore – 3xATCA

## 5 Test Equipment

### 5.1 Test Facility

The measurements were carried out in the Center for Quality Engineering: Siemens AG, Department Com CTO CQE 31, Hofmannstraße 50, 81359 München, Germany.

### 5.2 Measuring Equipment

Earthquake

ID No.	Equipment	Manufacturer	Status	Last Cal.	Next Cal.
	<b>Earthquake Test System 84A</b>				
S0353	Earthquake Test System	MTS	cnn		
S0420	Displacement Measuring Device	Schaevitz	ind		
S0896	Control System for Earthquake		cnn		
S0919	Amplifier	Endevco	cal	Jan 03, 2005	Jan 2006
S0922	Power Supply	Endevco	cnn		
S5398	Accelerometer	Endevco	cal	Feb 07, 2005	Feb 2007
S5453	Software Version 3.3A	MTS	cnn		
S5453	Software Version 2.2	MTS	cnn		
S5544	Position Transducer	National Oilwell	chk	Feb 08, 2005	Feb 2006
S5453	Software Version 2000 Prof	MTS	cnn		

cal = Calibration, car = Calibration restricted use, chk = Check, chr = Check restricted use, cpu = Check prior to use, cnn = Calibration not necessary, ind = for indication only

Resonance search

ID No.	Equipment	Manufacturer	Status	Last Cal.	Next Cal.
	<b>Vibration Test System 80A</b>				
S0795	Frequency Counter	Newport	ind		
S0854	Frequency Display	Newport	ind		
S1402	Charge Amplifier	Unholtz Dickie	cal	Feb 23, 2005	Feb 2006
S1403	Charge Amplifier	Unholtz Dickie	cal	Feb 23, 2005	Feb 2006
S1418	Paragon Mainframe	Hewlett Packard	cal	Feb 23, 2005	Feb 2006
S1419	Vibration Exciter VIB9000	RMS	cal	Feb 23, 2005	Feb 2006
S5004	Oscilloscope	Siemens	ind		
S5325	Personal Computer with VibControl/NT 2.8.0	Fujitsu Siemens	cnn		
S5449	Software Version 2.8.0	M&P	cnn		
S5082	Accelerometer	Bruel & Kjaer	cal	Dec 08, 2004	Dec 2006
S5080	Accelerometer	Bruel & Kjaer	cal	Dec 08, 2004	Dec 2006

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## 6 Test Specifications and Results

The test results in the report refer exclusively to the test object described in section 4 and the test period in section 3.3.

### 6.1 Earthquake (indoor)

ETSI EN 300 019-2-3 [2]; Stationary use at weather protected locations  
Vibration Response Investigation (clause 4.1) and Earthquake Test (clause 4.2)

#### 6.1.1 Vibration Response Investigation

Parameter	Severity	Method
Frequency range	1 to 35 Hz	IEC 60068-2-6 [3] Test Fc: Vibration
Vibration amplitude	2 m/s <sup>2</sup>	
Sweep rate	≤ 1 octave/min	

#### 6.1.2 Earthquake Test

Test	Parameter	Dim	Test severity	Duration	Reference	Method
Earthquake Time History	RRS		Table 5	30 sec	IEC 68-2-57	Ff: Time History Method
	Frequency Range	Hz	1 – 35			
	ZPA	m/s <sup>2</sup>	15			
	Axes		3			
	Damping ratio	%	2			

Table 5 Acceleration Coordinates for the RRS

Co-ordinate Point	Frequency (Hz)	Ground Acceleration (m/s <sup>2</sup> )
1	1,0	30
2	2,0	50
3	5,0	50
4	15,0	15
5	35,0	15

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## 6.2 Test Performance

The EUT were mounted to the earthquake table in its normal use position on a aluminum plate of 40mm thickness.

The test was performed in 3 mutually perpendicular axes.

horizontal longitudinal front to back = Y-axis  
 horizontal lateral = X-axis  
 vertical = Z-axis

Tests performed in normal use attitude.

### 6.2.1 Vibration Response Investigation

Before execution of the main earthquake tests a vibration response investigation (resonance search) was performed on the electro dynamic vibration system VIB 9000 in 3 mutually perpendicular axes with the following parameters:

Frequency Range:	1.5 to 35 Hz
Acceleration:	2 m/s <sup>2</sup>



Pic. 2 Mounting of EUT Z-Axis (Vibration Response Investigation)e

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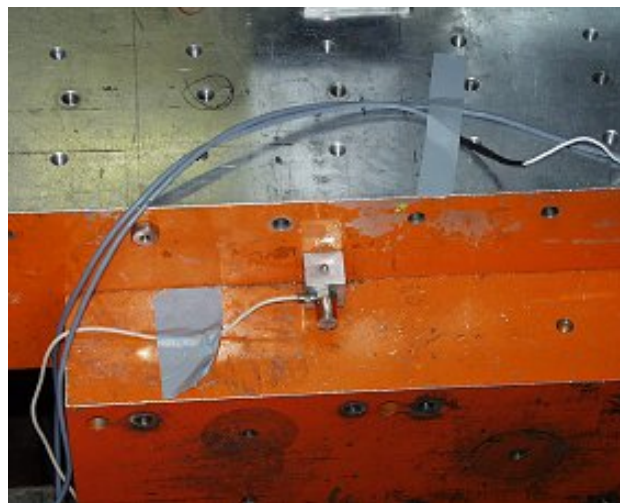
Pic. 3 Mounting of EUT X-Axis (Vibration Response Investigation)



Pic. 4 Mounting of EUT X-Axis (Vibration Response Investigation) Example

**6.2.2 Earthquake test**

Control point in direction of excitation and recording the time history over a time of 35 sec



Pic. 5 Measuring point – earthquake table

At The top of the EUT a measuring equipment were mounted to destinate displacement in sensing direction.



Pic. 6 Measuring equipment LVTD for displacement

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Pic. 7 EUT mounted on the earthquake table

**6.3 Test Results**

**6.3.1 Results Vibration Response Investigation**

The measured resonance frequencies are:

**Table 6.1: Results - Resonance Frequencies**

Axis	Frequency [Hz]
X	4.66
Y	6.5
Z	36.9

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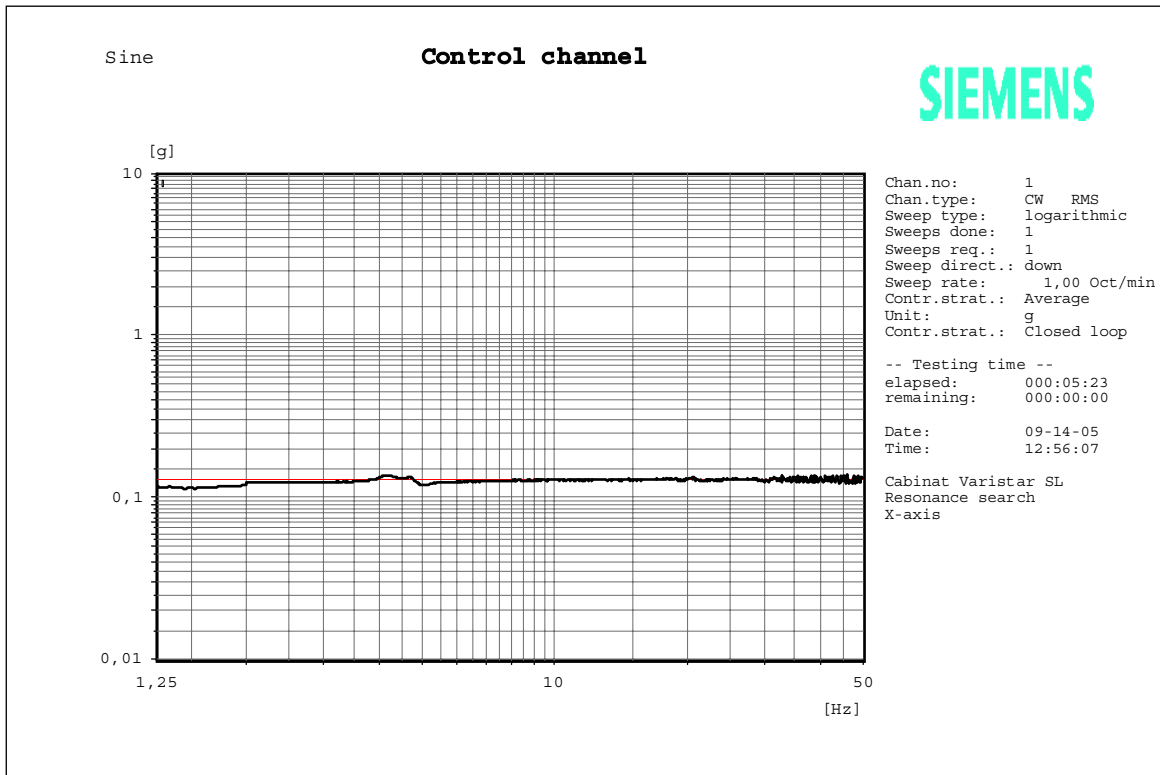


Figure 6.1: Acceleration at Vibration Table (X-Axis)

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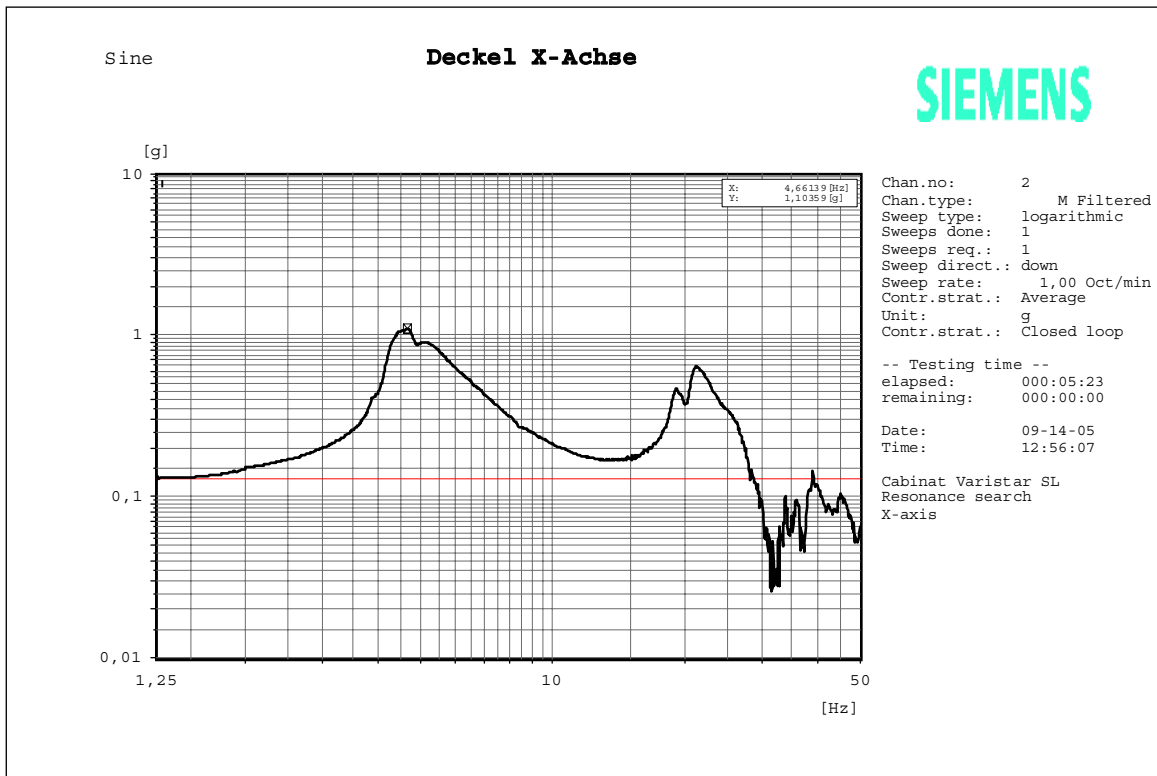


Figure 6.2: Vibration Response at the Top of EUT (X-Axis)

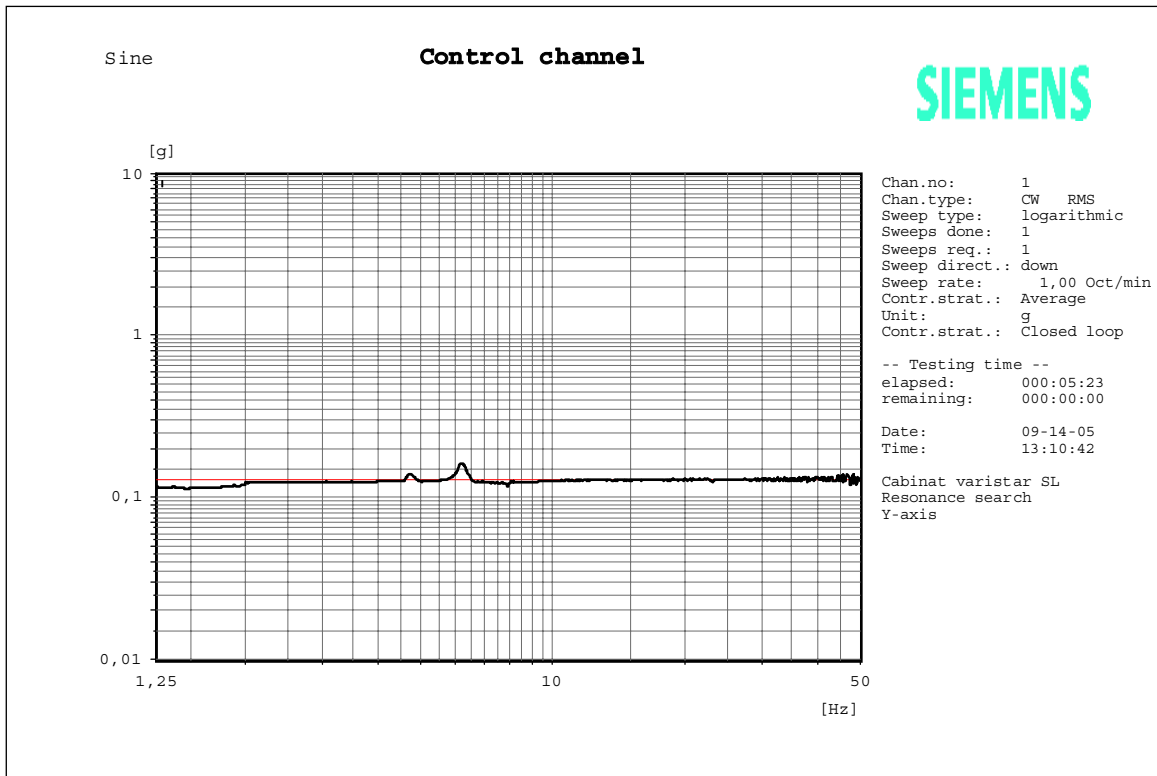


Figure 6.3: Acceleration at Vibration Table (Y-Axis)

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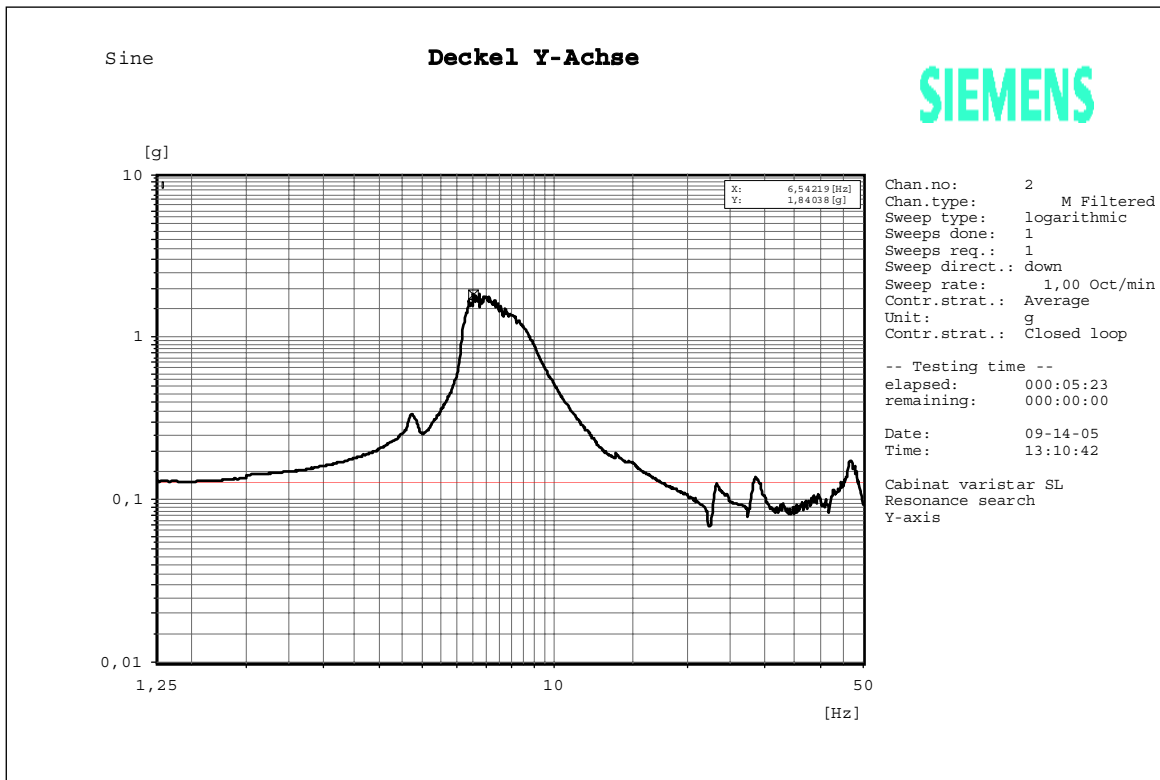


Figure 6.4: Vibration Response at the Top of EUT (Y-Axis)

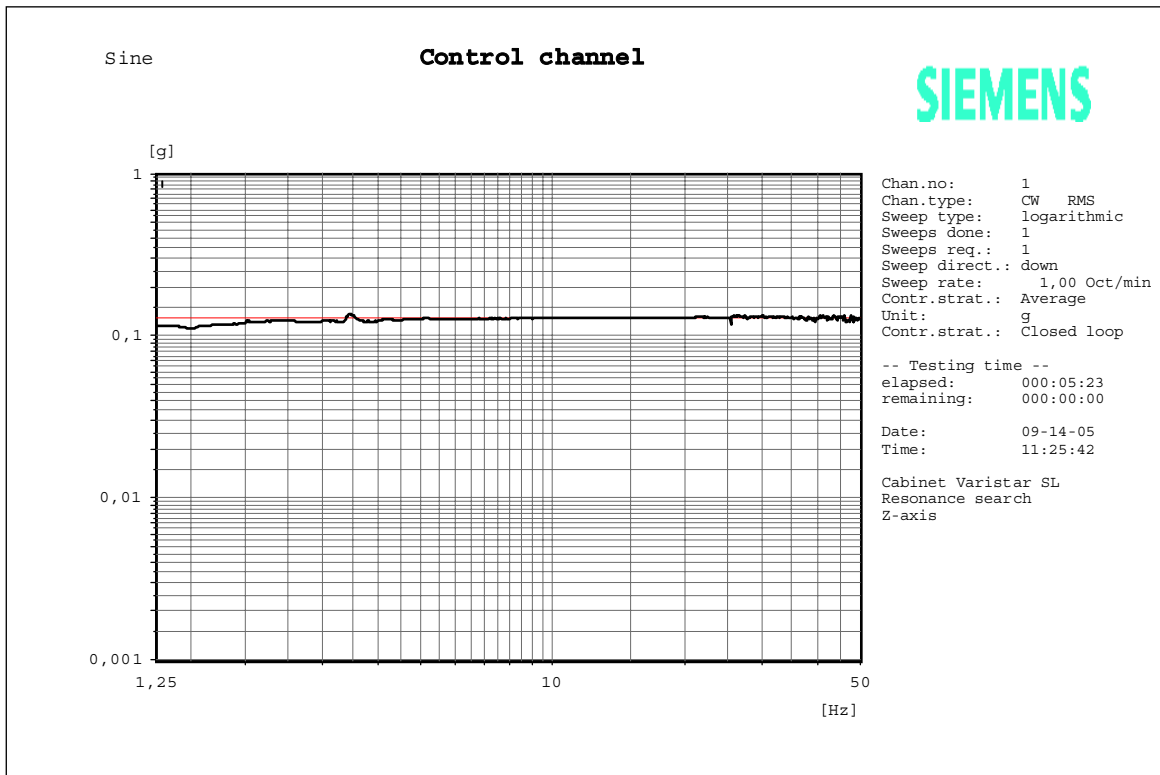


Figure 6.5: Acceleration at Vibration Table (Z-Axis)

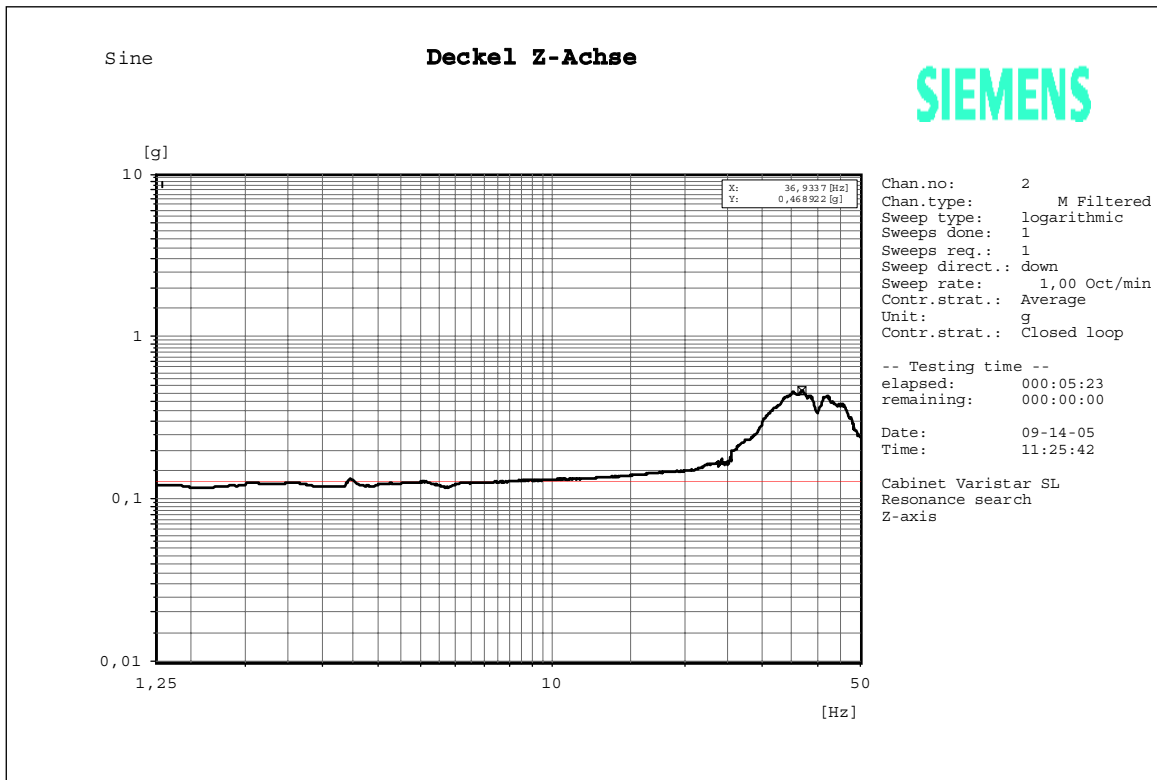


Figure 6.6: Vibration Response at the Top of EUT (Z-Axis)

### 6.3.2 Results Earthquake Test

**Result:** No mechanical deformation of the EUT could be ascertained during and after the test.

#### Earthquake TRS vs. RRS and Acceleration at EUT

The shaker table's analysed acceleration, known as Test Response Spectrum (TRS, red line), must meet or exceed the Required Response Spectrum (RRS, blue line) for the Earthquake Risk Zone 4 in the range from 1.0 to 35 Hz.

The following diagrams show the recorded plots for each axis.

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X-axis (horizontal)

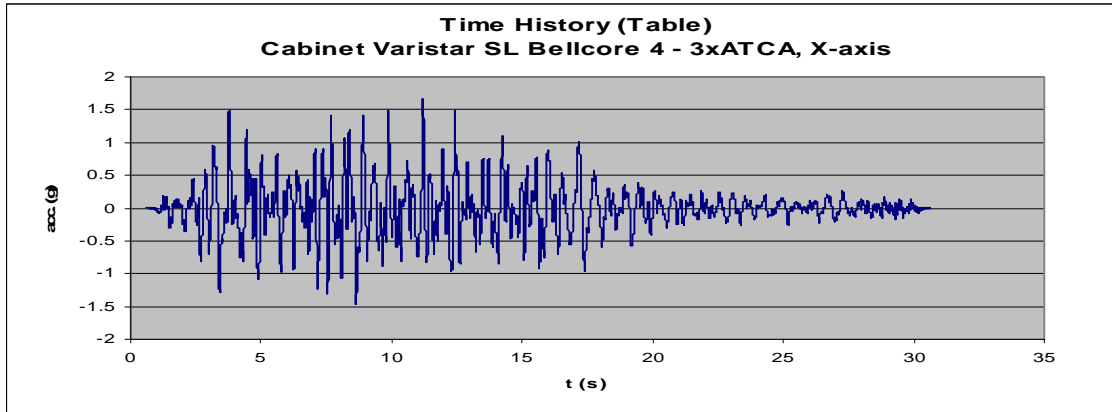


Figure 6.7: Acceleration at Earthquake Table (X-Axis)

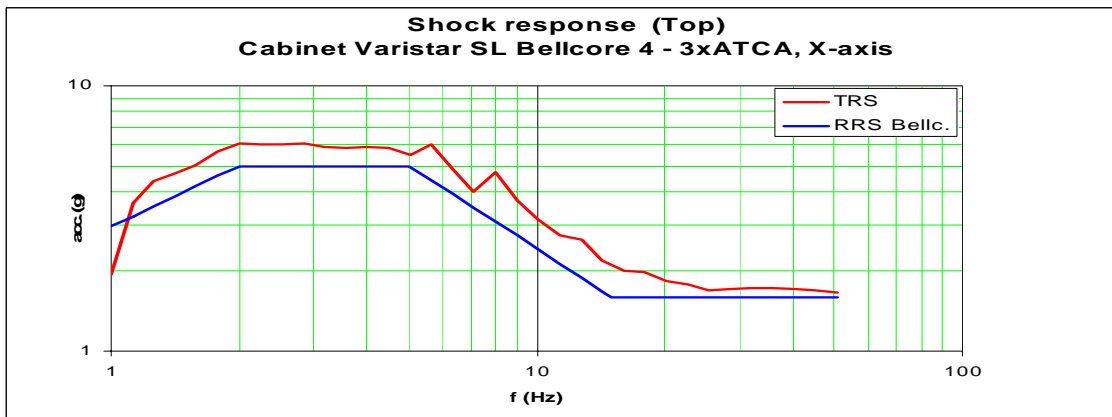


Figure 6.8: Test Response Spectrum (X-Axis)

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Y-axis (horizontal)

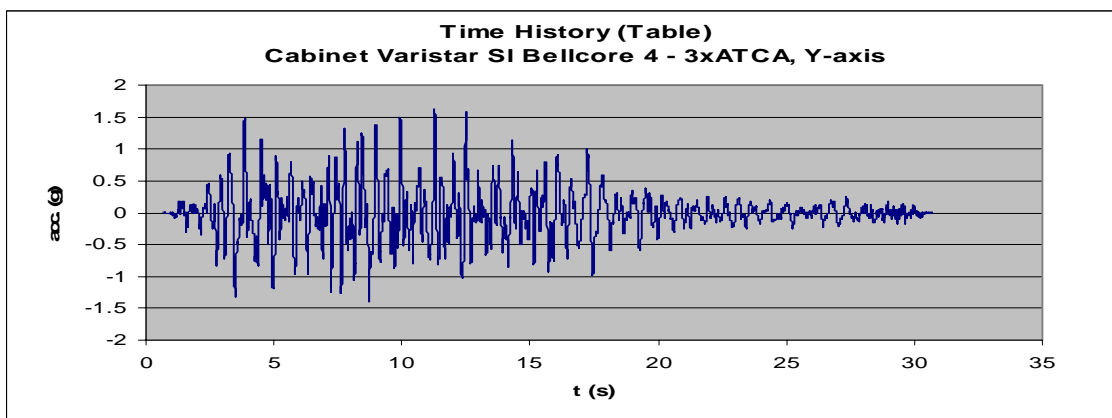


Figure 6.9: Acceleration at Earthquake Table (Y-Axis)



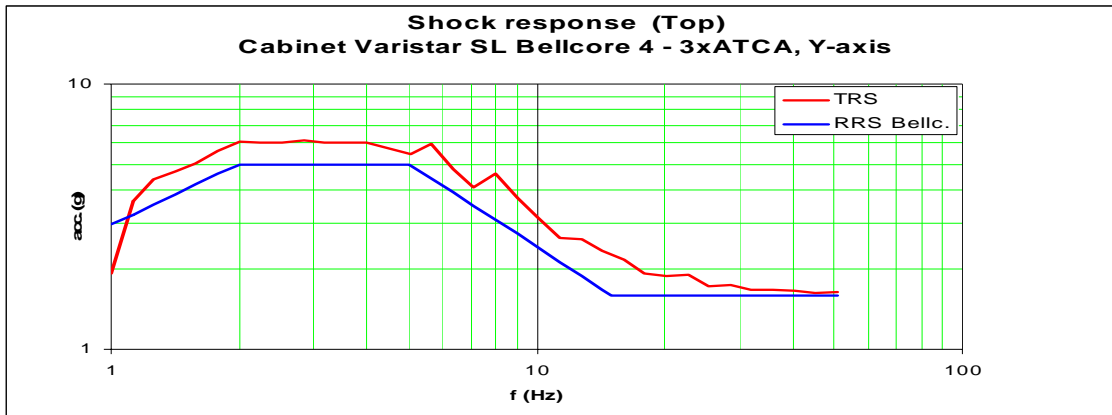


Figure 6.10: Test Response Spectrum (Y-Axis)

Z-axis (vertical)

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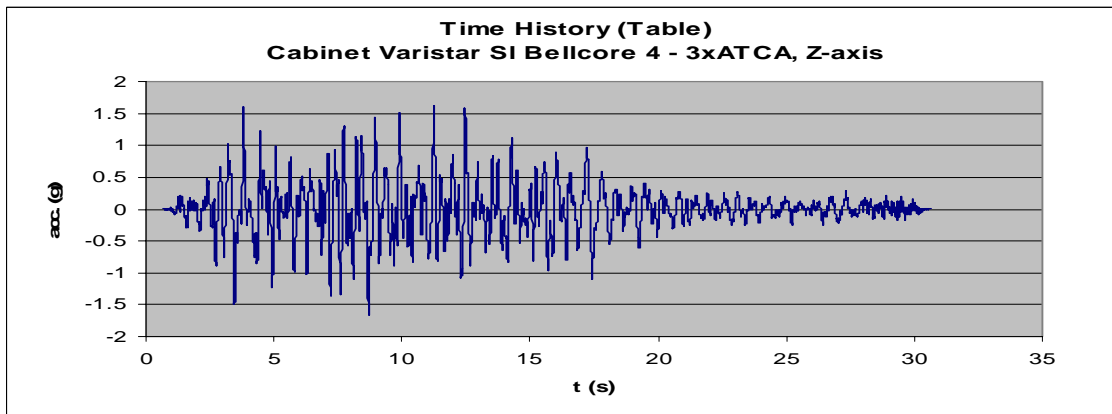


Figure 6.11: Acceleration at Earthquake Table (Z-Axis)

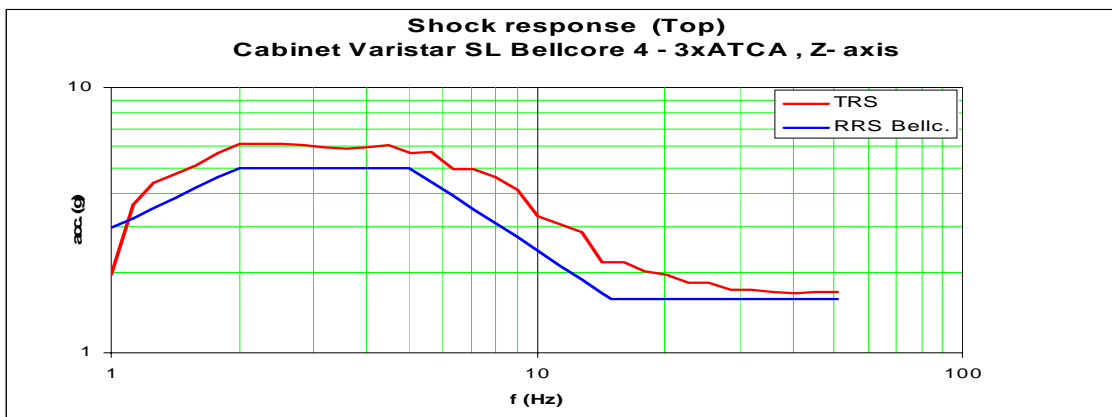


Figure 6.12: Test Response Spectrum (Z-Axis)

6.3.3 Results of Displacement measurement

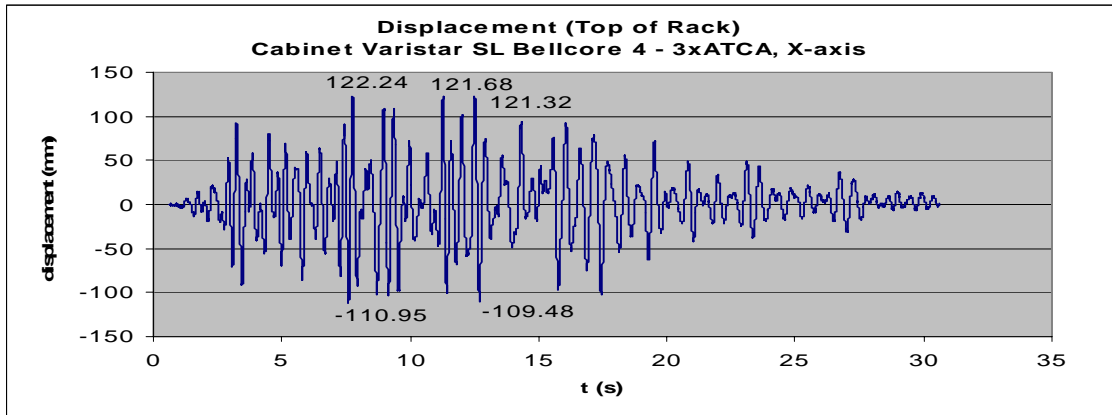


Figure 6.13: illustrates the displacement at top of EUT X-axis

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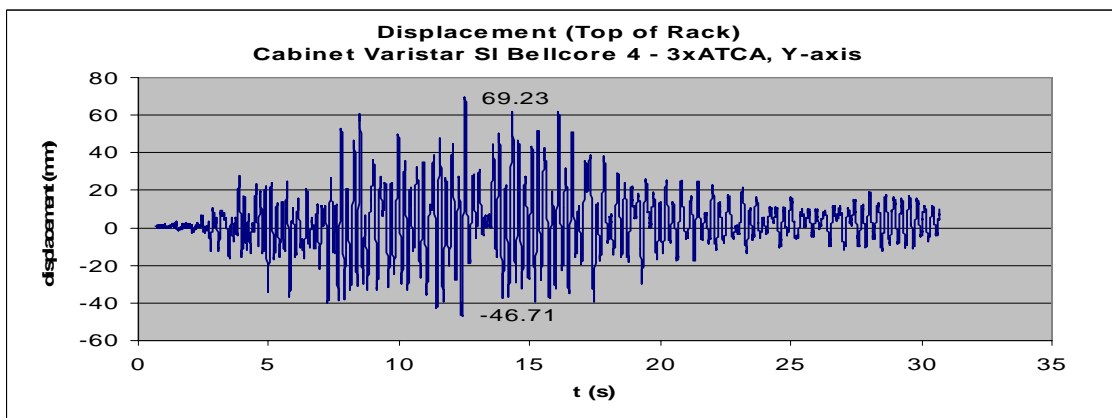


Figure 6.14: illustrates the displacement at top of EUT Y-axis

In **vibration direction vertical (Z-axis)** no displacement was measured.

6.4 Evaluation

The EUT **CONFORMS** with the Earthquake Requirements acc. EN 300 019-2-3 Class 3.1-3.6.