

Center for Quality Engineering

Test Report No.: U0ES0002

Order No.: U0ES	Pages: 19	Munich, Nov 29, 2006
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Client:	Schroff GmbH
Equipment Under Test:	ATCA shelf 14 slot equipped with AMC Carriers containing AMC Modules having defined weights, and two ATCA Shelf Managers
Manufacturer:	Schroff GmbH
Task:	Conformance test according to the below mentioned test specifications Earthquake
Test Specification(s): [covered by accreditation]	IEC 60068-2-57, Test Ff: Vibration –Time-history method
Test Specification(s): [not covered by accreditation]	IEC 61587-2
Result:	The EUT was subject to the tests listed in detail in ch. 6 of this report and complies with the corresponding requirements.

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

approved by:	Date	Signature
Alt Director 'Environmental Engineering'	Nov 30, 2006	

This document was signed electronically.

The Center for Quality Engineering of Siemens Networks GmbH & Co. KG is accredited by DATech for
COMPONENTS TESTING ENVIRONMENTAL ENGINEERING ELECTROMAGNETIC COMPATIBILITY PRODUCT SAFETY
TELECOM CONFORMANCE TESTS

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1 Summary

Testing was performed to determine if the ATCA shelf 14 slot, the installed AMC Carriers with AMC Modules, and installed ATCA Shelf Manager meet the requirements of

IEC 60068-2-57

IEC 61587-2: 2000-12

Mechanical structures for electronic equipment - Tests for IEC 60917 and IEC 60297;
Part2: Seismic tests for cabinets and racks

The performed Earthquake tests are also covered in the specifications of

GR 63 CORE , Issue 3: March 2006

NEBS Requirements : Physical Protection

Part 5.4.1 Earthquake Test Methods; Section(s) 4.4 , 5.4, Earthquake

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

Part 4 Earthquake test specification

The EUT shows no physical damage during and after the tests.

The table below contains a detailed list of tests performed.

Tested Requirement(s)	Test Passed	Remark
IEC 60068-2-57, Test Ff Vibration –Time-history method	yes	
Requirement acc. to GR 63 CORE	Criteria met (yes/no)	Remark
R 4-46 Earthquake: Structural / Mechanical Damage	yes	

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2 References

2.1 Specifications

- [1] **IEC 61587-2: 2000-12**
Mechanical structures for electronic equipment - Tests for IEC 60917 and IEC 60297;
Part2: Seismic tests for cabinets and racks
- [2] **IEC 60068-2-6: 1995-03**
Environmental testing
Part 2: Tests, Test Fc: Vibration (sinusoidal)
- [3] **IEC 60068-2-27: 1987**
Basic environmental testing procedures
Part 2: Tests, Test Ea and guidance: Shock
- [4] **IEC 60068-2-57 : 1999-11**
Environmental testing
Part 2-57: Tests , Test Ff: Vibration –Time-history method
- [5] **GR 63 CORE , Issue 3: March 2006**
NEBS Requirements : Physical Protection
Part 5.4.1 Earthquake Test Methods
- [6] **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
Part 4 Earthquake test specification

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3 General Information

3.1 Identification of Client

Schroff GmbH
R&D Subracks and Systems
Langenalber Str. 96-100
75334 Straubenhardt

3.2 Test Laboratory

Center for Quality Engineering
Siemens Networks GmbH & Co. KG
SN CTO CQE CoC31
Hofmannstraße 51
81359 München

3.3 Time Schedule

Delivery of EUT: Oct 23, 2006
Start of test: Oct 23, 2006
End of test: Oct 25, 2006

3.4 Participants

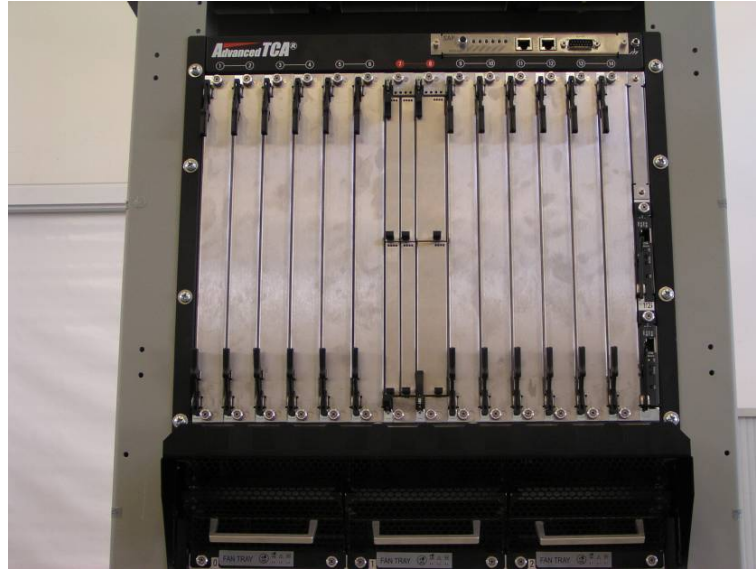
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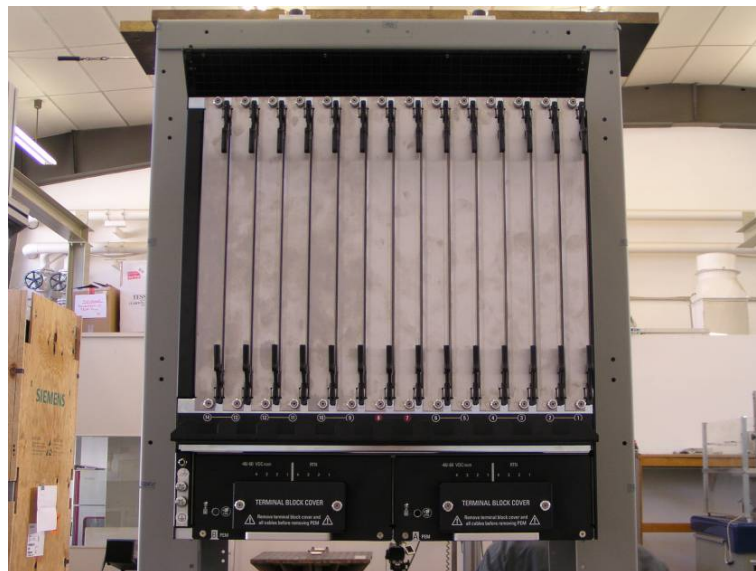
4 Equipment Under Test

ATCA – shelf 14 slot Part No.: 11592-401 total weight with boards 71,5Kg

mounted in a 19" Global Seismic Frame from the manufacturer Hendry / USA part number:
OGS136



Pic. 1 EUT front side



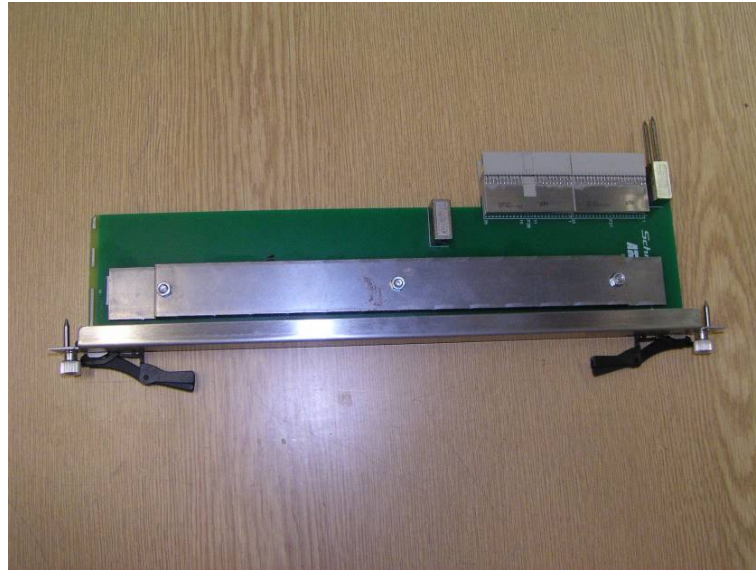
Pic. 2 EUT rear side

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The ATCA shelf 14 slot was completed with:

14x RTM – Dummyboards

weight: 0,865 Kg

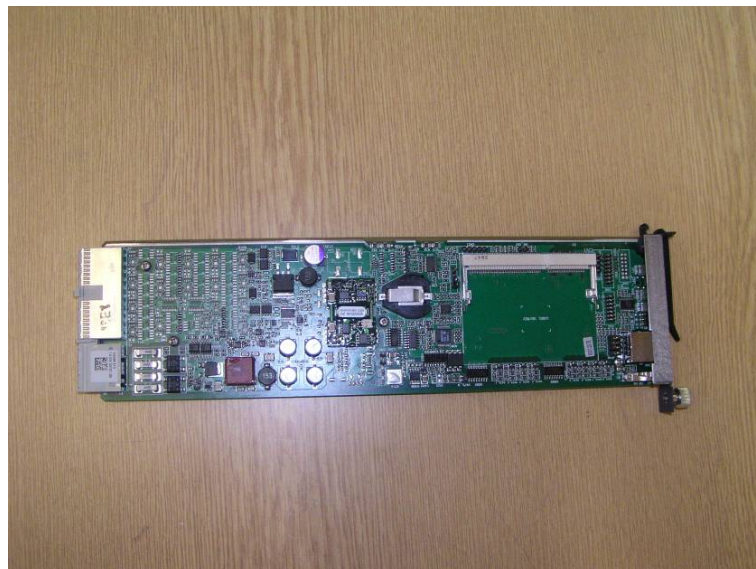


Pic. 3 RTM - Dummyboard

2x Shelf – Manager

Part No.: 21593-175

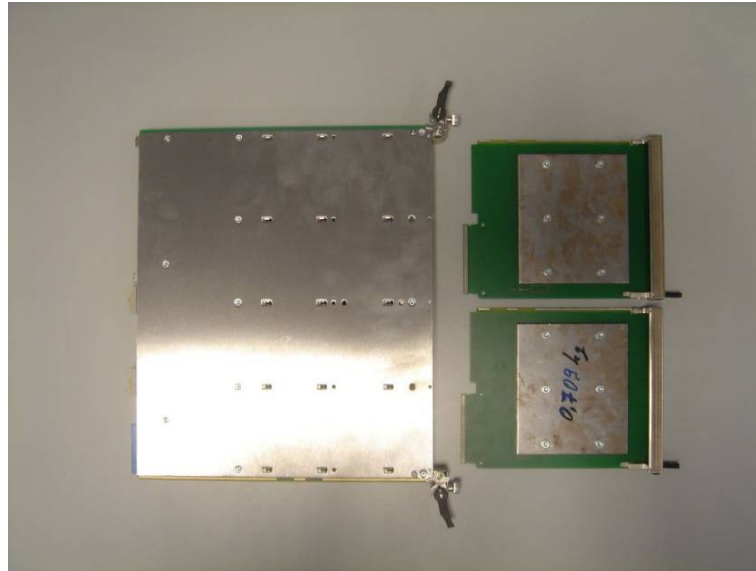
weight: 0,319 Kg



Pic. 4 Shelf- Manager

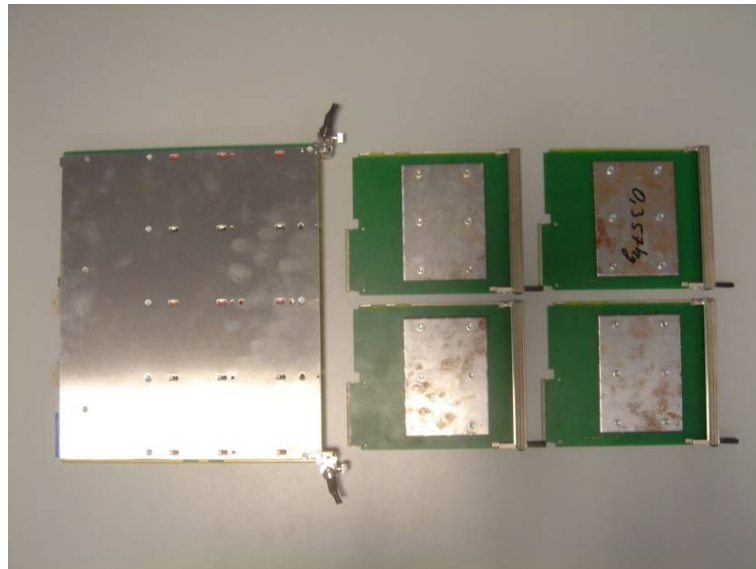
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1x AMC - Carrier with 2x FS-D – Modules Part Nos.: 10849-001 / 20849-005
weight: Empty Carrier – 1,277 Kg, Module with weights – 0,709 Kg, Total – 2,695 Kg



Pic. 5 AMC - Carrier with 2x FS-D – Modules

1x AMC - Carrier with 4x C-D – Modules Part Nos.: 10849-001 / 20849-003
weight: Empty Carrier – 1,277 Kg, Module with weights – 0,357 Kg, Total – 2,705 Kg

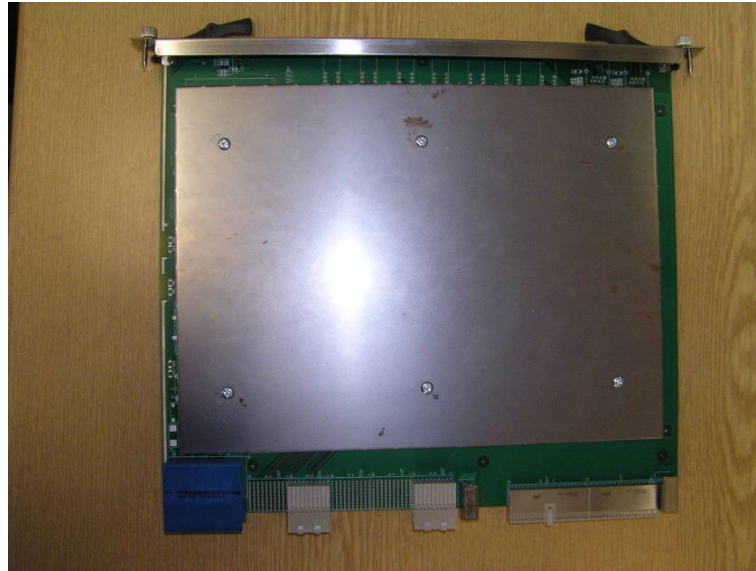


Pic. 6 AMC - Carrier with 4x C-D – Modules

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12x ATCA – Dummyboards

weight: 2,307Kg



Pic. 7 ATCA – Dummyboards

4.1 Failure Criteria

No mechanical deviations.

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5 Test Equipment

5.1 Test Facility

The measurements were carried out in the Center for Quality Engineering: Siemens Networks GmbH & Co. KG, Department SN CTO CQE CoC3, Hofmannstraße 50, 81359 München, Germany.

5.2 Measuring Equipment

Earthquake test

ID No.	Equipment	Type	Manufacturer	Status	Last Cal.	Next Cal.
	Earthquake Test System 84A					
S0353	Earthquake Test System	921.67	MTS	cnn		
S0896	Control System for Earthquake	TESTSTAR IIS		cnn		
S0919	Amplifier	106	Endevco	cal	Jan 25, 2006	Jan 2007
S0922	Power Supply	109V	Endevco	cnn		
S5398	Accelerometer	2262A-25	Endevco	cal	Jan 24, 2006	Jan 2007
S5453	Software Version 3.3A	Teststar Iis	MTS	cnn		
S5453	Software Version 2.2	Component RPC III	MTS	cnn		
S5453	Software Version 2000 Prof	Mathcad.	MTS	cnn		
S5482	Netzgerät	ARGOS	TET Electronic	cnn		
S5544	Position Transducer	1850-125	National Oilwell	chk	Apr 17, 2006	Apr 2007

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

5.3 Measurement Uncertainty

The measurement uncertainty is given by the used equipment. Detailed information can be seen in the technical descriptions of the used equipment and in the calibration data sheet. It is available on request.

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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 Test Specification

6.2 Earthquake test:

IEC 61587-2: 2000-12

Mechanical structures for electronic equipment - Tests for IEC 60917 and IEC 60297;
Part2: Seismic tests for cabinets and racks

Waveform A

GR 63 CORE , Issue 3: March 2006, NEBS Requirements : Physical Protection, Part 5.4.1 Earthquake Test Methods

R 4-46 All equipment shall be constructed to sustain the waveform testing of **GR-63-CORE Section 5.4.1** without permanent structural or mechanical damage

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
Part 4 Earthquake test specification

6.2.1.1 Earthquake Waveform and Required Response Spectrum

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 – 15			
	ZPA	m/s ²	16			
	Axes		3			
	Damping ratio	%	2			

Table 5 Acceleration Coordinates for the RRS

Co-ordinate Point	Frequency (Hz)	Ground Acceleration (m/s ²)
1	1,0	30
2	2,0	50
3	5,0	50
4	15,0	16
5	50,0	16

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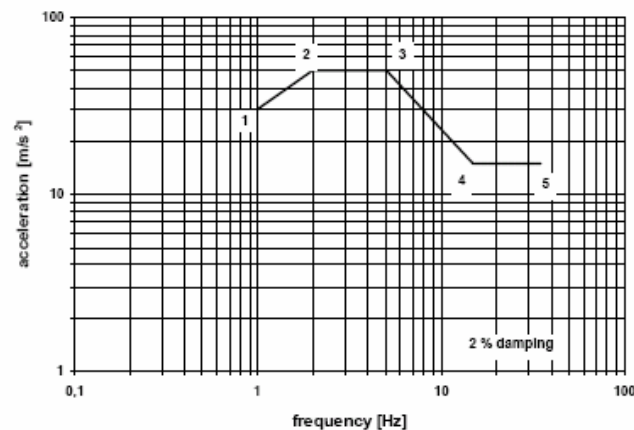


Fig. 6.1: Earthquake Required Response Spectrum

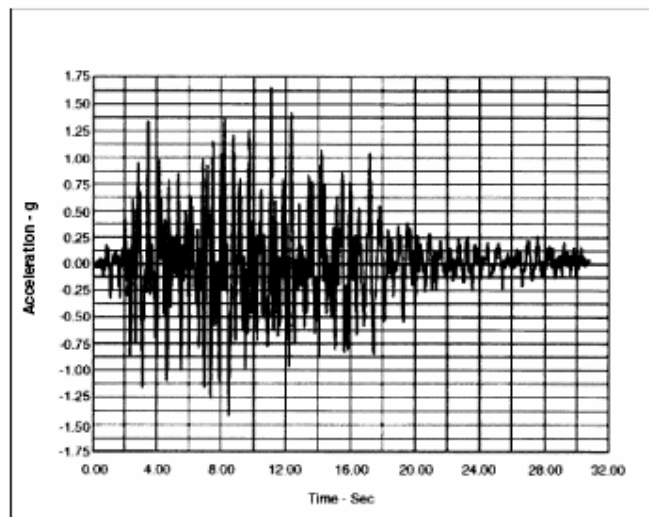


Fig. 6.2: Earthquake Synthesized Waveform VERTEQ II Zone4
Test Performance

The Advanced TCA shelf with AMC Carriers, AMC Modules, and dummy boards was mounted for earthquake test with its normal fastening points in a 19" Global Seismic Frame from the manufacturer Hendry/USA. On top of the frame a 18kg load were mounted to simulate overhead cable load. A 48kg mass was mounted in the lower area to duplicate the shelf mass and the stiffness characteristics of a fully loaded equipment frame. These EUT was mounted at earthquake table by means of an 40mm aluminium adapter plate.

A LVDT was attached to the top of the EUT to measure the deflection in X- and Y-axis. As the EUT is a shelf level equipment displacement on top during waveform testing are no criteria of the specifications. Even so, for information, they were measured and reported.

A video taken from tests in all three axes is part of the documentation.

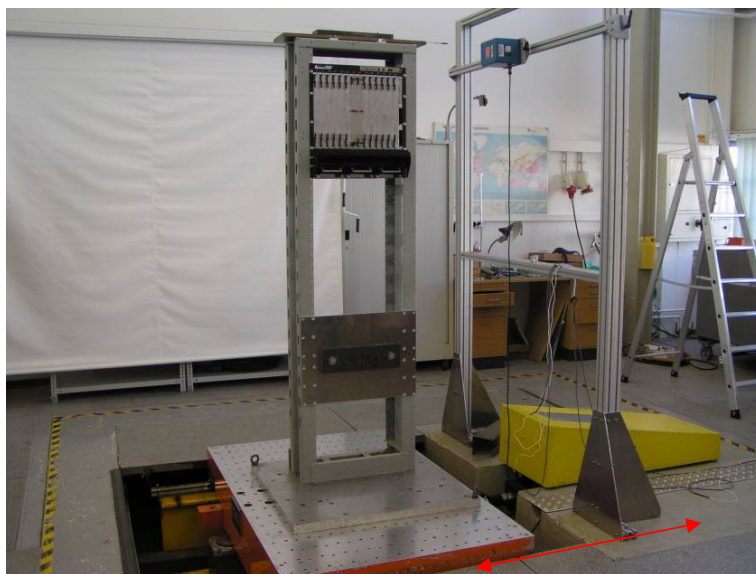
The test was performed in 3 mutually perpendicular axes.

horizontal longitudinal front to back = Y-axis

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horizontal lateral = X-axis
vertical = Z-axis

The tests were performed in normal use attitude.

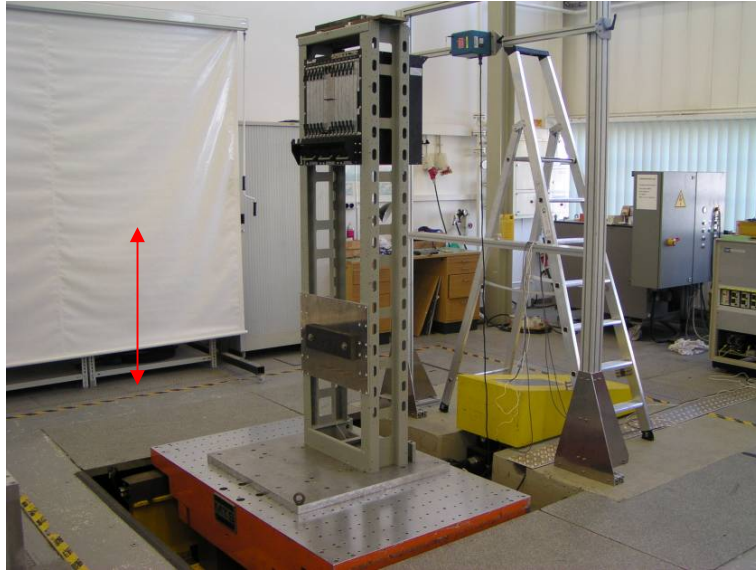


Pic. 8 Mounting of EUT X-Axis (horizontal lateral)



Pic. 9 Mounting of EUT Y-Axis (horizontal longitudinal)

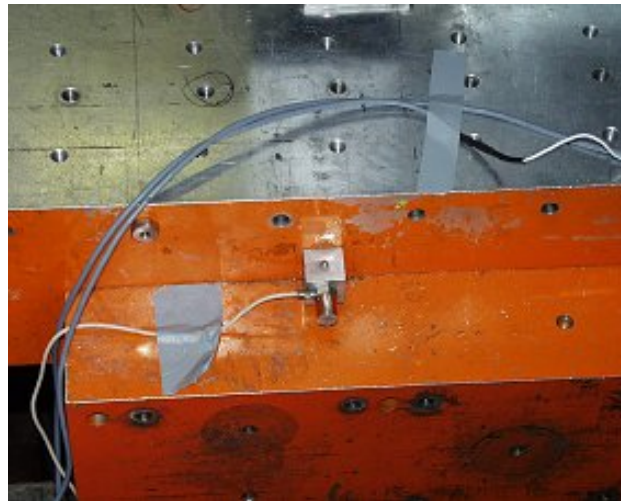
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Pic. 10 Mounting of EUT Z-Axis (vertical)

For Z-axis test (vertical), a vertically oriented piston underneath the table is used.

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



Pic. 11 Measuring point – earthquake table

At the top of the EUT a measuring equipment were mounted to record displacement in sensing direction. For the Z-axis test, no LVDT is applied.

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Pic. 12 Measuring equipment LVTD for displacement

6.3 Test Result

No visible mechanical deviations were identified.

6.3.1 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.

Excitation in direction of x-axis

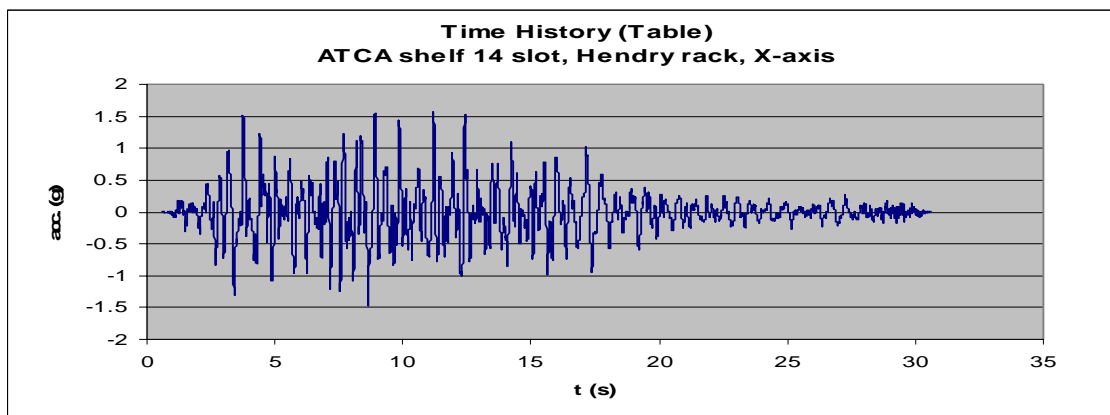


Fig. 6.3: Time history signal at the table

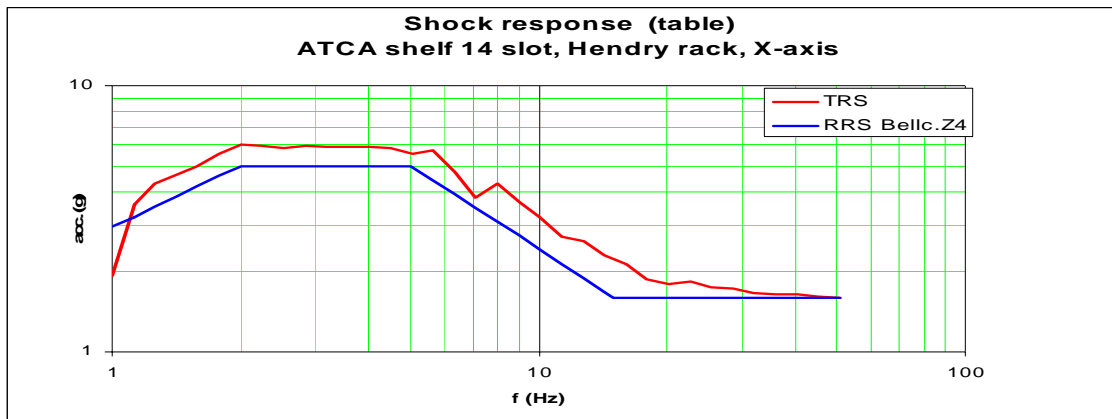


Fig. 6.4: RRS and TRS at the table

Excitation in direction of y-axis

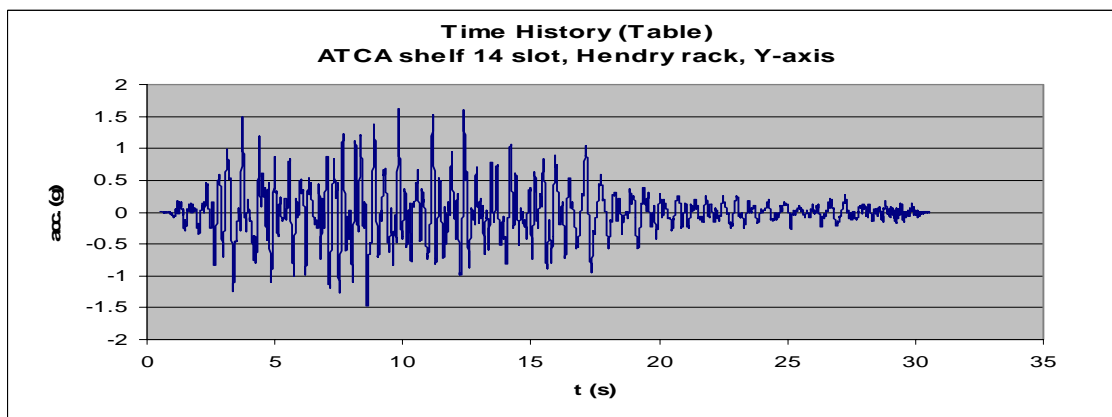


Fig. 6.5: Time history signal at the table

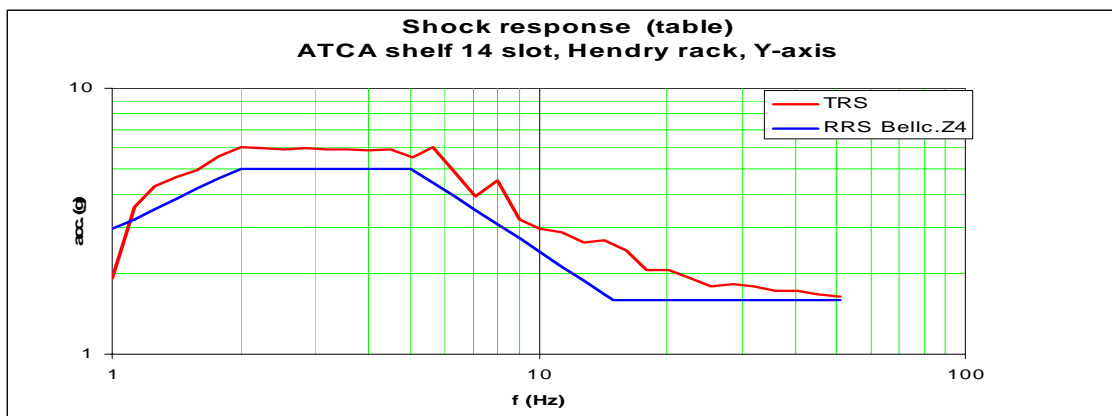


Fig. 6.6: RRS and TRS at the table

Excitation in direction of z-axis

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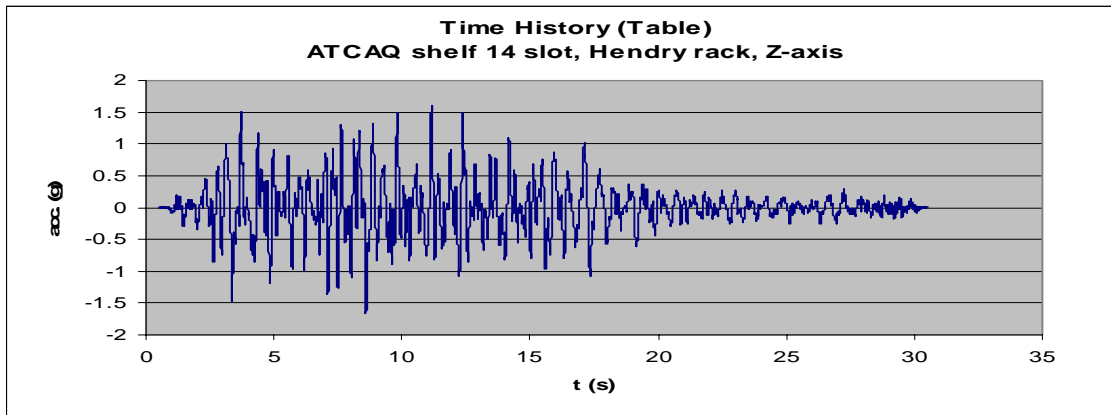


Fig. 6.7: Time history signal at the table

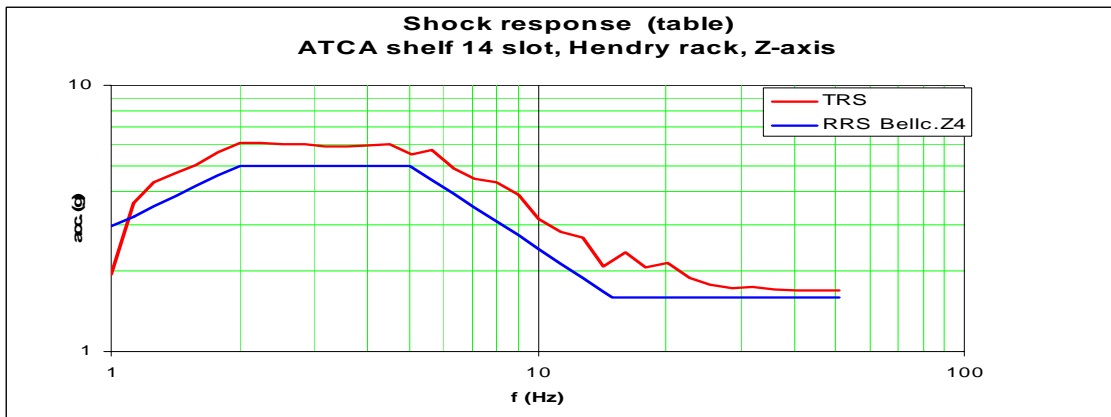


Fig. 6.8: RRS and TRS at the table

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6.3.2 Results of Displacement measurement

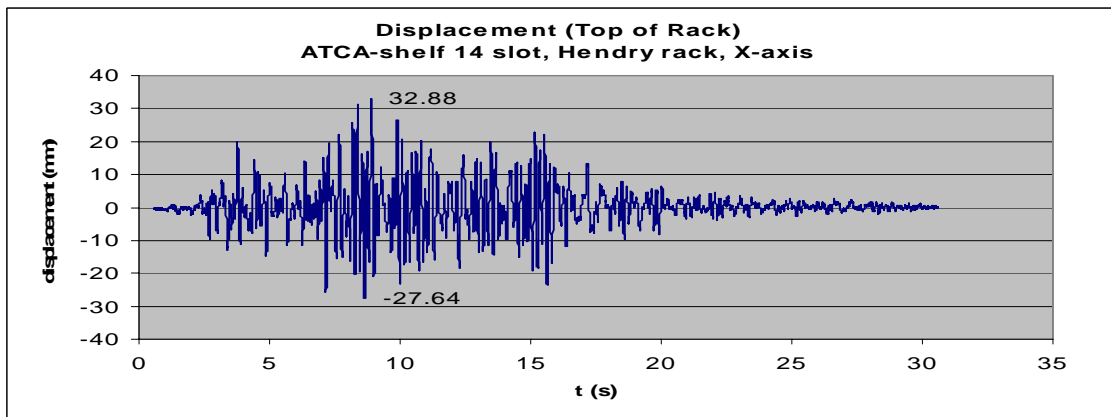


Fig. 6.9: Displacement measured at top of the rack- X-axis

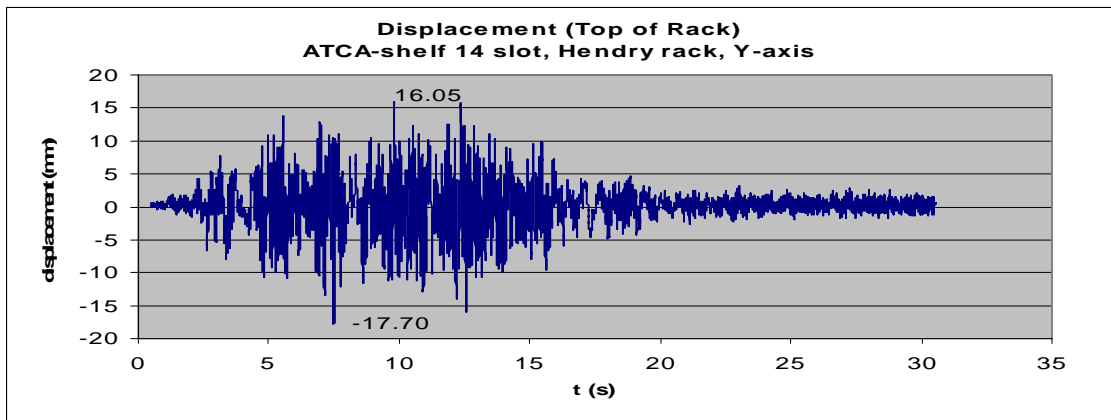


Fig. 6.10: Displacement measured at top of the rack- Y-axis

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

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