

V A R I S T A R

Test report

Mechanical tests on
Slim-Line and Heavy-Duty
cabinets

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TESTS REPORT

LD 34040

MECHANICAL TESTS ON TWO CABINETS

Company :
SCHROFF

Copy N° 2

Project Engineer : **D. TAUZIN**

Number of pages, appendices not included : 15

Number of appendices : 1

Number of pages in appendices : 42

Certified accurate for SOPEMEA
Villacoublay, 21 September, 2004

This test report only concerns objects submitted to testing



Y. COURTAY
Test Engineer

1 - GENERAL PART

1.1. ADMINISTRATIVE INFORMATION

1.1.1. ORDER ISSUER

SCHROFF Company
ZI - 4, rue du Marais
BP 16
67660 BETSCHDORF

1.1.2. ORDER NUMBER

SCHROFF ref. : Order No. 4029965/OP of 20 July, 2004

1.1.3. PURPOSE OF THE ORDER

Mechanical tests on two cabinets

1.1.4. SOPEMEA REFERENCE

In-house reference number : LD 34040

1.1.5. TEST PERFORMANCE DATE

The tests were performed from 09 to 13 August, 2004

1.2. SOPEMEA PERSONNEL

L. DESJEUNES

1.3. TEST ATTENDANT

NAME

COMPANY

Mr. FISCHER

SCHROFF



2 - TEST RESOURCES

2.1. TEST EQUIPMENT USED

2.1.1. TEST FACILITY

Character	Manufacturer	Type	Periodicity ± 1 month	Date of last verification
Vibration exciter	LING DYN SYSTEMS	V 994	1 year	25/03/2004

2.1.2. CONTROL

☐ Control system

Character	Manufacturer	Type	Serial No.	Periodicity ± 1 month	Date of last verification
Digital servo-system	DATA PHYSICS	ISTPIL9	8QLC70J	2 years	18/11/2003

☐ Control channels

SENSORS : Piezoelectric accelerometers					CASING MODULE : Load amplifiers				
Manu- facturer	Type	Serial No.	Periodicity ± 1 month	Date of last calibration	Manu- facturer	Type	Serial No.	Periodicity ± 1 month	Date of last calibration
ENDEVCO	2224C	AGF15	6 months	30/03/2004	SOPEMEA	ASS02U	07	6 months	30/03/2004
ENDEVCO	2224C	AGF25	6 months	30/03/2004	SOPEMEA	ASS02U	14	6 months	30/03/2004



2.2. MEASUREMENT EQUIPMENT USED

MEASURING CHANNELS

SENSORS : Piezoelectric accelerometers					CASING MODULE : Load amplifiers				
Manu- facturer	Type	Serial No.	Periodicity ± 1 month	Date of last calibration	Manu- facturer	Type	Serial No.	Periodicity ± 1 month	Date of last calibration
ENDEVCO	2226C	15926	1 year	04/07/2003 24/08/2004	SOPEMEA	ASS02	8301	1 year	22/09/2003
ENDEVCO	2226C	15928	1 year	04/07/2003 24/08/2004	SOPEMEA	ASS02	8301	1 year	22/09/2003
ENDEVCO	226C	ZB77	1 year	04/07/2003 24/08/2004	SOPEMEA	ASS02	8301	1 year	22/09/2003

3 - TECHNICAL PART

3.1. EQUIPMENT PRESENTED FOR TESTS

SCHROFF submitted testing for :

- a "HEAVY-DUTY" cabinet, P/N : F15053-125, prototype,
- a "SLIMLINE" cabinet, P/N : F15053-124, prototype.

3.2. TEST PROGRAM

The test program, communicated by SCHROFF's representatives, is defined as follows :

3.2.1. SINUSOIDAL VIBRATION ENDURANCE TESTS

According to the IEC 61587-1 standard, DL 5

Program A

Minimum frequency	= 5 Hz.
Maximum frequency	= 9 Hz.
Displacement level	= 1.5 mm.

Minimum frequency	= 9 Hz.
Maximum frequency	= 100 Hz.
Acceleration level	= 0.5 g.

Sweep rate	= 1 oct/min (logarithmic).
Number of cycles	= 10
Duration per axis	= 1 h 26 min 26 s
Number of axes	= 3 (longitudinal, transversal, vertical).

3.2.2. SHOCK TESTS

According to the IEC CEI 61587-1 standard, DL 5

Program B

Wave form	= half-sine
Acceleration	= 5 g
Duration	= 11 ms
Number of shocks	= 3 per direction
Number of directions	= 2 (± vertical)

3.3. OPERATING PROCEDURE

3.3.1. ORIENTATION REFERENCE

The position of equipment is defined in relation to the axes of the trirectangular reference system shown on the photograph No. 1, page 7.

3.3.2. TEST CONDITIONS

3.3.2.1. Assembly

The cabinets are fastened by their natural attachment on a light alloy plate, itself attached to the test facility.

3.3.2.2. Sinusoidal vibration tests

The tests are carried out with an electrodynamic vibration exciter. The installation is controlled by a digital control console.

The rectilinear and sinusoidal vibration signals transmitted are defined by their amplitude of displacement a and their frequency f .

The amplitude of acceleration obtained is :

$$\Gamma = \frac{1}{g} 4\pi^2 f^2 a$$

with : Γ in number of g
 f in Hz
 a in m

(g : acceleration of normalized gravity)

The control is made at 2 points on the signal of reference sensors, on the highest signal.

3.3.2.2. Shock tests

The tests are performed on an electrodynamic vibration exciter.

The measurement is taken on the filtered signal $\Delta f = 2.5 - 500$ Hz of the reference accelerometer which is recorded and restored directly by the digital control console.

3.3.3. ACCELERATION MEASUREMENTS

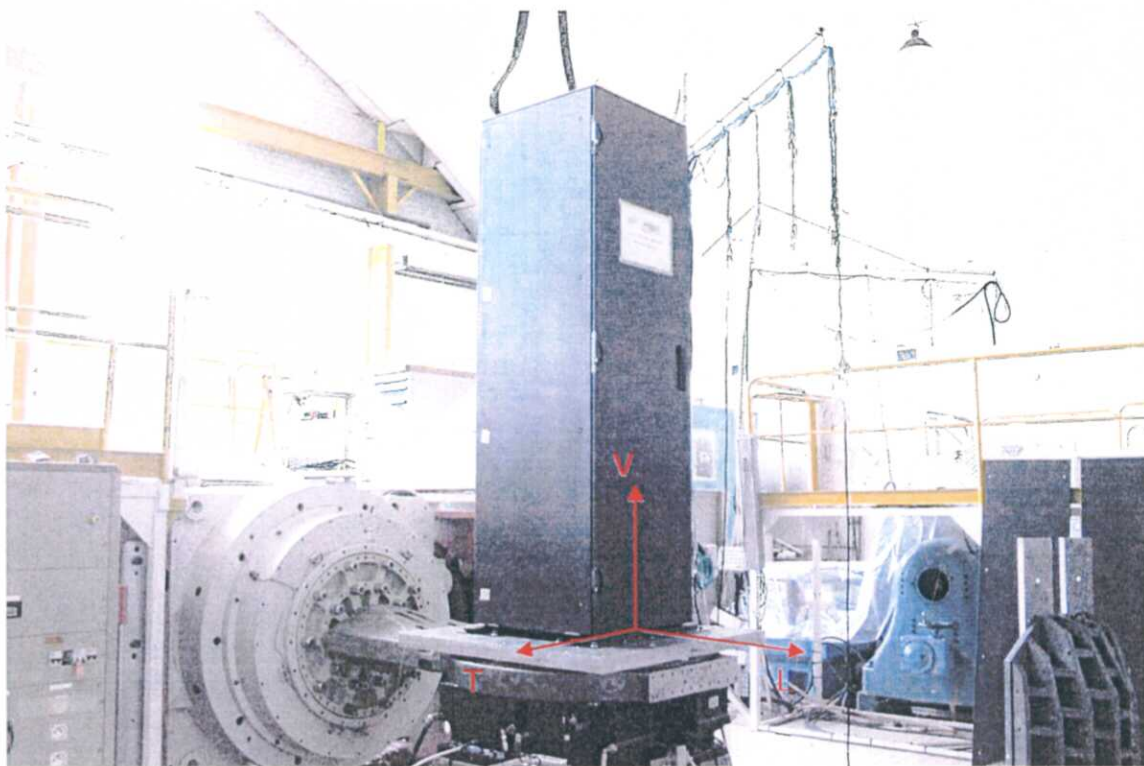
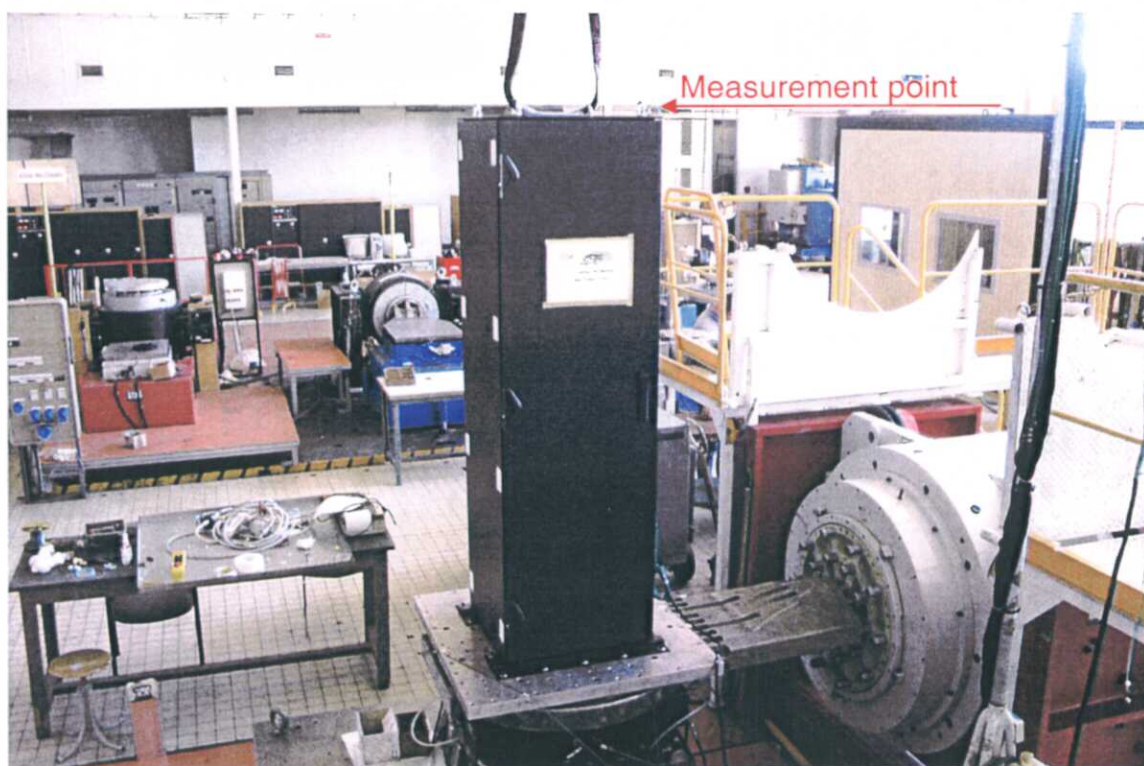
3.3.3.1. Measuring point

An accelerometer is fixed on the upper right-hand corner (see the photograph No. 2, page 7).

3.3.3.2. Data acquisition and processing

The signals delivered by the accelerometric measurement channels are recorded and directly restored by the digital control console.

The acquisition parameters are shown on graphs.

PHOTOGRAPH No. 1**VIEW OF A CABINET ALONG THE LONGITUDINAL AXIS****PHOTOGRAPH No. 2****VIEW OF A MEASUREMENT POINT ON A CABINET ALONG THE TRANSVERSAL AXIS**

PHOTOGRAPH No. 3

VIEW OF A CABINET ALONG THE VERTICAL AXIS



3.4. TEST SCHEDULES AND RESULTS

The tests were carried out in accordance with the conditions defined in paragraphs 3.2 and 3.3. Schedules and results are set out :

- in the tables hereafter, for the tests,
- in the appendix for acceleration recordings

3.4.1. SINUSOIDAL VIBRATION ENDURANCE AND SHOCK TESTS, LEVEL DL5

3.4.1.1. Tests along the longitudinal axis

Date	Program	Duration	Graphs No.	Remarks
09/08/04	A	1 h 26 min 26 s	1 and 2	<u>Sinusoidal vibration endurance on "slimline" cabinet</u> Beginning of the endurance. Stoppage after 5 cycles of vibrations for visual inspection : the sidewall panels screws are loosened. After tightening of the screws, resumption of the tests for remaining time. After the tests, the screws are loosened again.
10/08/04	A	1 h 26 min 26 s	3 and 4	<u>Sinusoidal vibration endurance on "heavy-duty" cabinet</u> Removal of the panel screws for application of low screw thread bonding. Starting of the endurance. In spite of the screw thread bonding, the screws are loosened.

3.4.1.2. Tests along the transversal axis

Date	Program	Duration	Graphs No.	Remarks
10/08/04	A	1 h 26 min 26 s	5 and 6	<u>Sinusoidal vibration endurance on "heavy-duty" cabinet</u>
11/08/04	A	1 h 26 min 26 s	7 and 8	<u>Sinusoidal vibration endurance on "slimline" cabinet</u>

3.4.1.3. Tests along the vertical axis

Date	Program	Duration	Graphs No.	Remarks
11/08/04	A	1 h 26 min 26 s	9 and 10	<u>Sinusoidal vibration endurance on "slimline" cabinet</u>
	B	-	11 and 22	<u>Shocks on "slimline" cabinet</u> Application of 3 shocks along each direction. Nothing to report..
	A	1 h 26 min 26 s	23 and 24	<u>Sinusoidal vibration endurance on "heavy-duty" cabinet</u>
12/08/04	B	-	25 and 36	<u>Shocks on "heavy-duty" cabinet</u> Application of 3 shocks along each direction. Nothing to report.

3.4.2. ADDITIONAL REQUEST OF SINUSOIDAL VIBRATION ENDURANCE TESTS, LEVEL DL6

Date	Axis	Program	Duration	Graphs No.	Remarks
12/08/04	V	A	1 h 26 min 26 s	37 and 38	<u>"Slimline" cabinet</u> Note : level DL6 = 3.5 mm and 1 g. Nothing to report.
	T	A	1 h 26 min 26 s	39 and 40	<u>"Slimline" cabinet</u> Nothing to report.
13/08/04	L	A	1 h 26 min 26 s	41 and 42	<u>"Slimline" cabinet</u> Stoppage of the tests at 7.6 Hz because the door was opened : two of the three locks of the door are broken (see the photographs No. 4 to 6, pages 11 and 12). End of the tests.