ENVIRONNE'TECH
GROUPE EMITECH

RME-ENVESS22M868LOR-01/A (01)

This report cancels and replaces the test report N°RME-ENVESS22M868LOR-01/A, Edition 00

MECHANICAL TEST REPORT

According to the standards:
NF EN 60068-2-6 (2008)
NF EN 60068-2-27 (2009)

According to the specifications:
NAVAL Group STB-MAT652-5005 Indice D

Equipment under test:
1 box equipped with: BGL136-NAV2:& CALT25 & CAL4/100IG

Company:
LOREME SA

DISTRIBUTION: Mr REPPERT **Company: LOREME SA**

Number of pages: 40
Included 18 pages in appendix

Ed.	Date	Modified Pages	Written by	Technical Verification	Quality Approval
			Name, function and Visa	Name, function and Visa	Name, function and Visa
01	26/06/2023	1, 2 and 4.	Jérome LAURENDON Mechanical Tests Technician	Benjamin VUGIER Mechanical Tests Technician	Renaud MOREAU Mechanical Tests Engineer

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EQUIPMENT UNDER TEST:

photo 1

Part number (P/N) **: BGL 136-NAV2 & CALT25 & CAL4/100IG**

CUSTOMER'S NAME AND ADDRESS:

Company: LOREME SA

Address: 12, rue des Potiers d'Etain
ACTIPOLE BORNY
BP 35014
57071 METZ CEDEX 3
FRANCE

Contact: Mr Emmanuel REPPERT

Persons who were present for the tests: /

PURCHASE ORDER: N° E230345 AMP

TEST DATES: From the 12th to the 15th of June 2023

TEST LOCATION: Test Laboratory of Bourgoin-Jallieu

TESTER: Jérôme LAURENDON

SUMMARY

1. PURPOSE OF THE TESTS.

Test purpose was to investigate the behavior of 1 box BGL136-NAV2 by means of shocks and vibration tests.

2. EQUIPMENT SUBMITTED FOR TESTING.

The equipment which has been tested is 1 box equipped with: BGL136-NAV2:& CALT25 & CAL4/100IG

photo 2

photo 3

The equipment carried the Environne'Tech test number: 22M868.

3. CUSTOMER SPECIFICATIONS SHEET.

3.1. Reference documents:

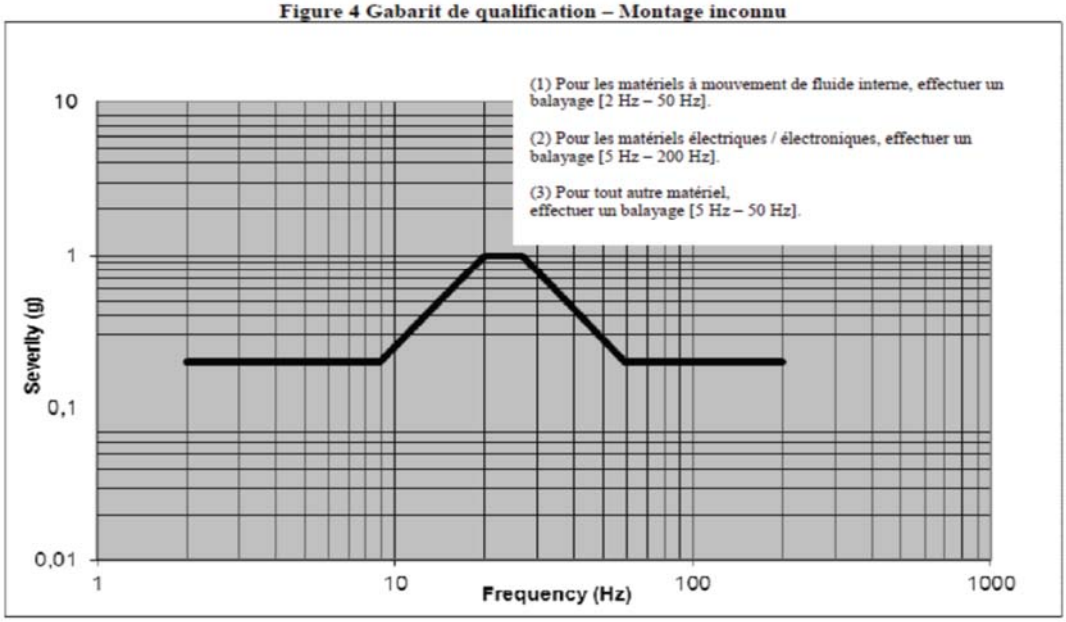
- Standard NF EN 60068-2-6 (2008)
- Standard NF EN 60068-2-27 (2009)
- Customer's specification NAVAL Group STB-MAT652-5005 Indice D
- Environne'Tech Offer N° ENVESS-22M868LOR-00V03

3.2. Reminder of the main criteria of tests:

3.2.1. Endurance vibration test:

- Type: Sinusoidal vibrations
- Standard: NF EN 60068-2-6 (2008)
- Frequency range: 5 Hz to 200 Hz
- Number of axes: along 3 axes (Ox, Oy and Oz)
- Duration:5 sweeps up and 5 sweeps down (53 minutes)
- Level: see below
- Sweeping rate: 1 oct/min
- Control points: P1 and P2
- Measuring point: M1
- State of equipment: On

Figure 4 Gabarit de qualification – Montage inconnu



Essai de qualification aux vibrations	Montage inconnu ou type de plot inconnu					
Fréquence	2 Hz	8.9 Hz	20 Hz	26.7 Hz	59.1 Hz	200 Hz
Sévérité	200 mg	200 mg	1 000 mg	1 000 mg	200 mg	200 mg

3.2.2. Shock Test:

- Type: half sine pulse
- Standard: NF EN 60068-2-27 (2009)
- Number of axes: along 3 axes (Ox, Oy and Oz)
- Number of shocks: 3 per direction (18 in total)
- State of equipment: on
- Duration & Level: 50g 8ms
- Control points: P2
- Measuring point: P1 and M1

3.3. Functional control verification:

Visual inspections were conducted after each test.

The equipment was ON during all the tests, a visual check is realised after each test.

4. EQUIPMENT USED.

4.1. Test facilities.

Identity	Designation	Brand and Model	Characteristics
MECA 76	Electrodynamic vibrator	LDS V875-640T	35kN; 5Hz to 2000Hz; resonance 2200Hz sine: 35kN; 25.4 mmPeak; 1.5m/sPeak; 50gPeak random: 33kNeff; 75geff / impact 1/2sine: 93kN
MECA 470	Electrodynamic vibrator	LDS V860	28kN; 5Hz to 2500Hz; resonance 2100Hz; sine: 28kN; 12,5mmPeak; 1.78m/sPeak; 48gPeak random 28kNeff; 48geff
MECA 33	Electrodynamic vibrator	LING 612VH	26kN; 5Hz to 2300Hz 107g max displacement max: 50.8mm p-to-p, max speed: 1,7 m/s
MECA 386	Electrodynamic vibrator	LDS 964LS	71kN, 5Hz to 3000Hz, resonance at 2400Hz - sine: 71kN, 19mm peak, 2.00m/s, 100g

4.2. Measurement Equipment.

Identity	Designation	Brand and Model	Characteristics	Last validity date	Metrological confirmation valid until
10487	Control generator	LDS LASER	in vibration, 8 measurement channels - sine, random, shocks - form 1Hz to 5000Hz accuracy: < ± 5% - linearity: < ±2.5%	07/06/2022	07/08/2024
MECA 806	Accelerometer	PCB 353B03	sensitivity: 9.95 mV/g at 160Hz	22/08/2022	22/10/2023
MECA 807	Accelerometer	PCB 353B03	sensitivity: 9.77 mV/g at 160Hz	23/08/2022	23/10/2023
MECA 745	Accelerometer	PCB 356A02	X: 9.85 mV/g, Y: 9.63 mV/g, Z: 9.57 mV/g at 160Hz	30/01/2023	30/03/2024
MECA 51	Torque setting wrench	FACOM R.304DA	with tripping: 1 - 5 Nm; scaling: 0.05Nm	28/12/2022	28/02/2024

4.3. Test fixtures.

Below equipment mounting pictures:

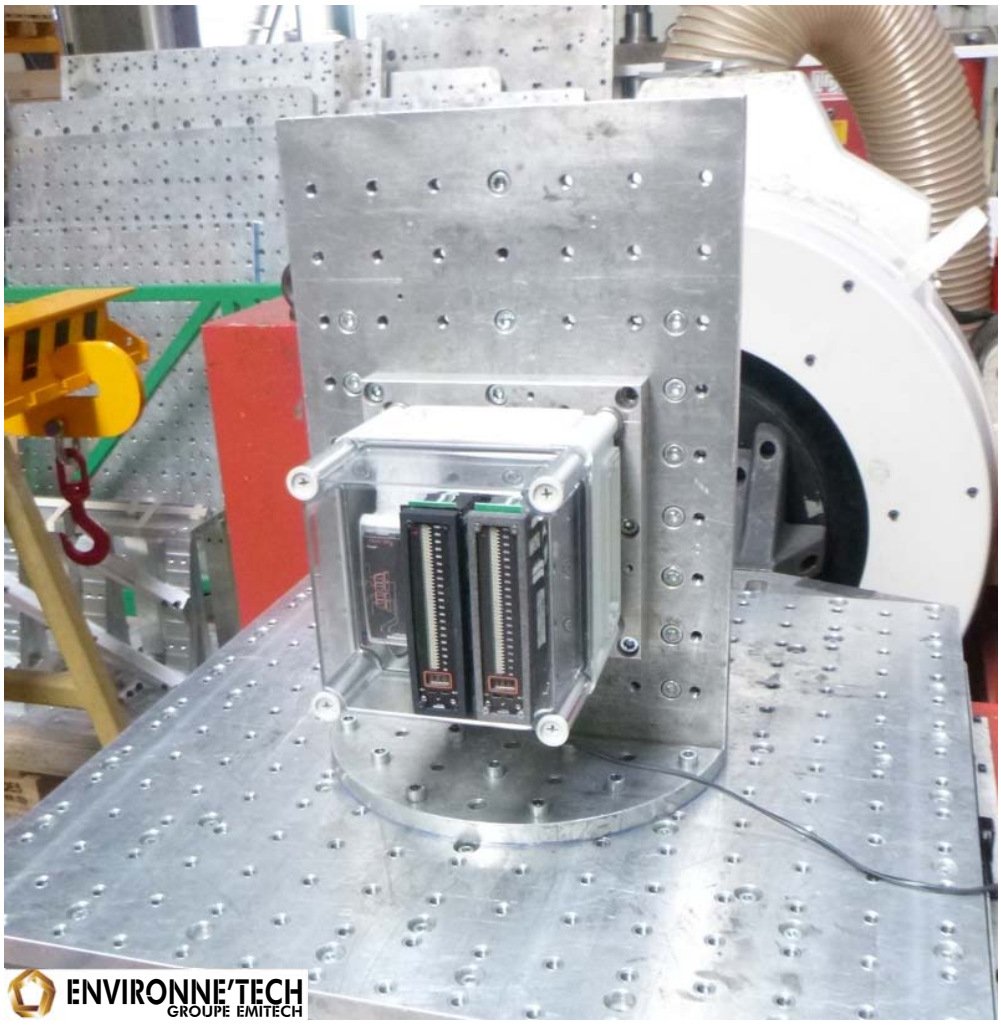


photo 4

The box is fixed on a plate M16060904 by 4 M6 screws. A tightening torque of 5 Nm is applied. The assembly is mounted on a square to test the box in vertical position.

5. TEST LOG.

5.1. Chronology:

Tests have been conducted on the equipment according to specifications described in chapter 3 of this report.

A summary table of the chronology of tests is given below:

Date	Test	Axis
13/06	Endurance vibration test	X
		Y
		Z
14/06	Shock tests	Z
15/06		X
		Y

On the curves below, tolerance lines are tolerances of the standard:

Test:	*Curves description: standard tolerance*
Endurance vibration test	
Shock test	

5.2. Axis direction:

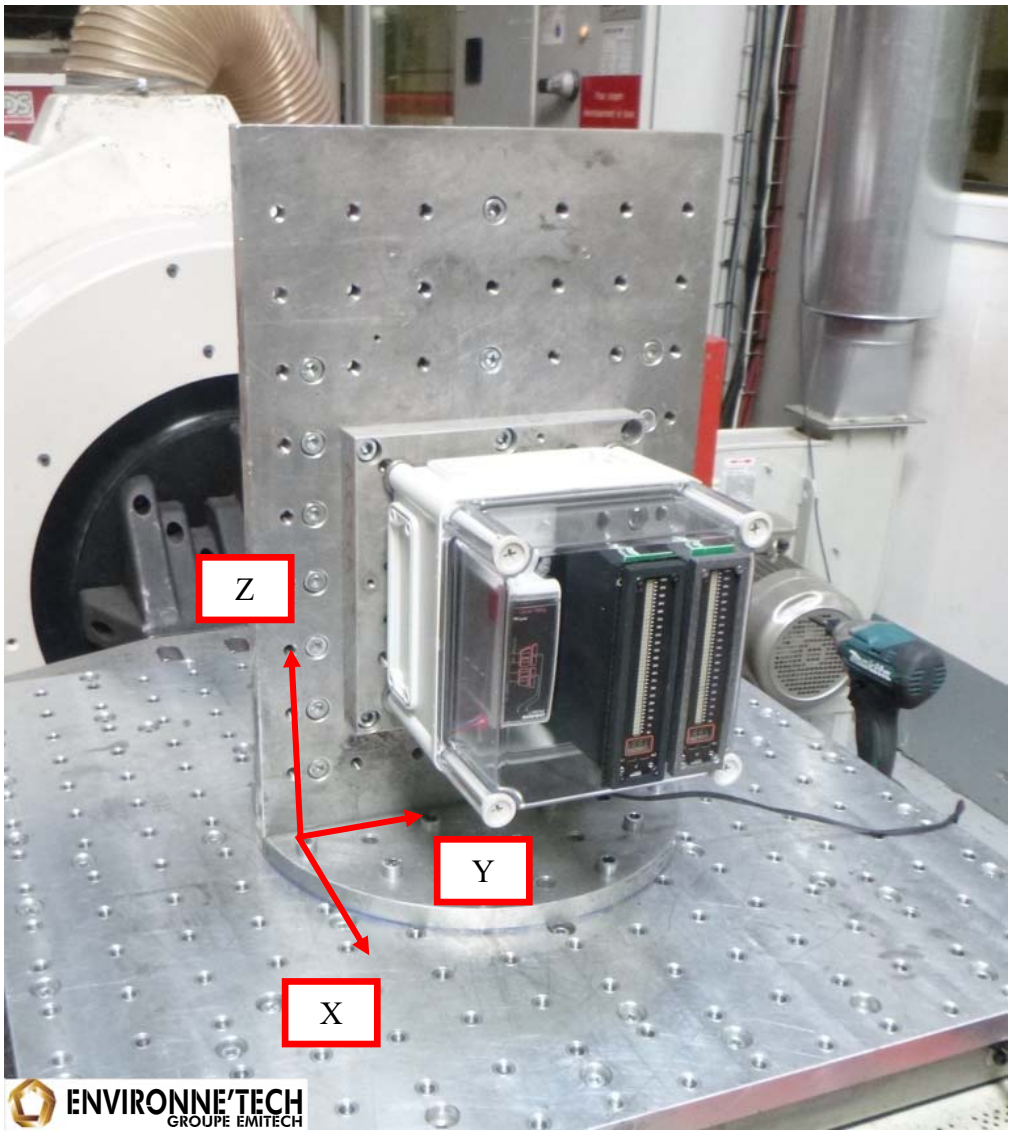


photo 5

5.3. Instrumentation:

1 Measuring accelerometer is used.

M1 is positioned on the box:

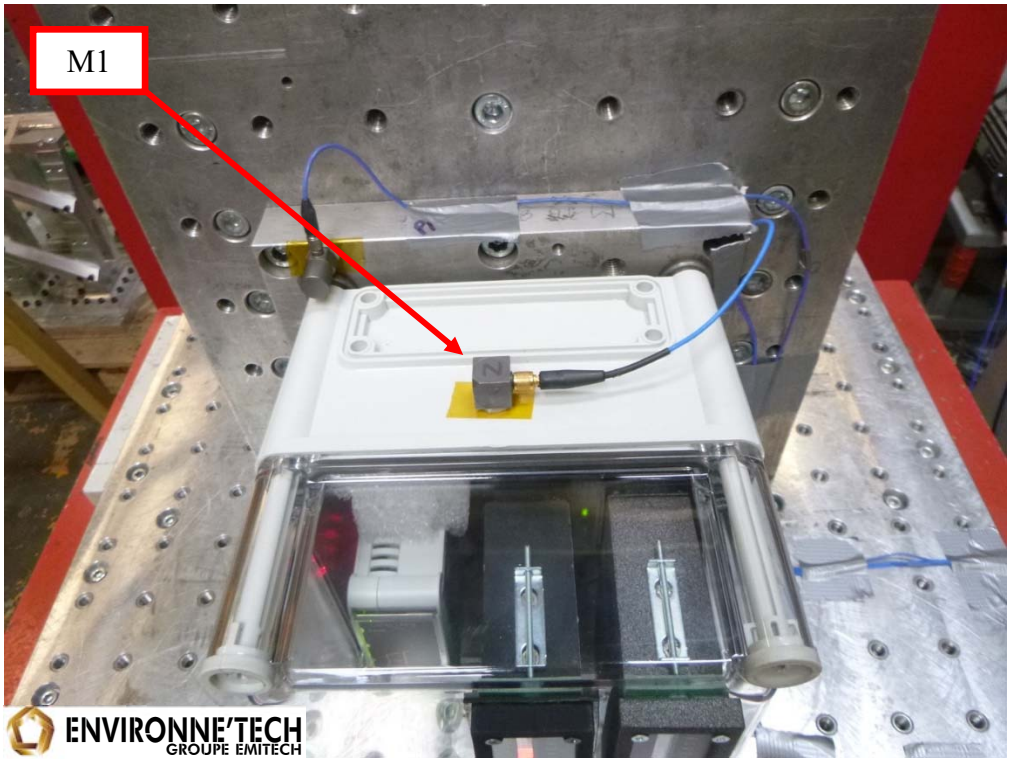


photo 6

5.4. Tests Set-up:

5.4.1. X axis:

Specimen set-up along X axis given below:

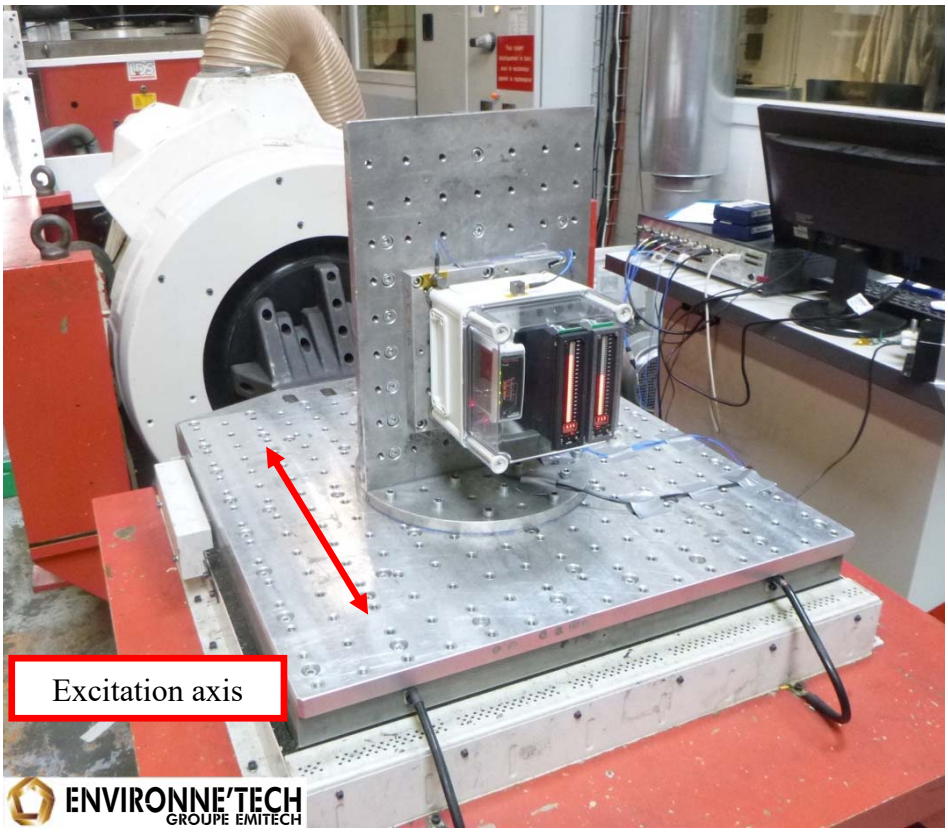


photo 7

Control accelerometers given below (P1 and P2):

photo 8

photo 9

A control strategy worked out in average on these 2 points was adopted except for the classical shocks tests (control was conducted only in P2).

5.4.2. Y axis:

Specimen set-up along Y axis given below:

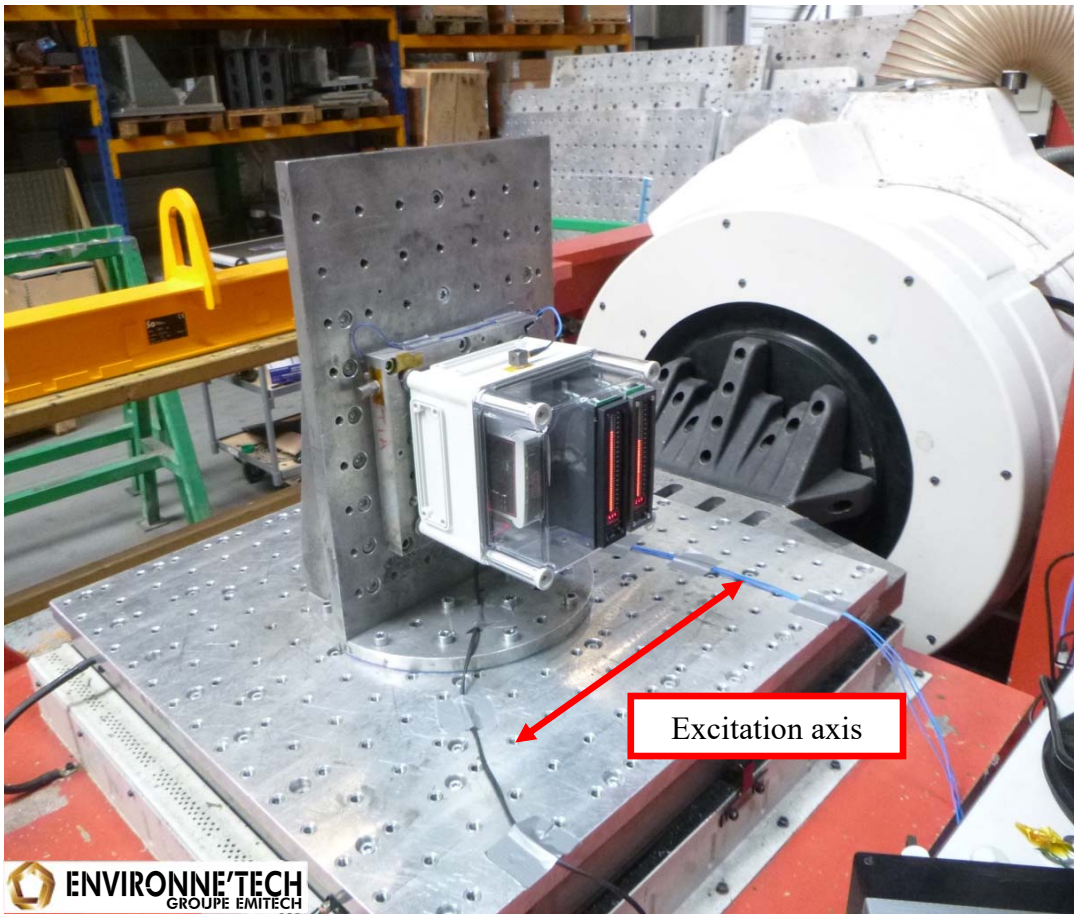


photo 10

Control accelerometers given below (P1 and P2):

photo 11

photo 12

A control strategy worked out in average on these 2 points was adopted except for the classical shocks tests (control was conducted only in P2).

5.4.3. Z axis:

Specimen set-up along Z axis given below:

photo 13

Control accelerometers given below (P1 and P2):

photo 14

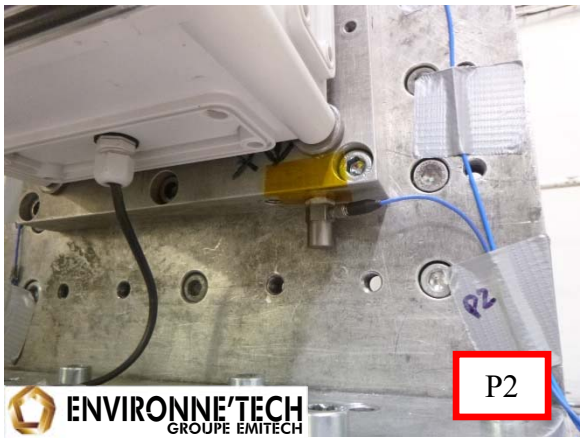


photo 15

A control strategy worked out in average on these 2 points was adopted except for the classical shocks tests (control was conducted only in P2).

5.5. Tests Results:

5.5.1. Endurance vibration test:

After all the endurance vibration tests realized following the 3 axis, we observed:

- No visual degradation
- No unscrewing of the fixing M6 screws
- The functional test was ok.

5.5.2. Shock tests:

Some problems have been observed during the shock tests, there are detailed below:

Shock tests	Visuals observations	Photos*	Functional test
Z+	/	/	OK
Z-	The lid of CAL4/100IG opened during the shocks. The CAL4/100IG opens slightly in two parts.	14 15	OK
X+	/	/	OK
X-	The lid of CAL4/100IG opened during the shocks. The CAL4/100IG opens slightly in two parts.	16 17	OK
Y+	The lid of CAL4/100IG ripped off during the shocks. The CAL4/100IG opens in two parts.	18 19	OK
Y-	The lid of CAL4/100IG ripped off during the shocks. The CAL4/100IG opens in two parts. The CAL4/100IG slides freely on the DIN rail, the stops have moved. A piece fell to the bottom of the box.	20 21 22 23 24	OK

*Photos are exposed below

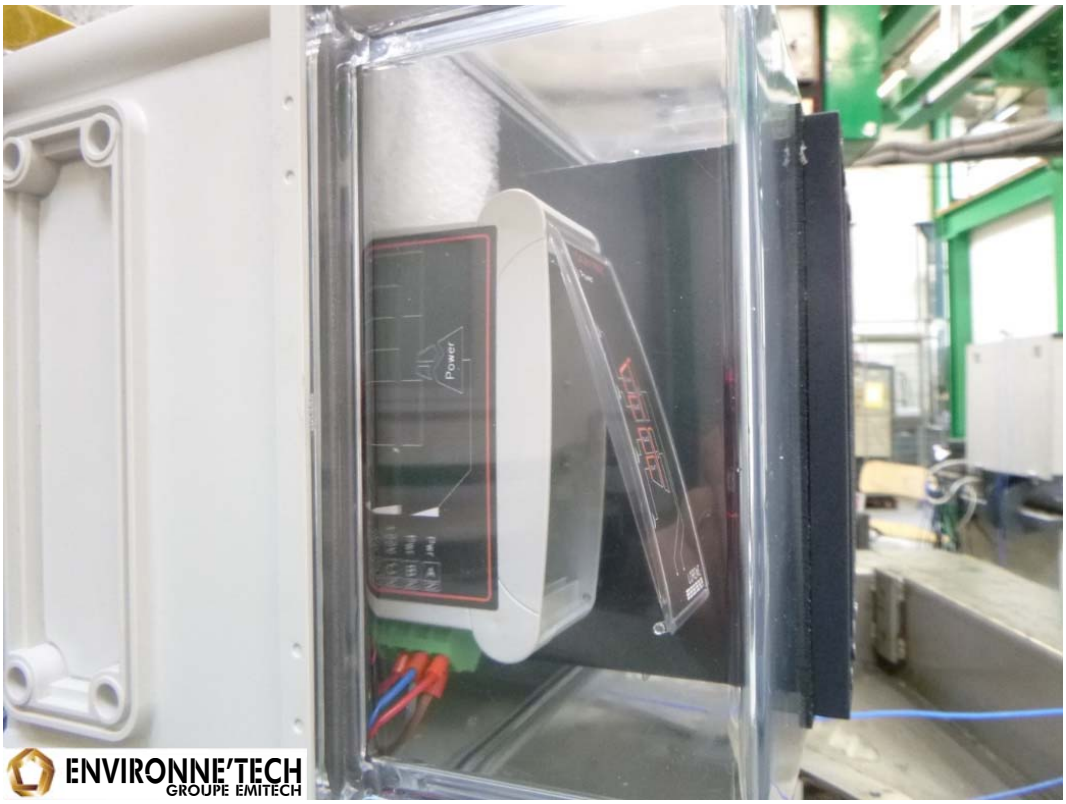


photo 16

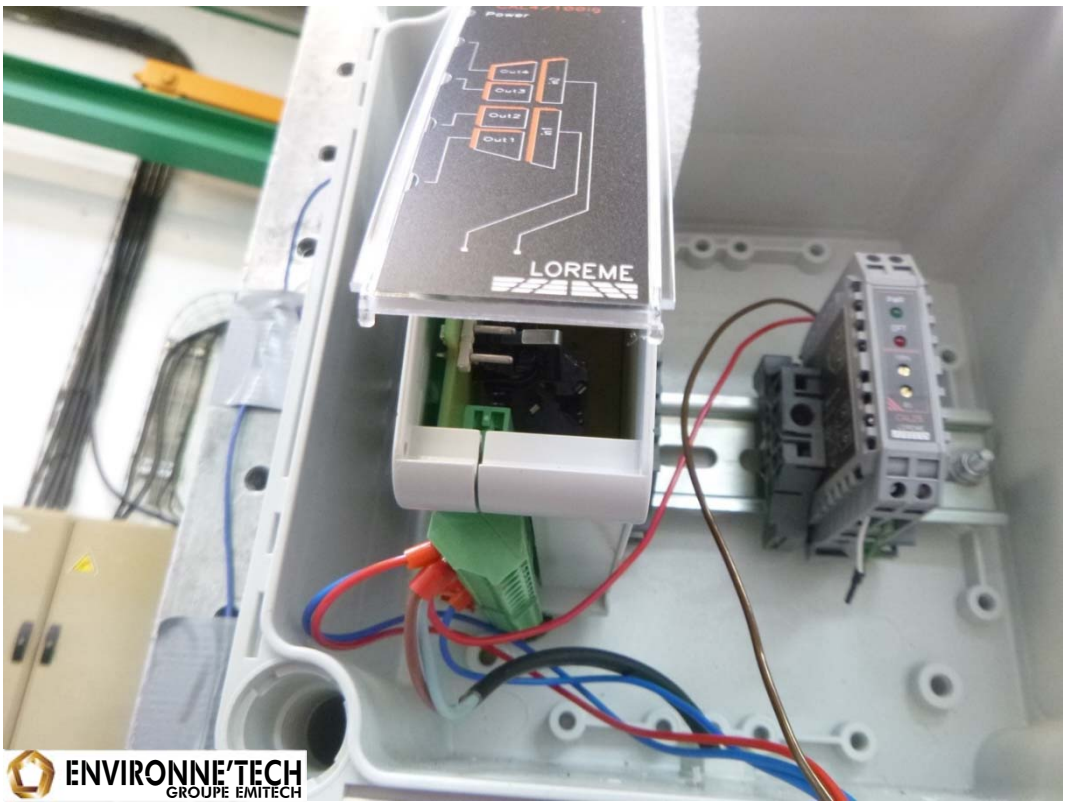


photo 17

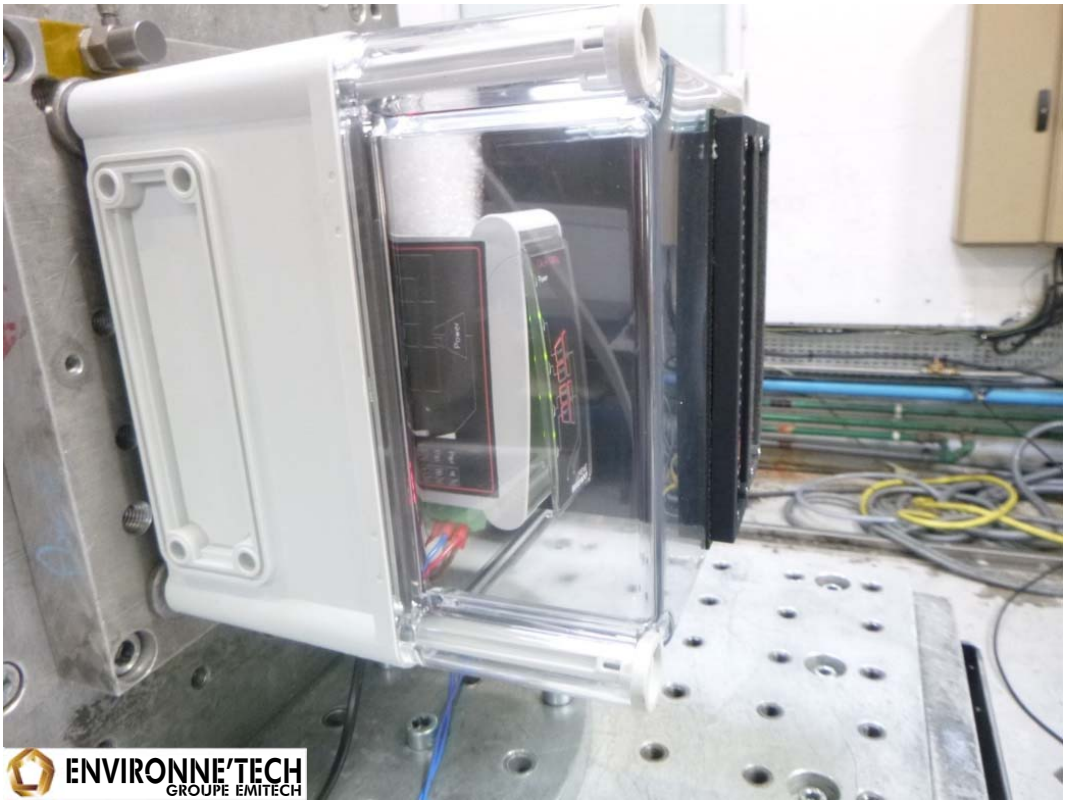


photo 18

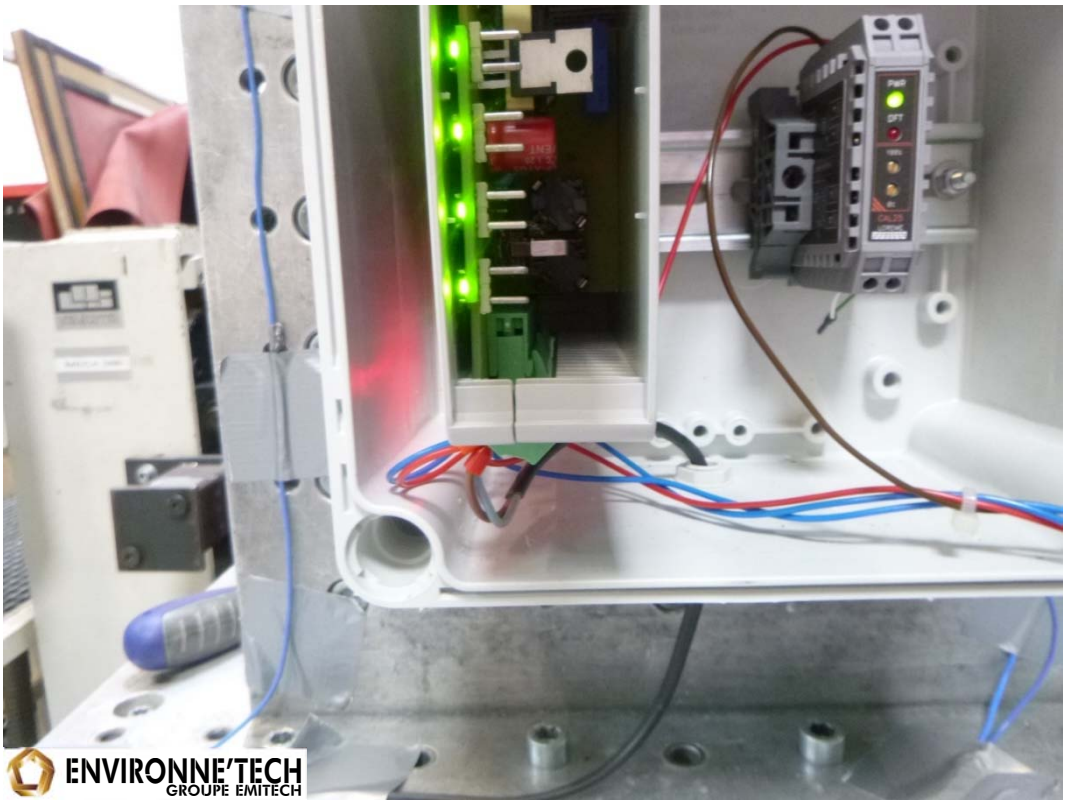


photo 19

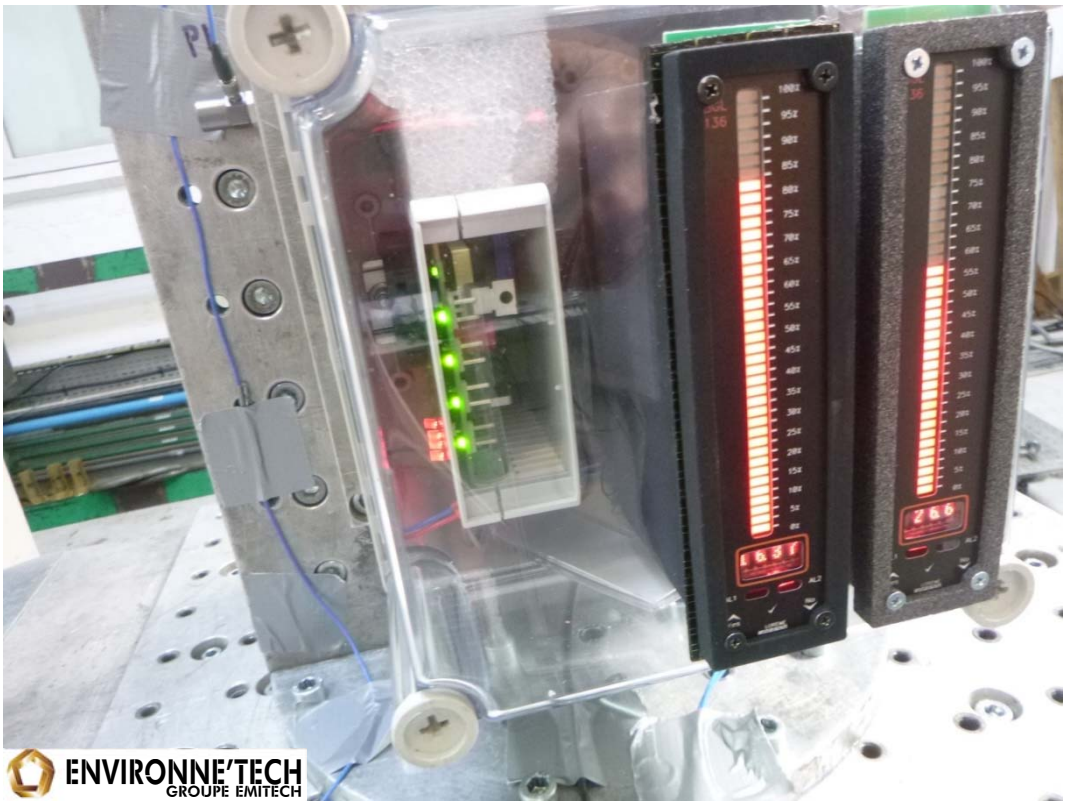


photo 20

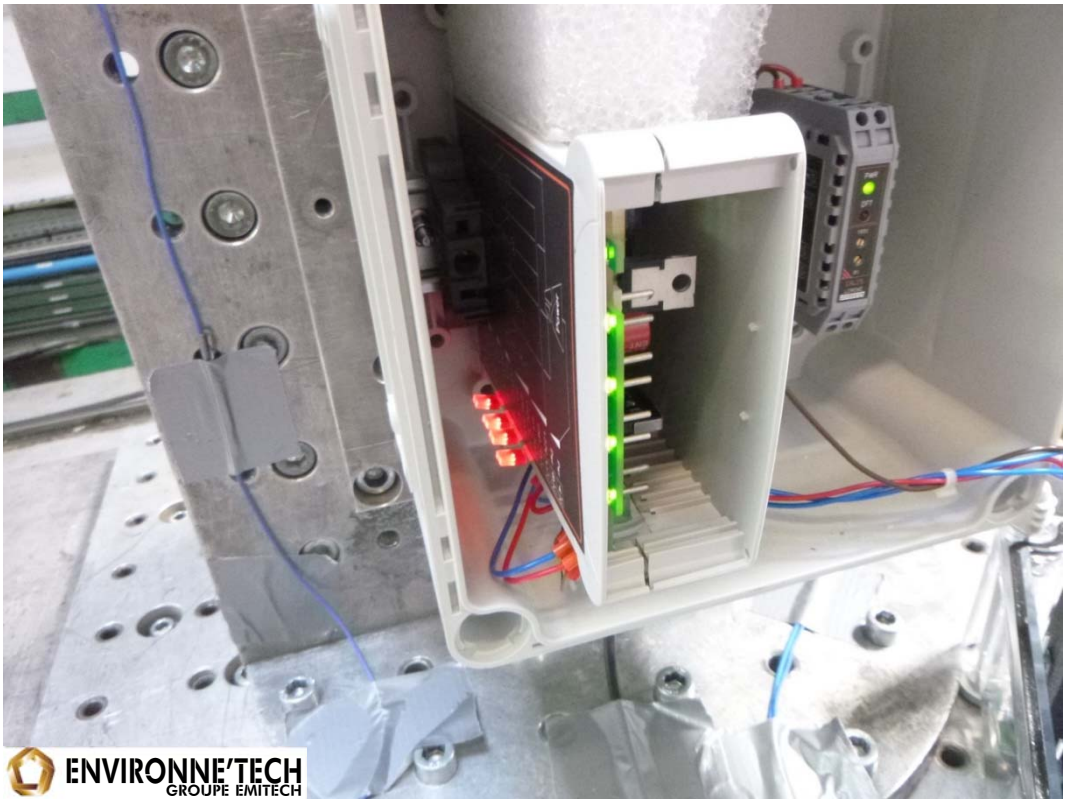
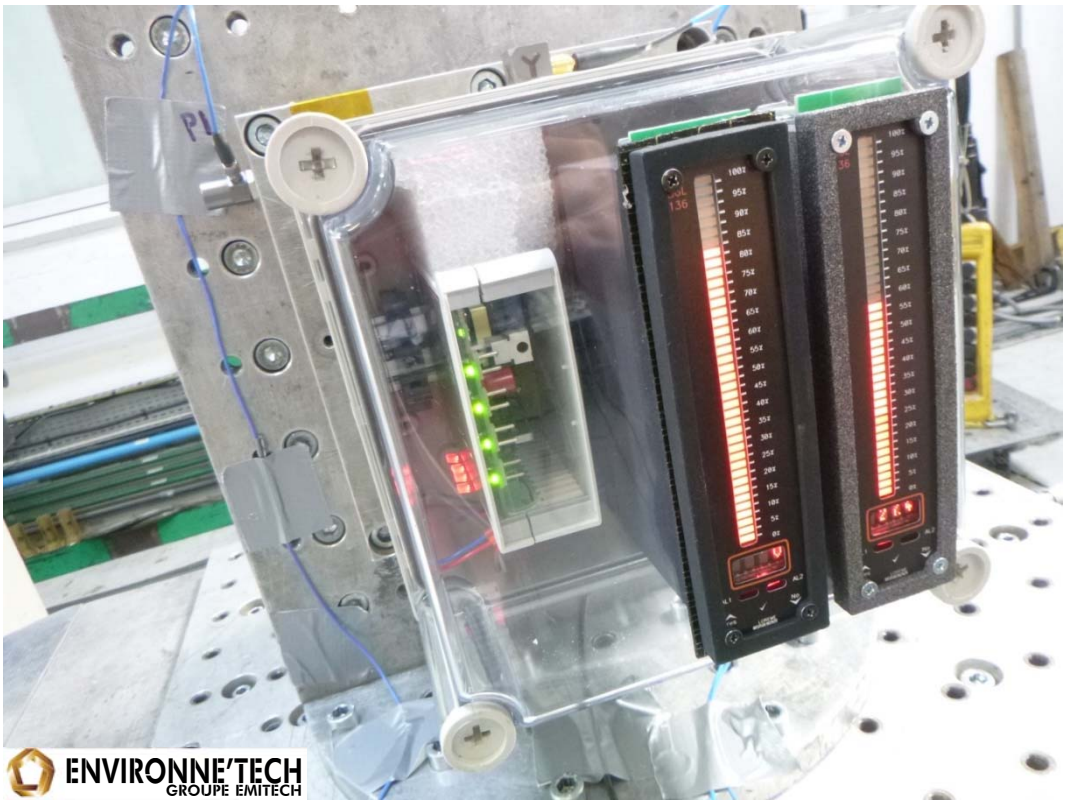


photo 21



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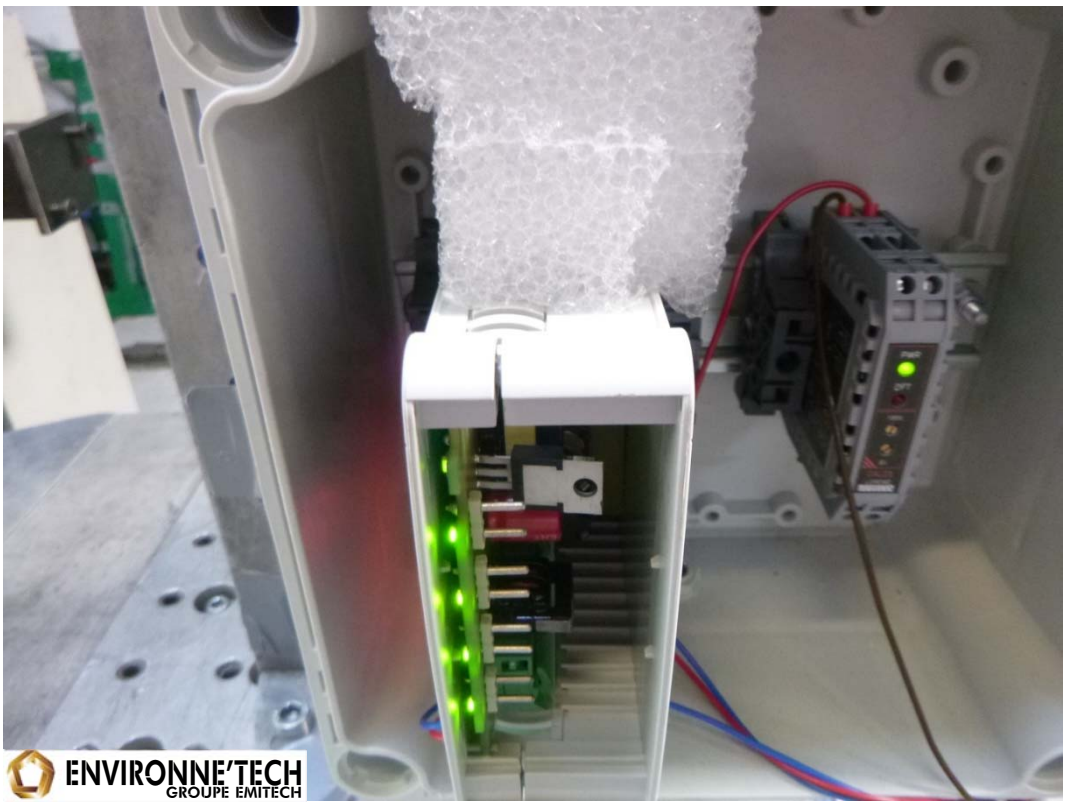

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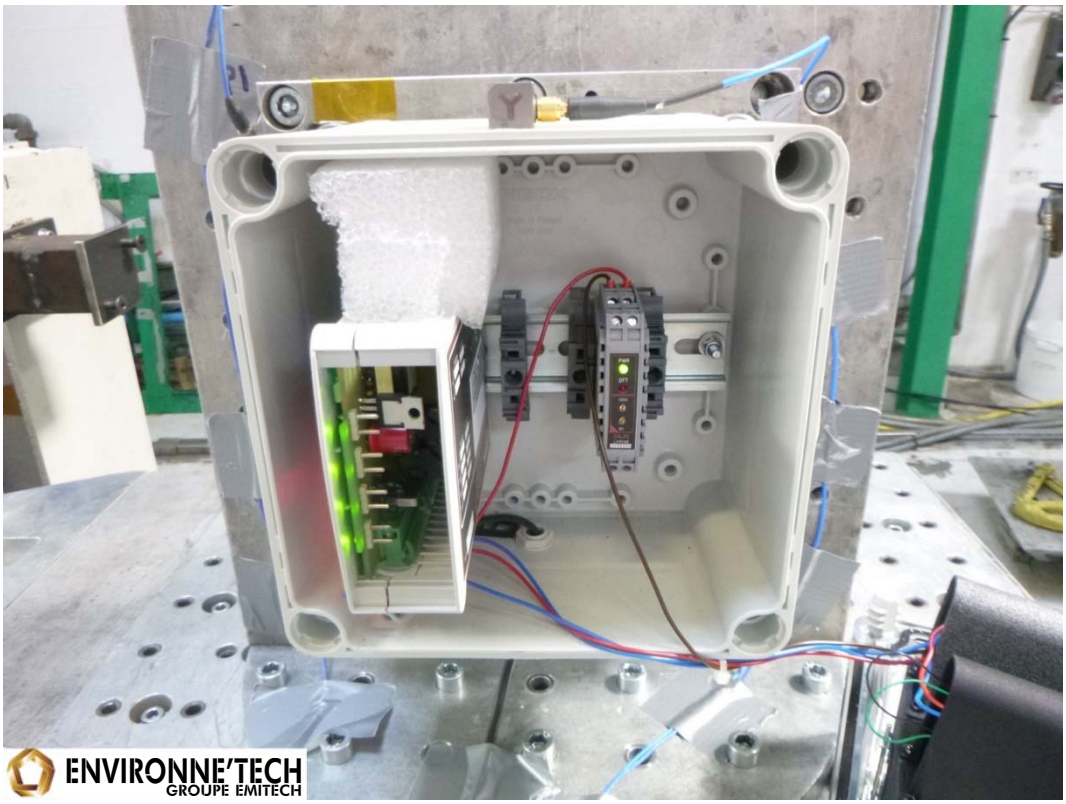

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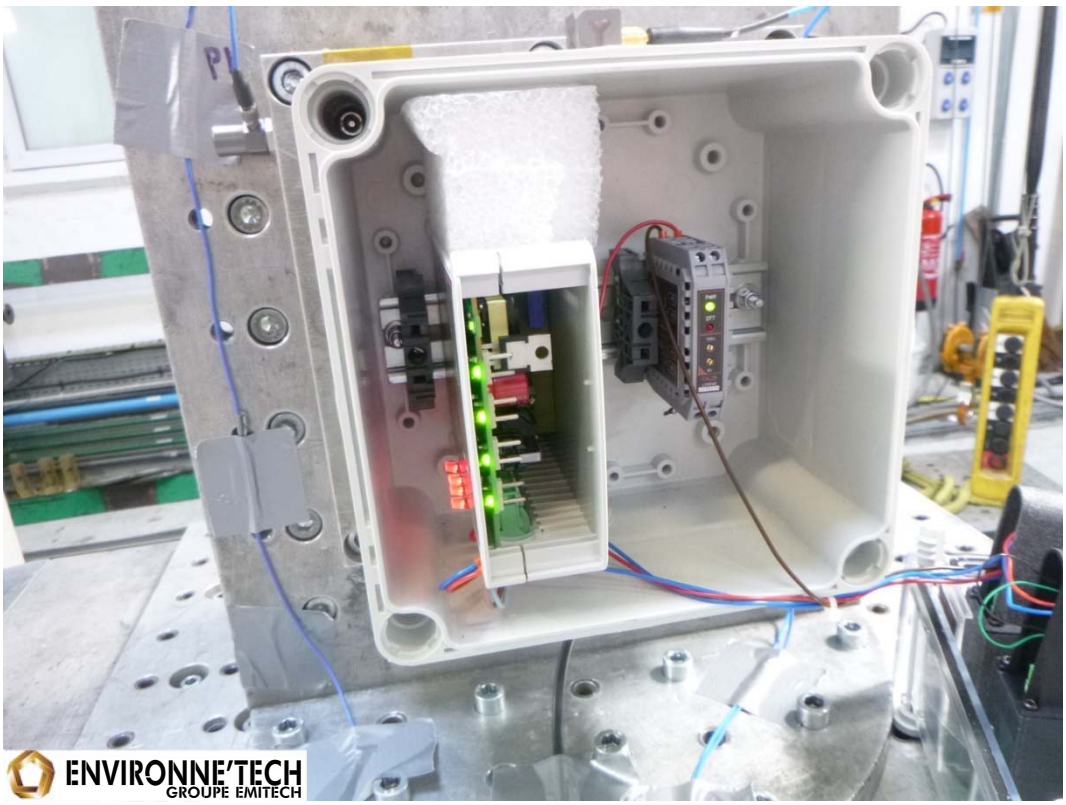
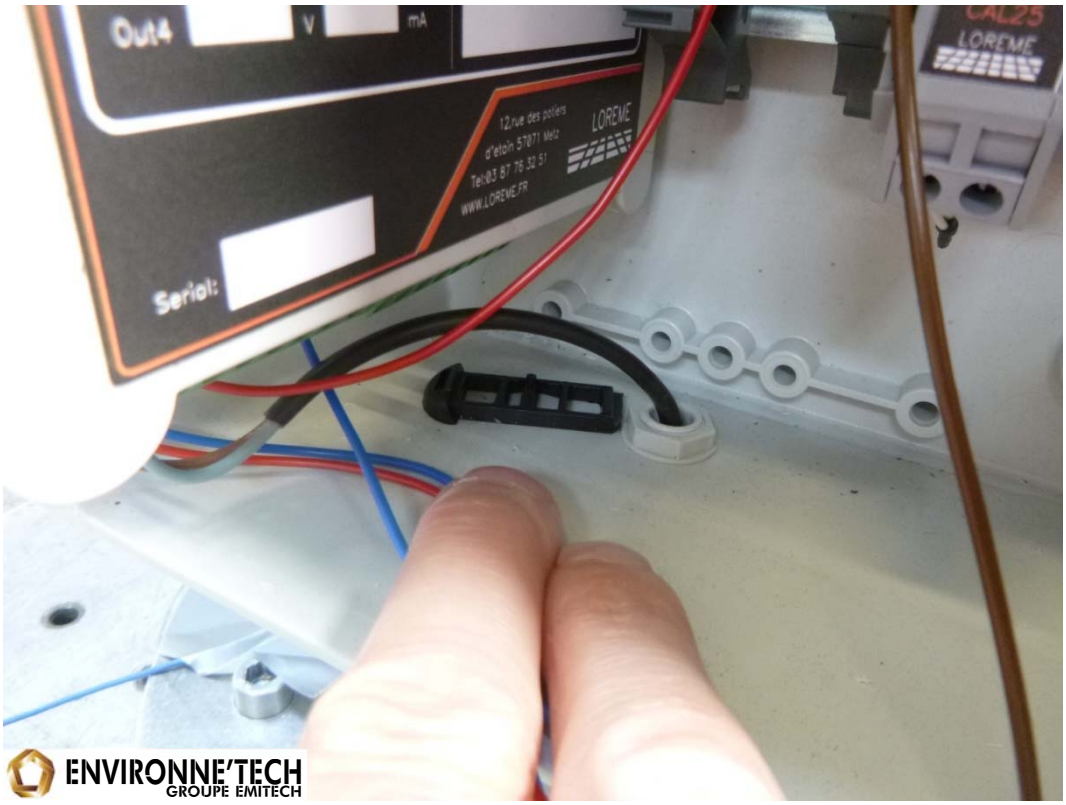


photo 25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LOREME
LOREME
ENVIRONNE'TECH
GROUPE EMITECH

photo 26

6. CONCLUSION.

Tests have been conducted on the box BGL136-NAV2 according to specifications described in chapter 3 of this report.

After all the endurance vibration tests realized following the 3 axis, we observed:

- No visual degradation
- No unscrewing of the fixing M6 screws
- The functional test was ok.

During the shock tests, some problems have been observed, see on the paragraph 5.5.2.

The box BGL136-NAV2 was sent back in this state for assessment by LOREME SA.

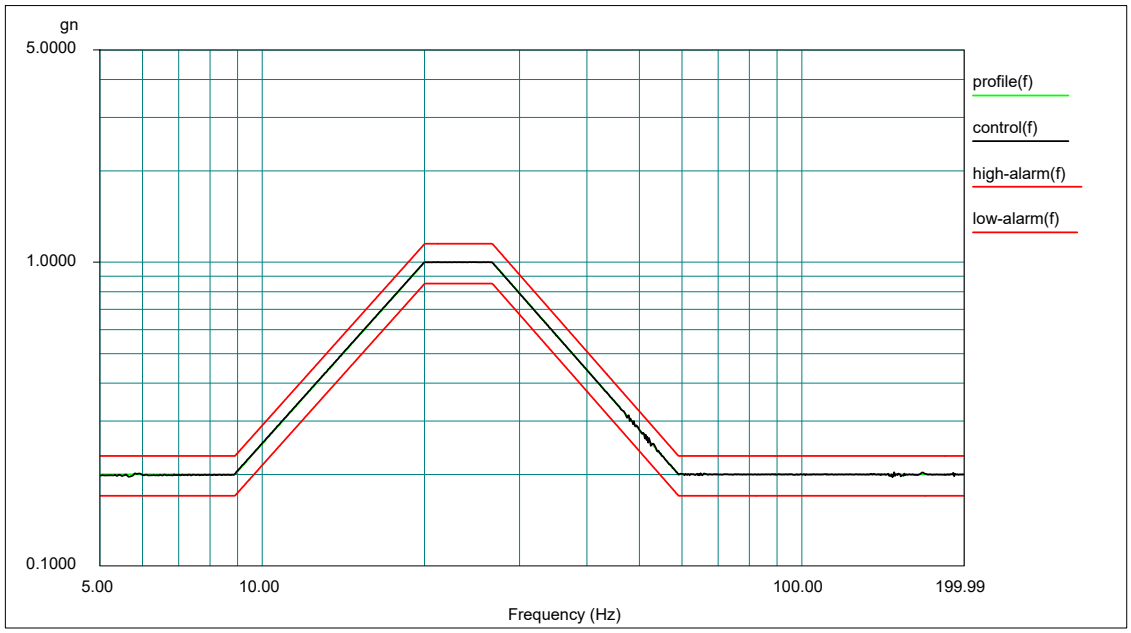
End of report, 18 pages in appendix to be forwarded

7. APPENDIX.

7.1. X AXIS:

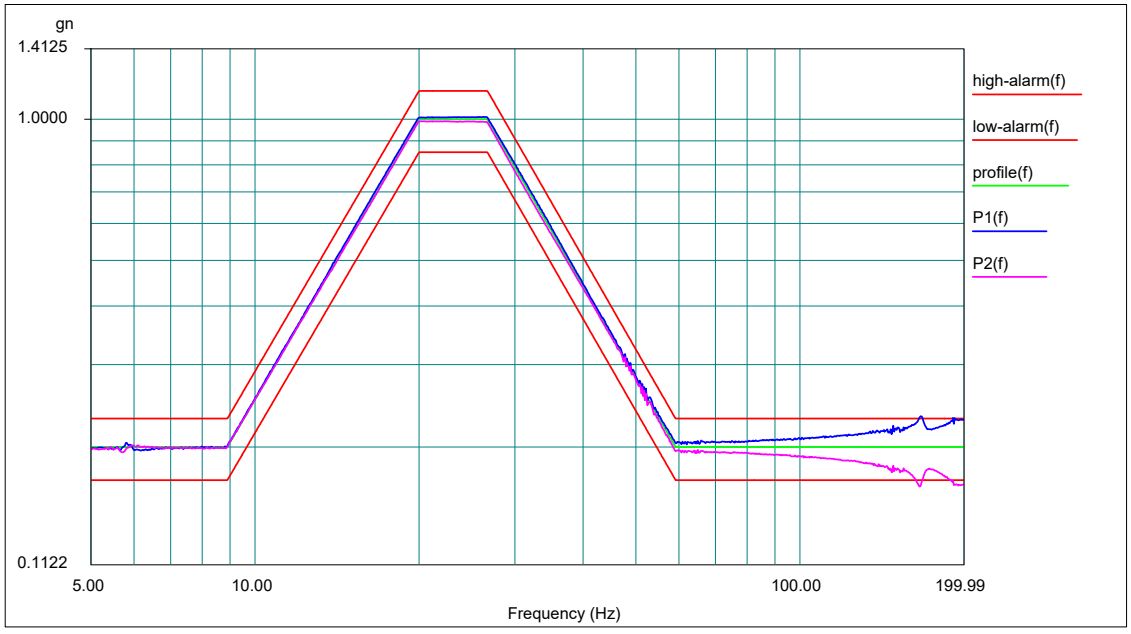
7.1.1. Endurance vibration test:

Control curve is given below:



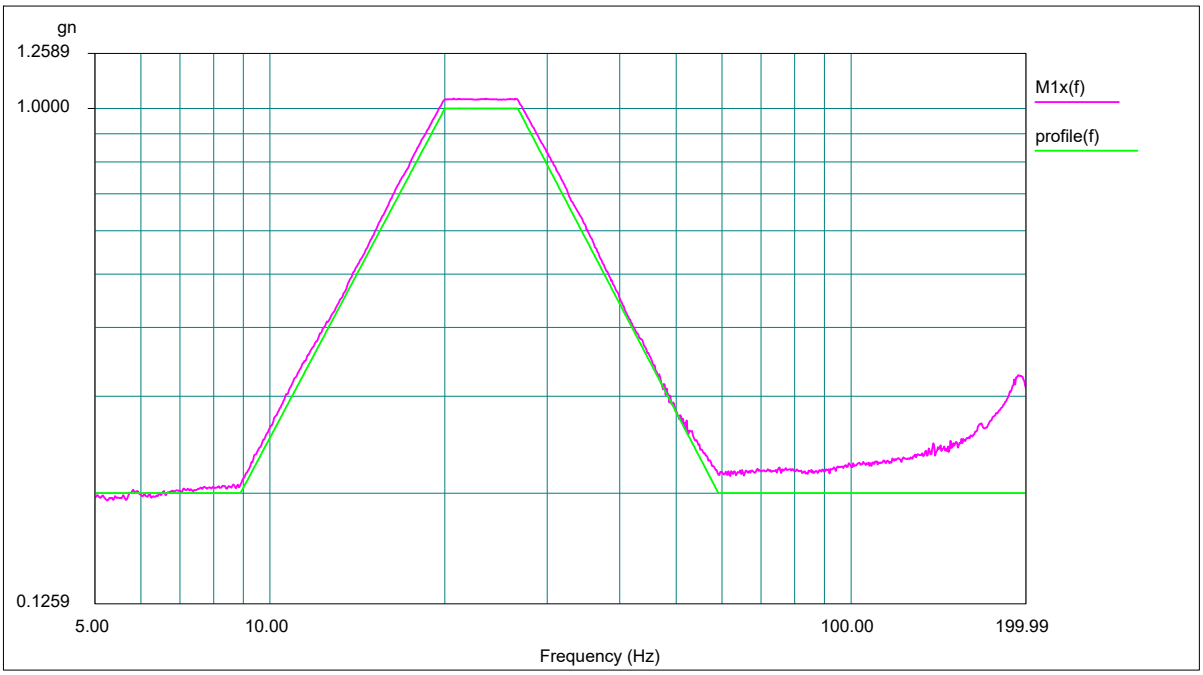
curve 1

Acceleration measurements of P1 and P2 points are given below:



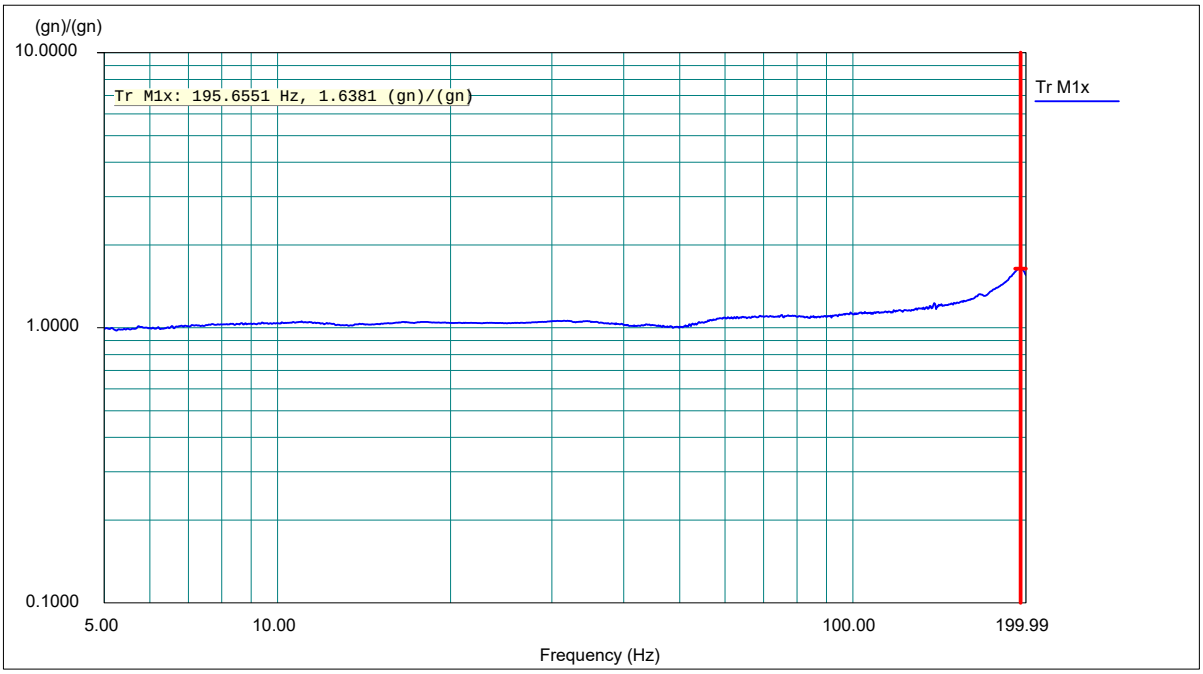
curve 2

Acceleration measurement of measurement point M1 is given below:



curve 3

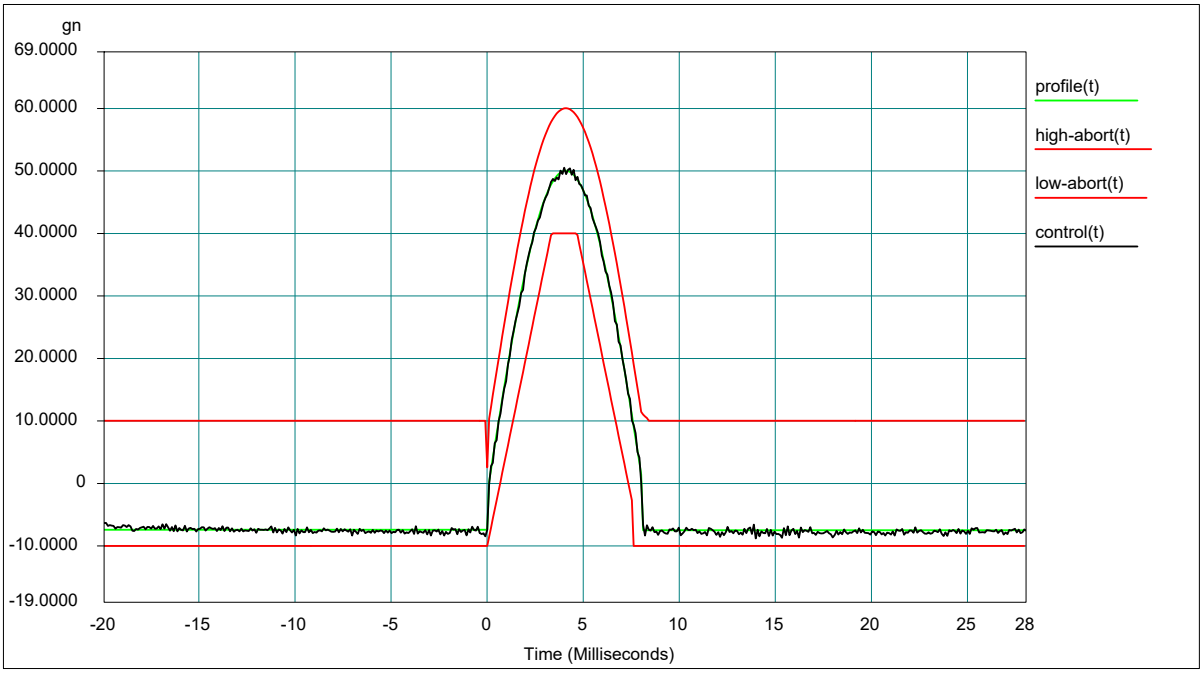
The transfer function of measurement point M1 is given below:



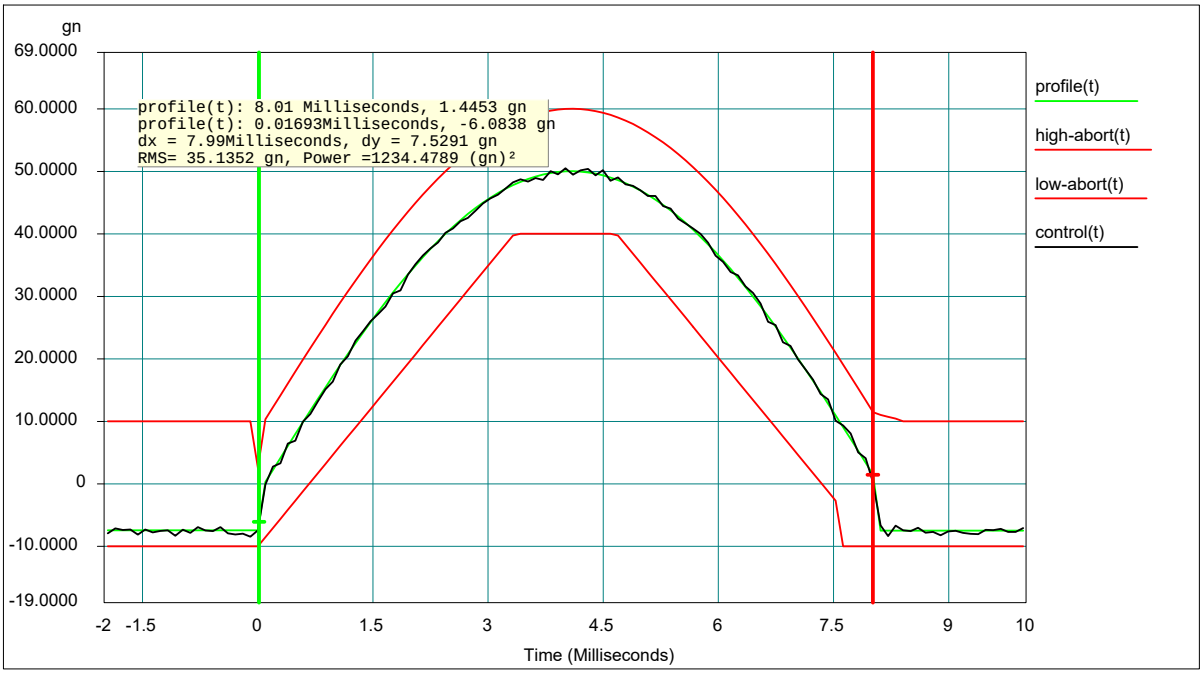
curve 4

7.1.2. Positive shock test:

Control curve is given below:

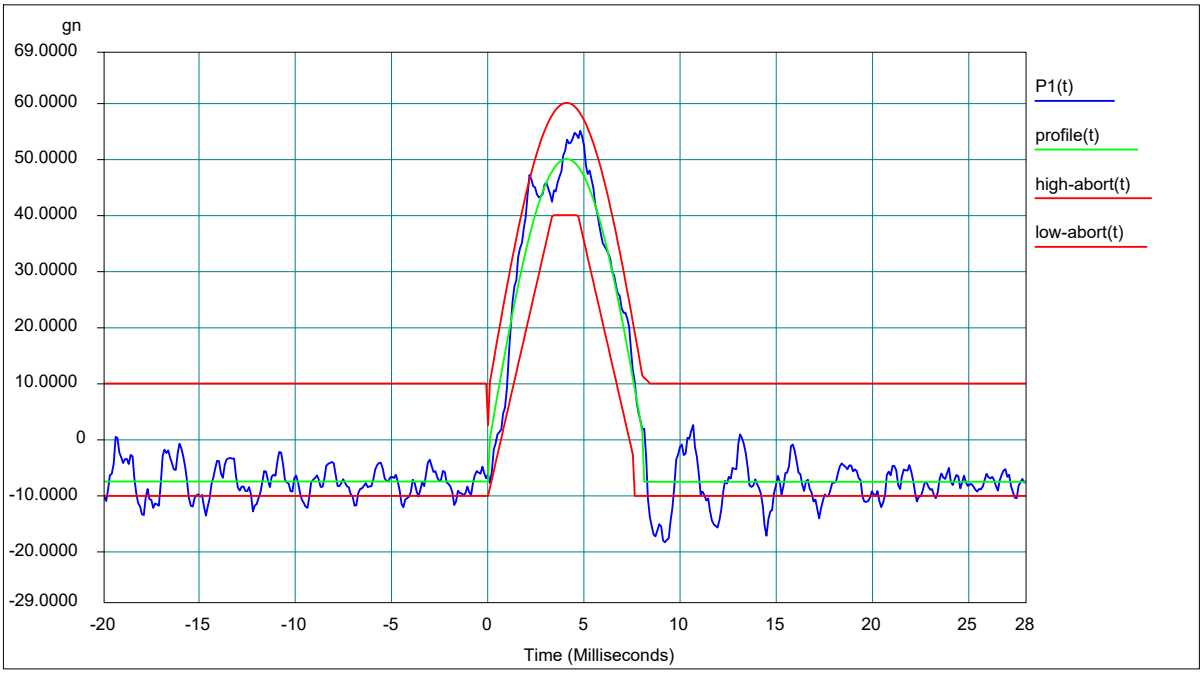


curve 5



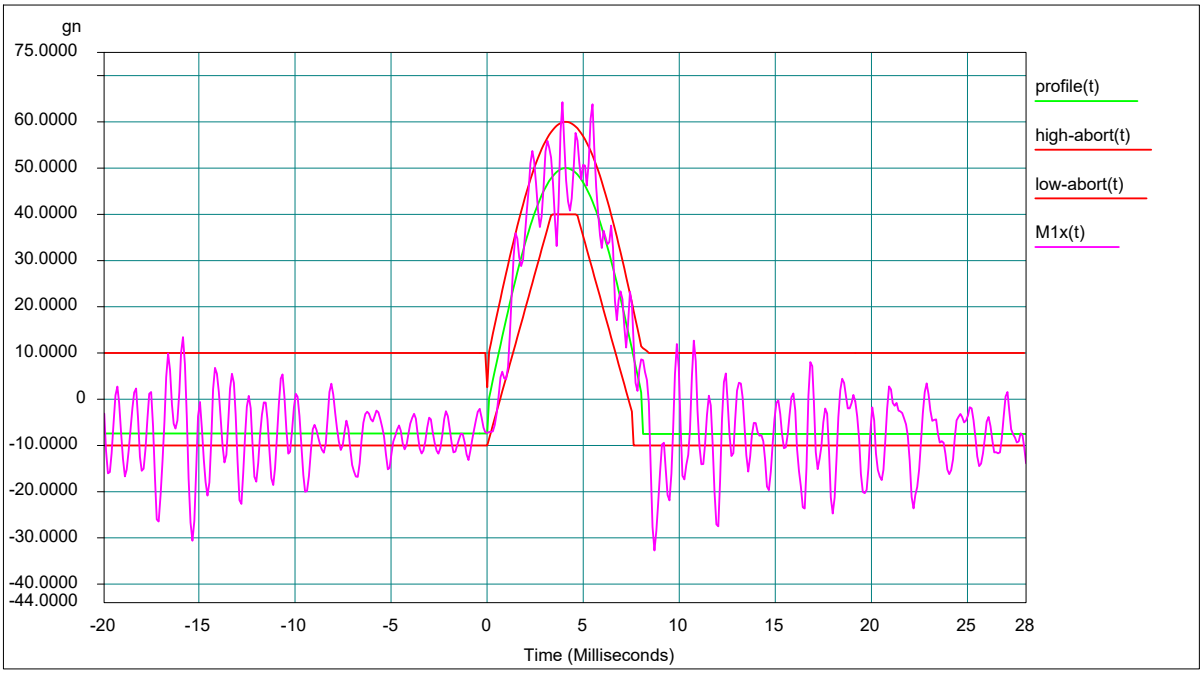
curve 6

Acceleration measurement of P1 point is given below:



curve 7

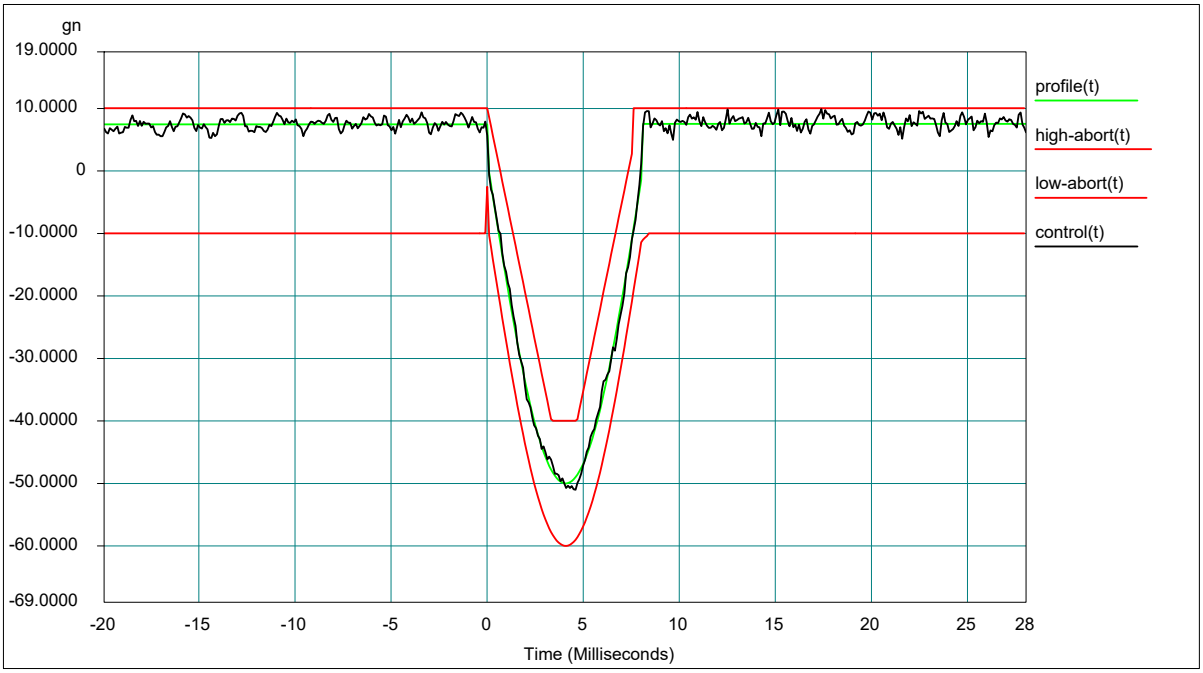
Acceleration measurement of M1 point is given below:



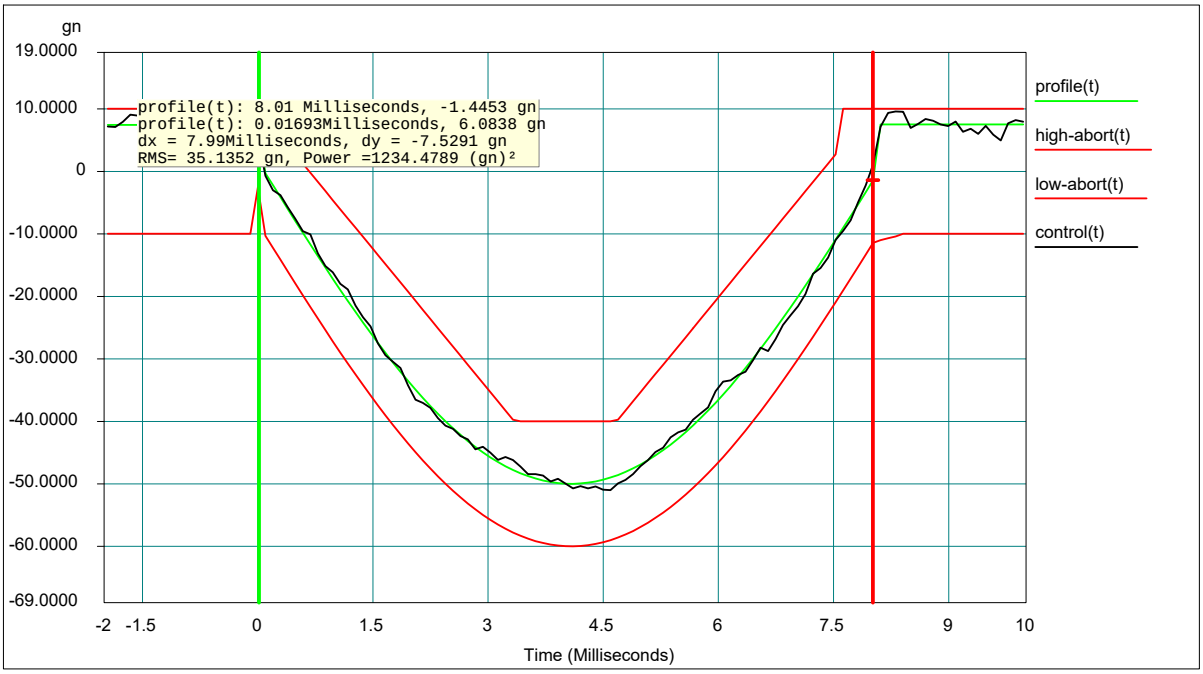
curve 8

7.1.3. Negative shock test:

Control curve is given below:

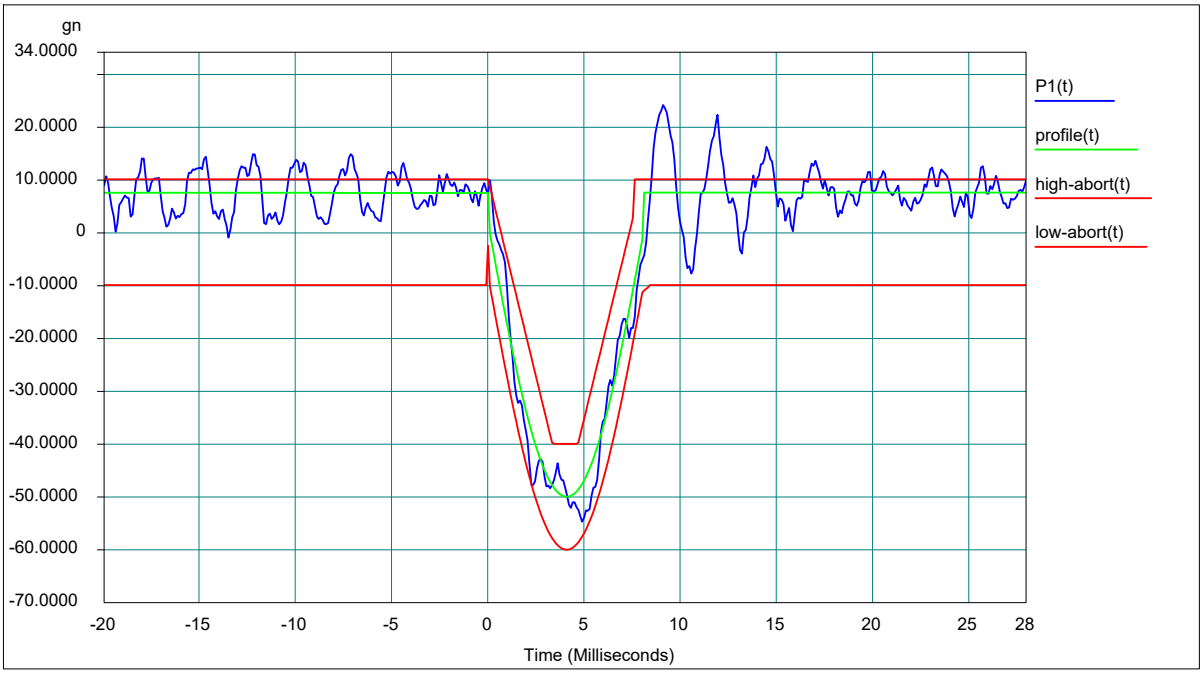


curve 9



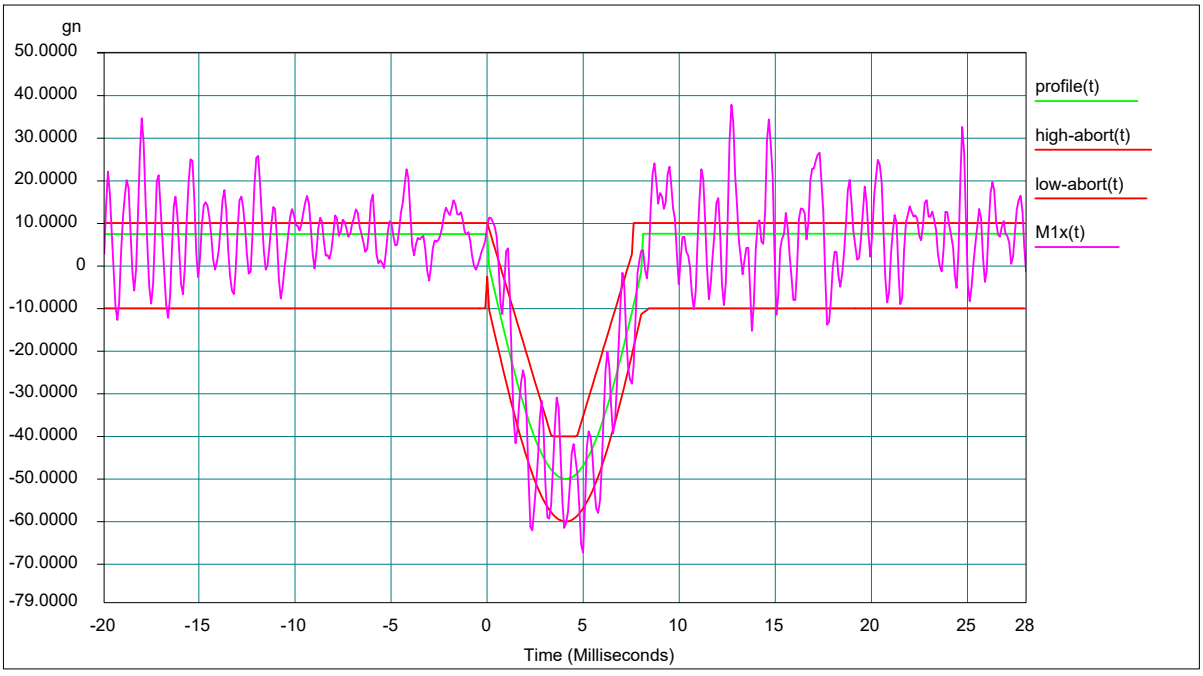
curve 10

Acceleration measurement of P1 point is given below:



curve 11

Acceleration measurement of M1 point is given below:

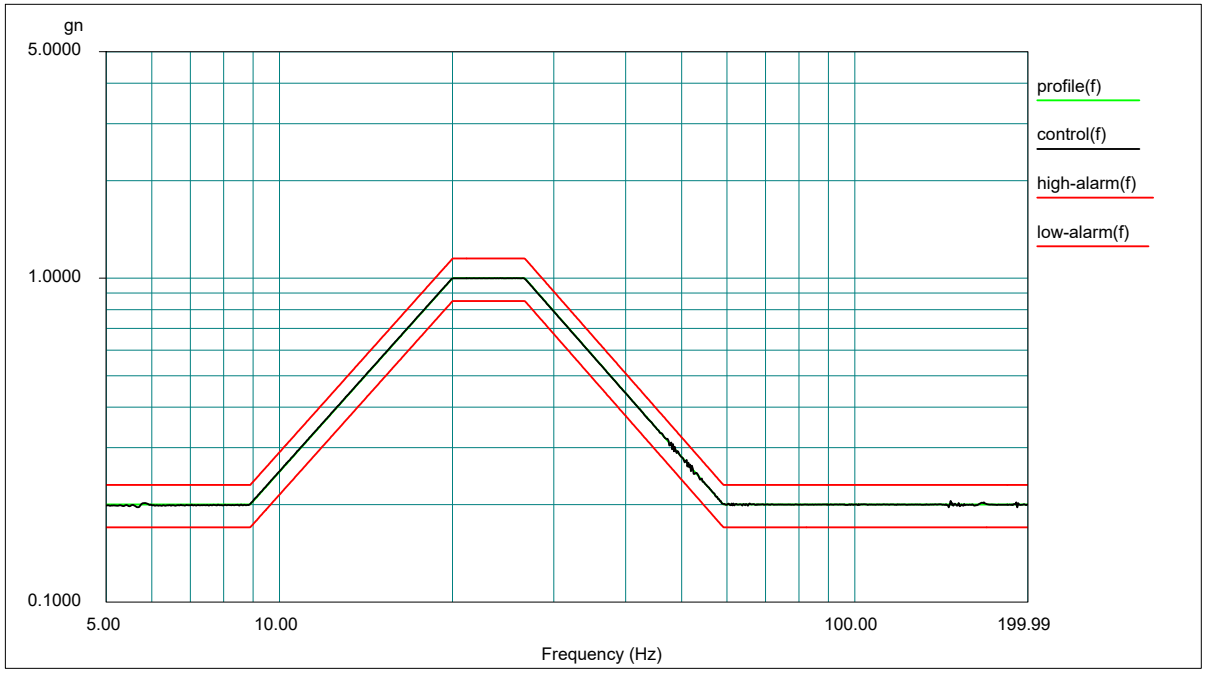


curve 12

7.2. Y AXIS:

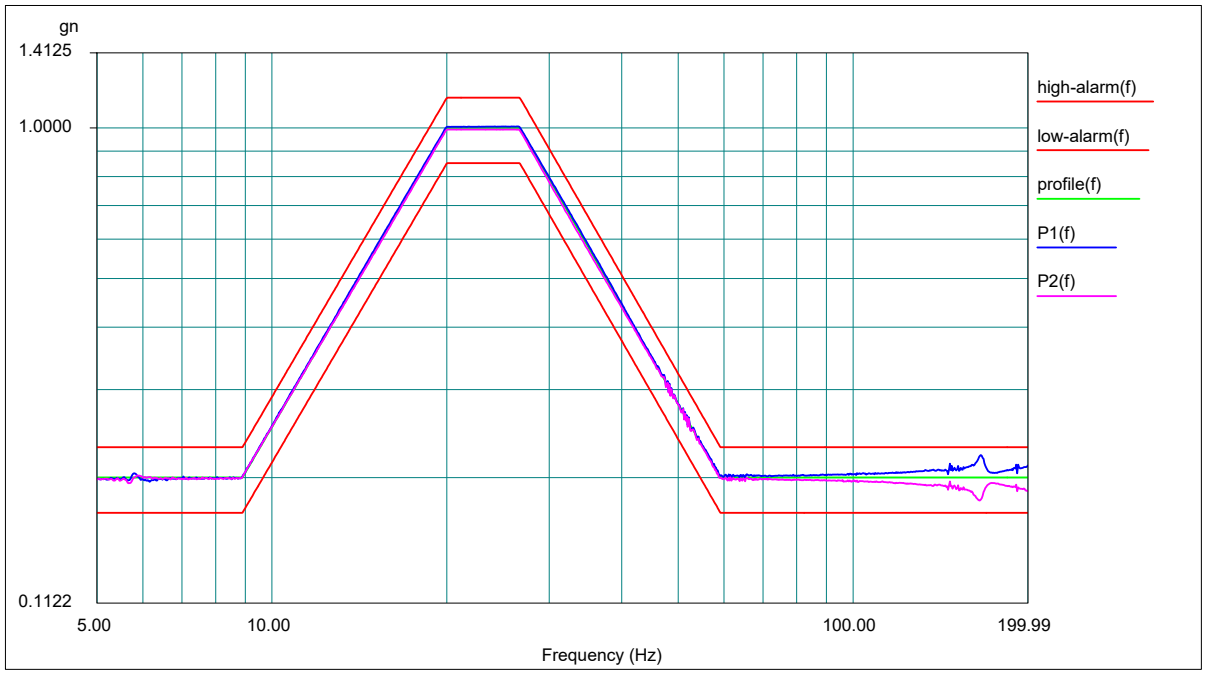
7.2.1. Endurance vibration test:

Control curve is given below:



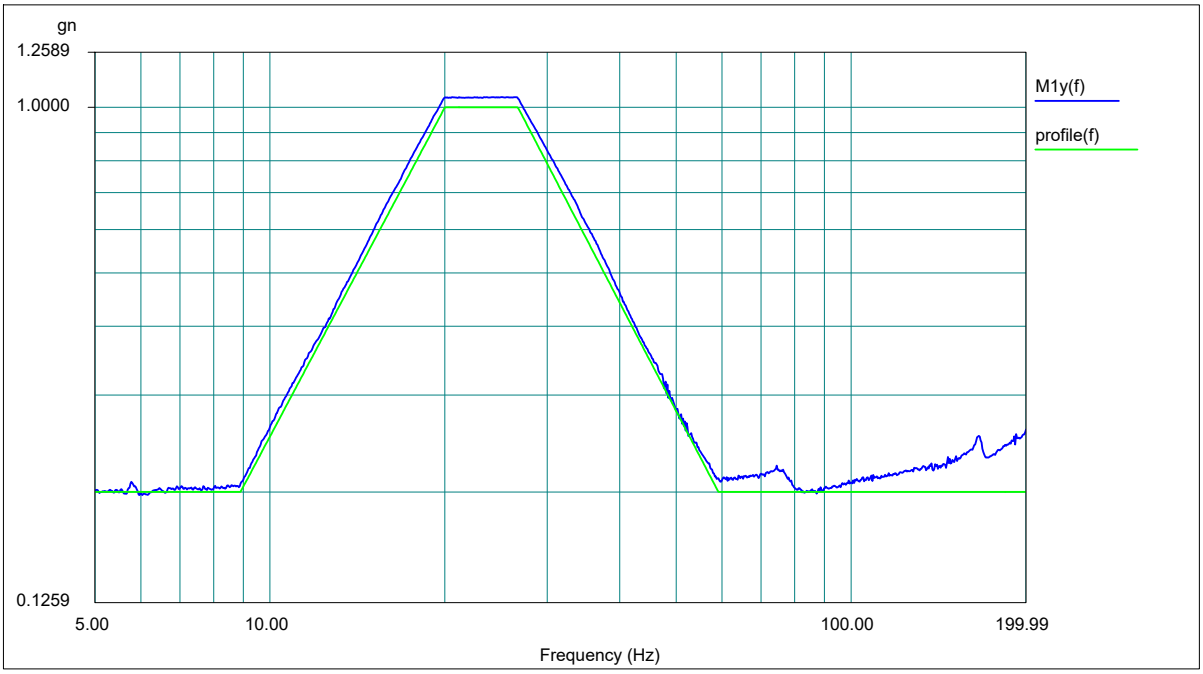
curve 13

Acceleration measurements of P1 and P2 points are given below:



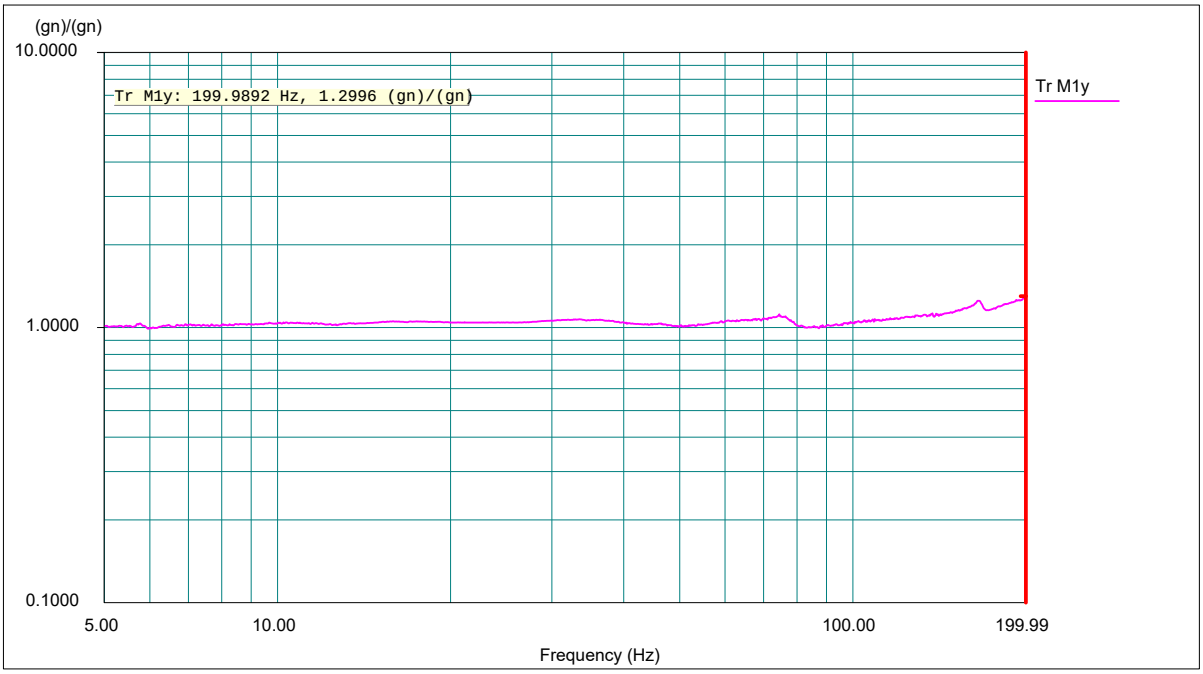
curve 14

Acceleration measurement of measurement point M1 is given below:



curve 15

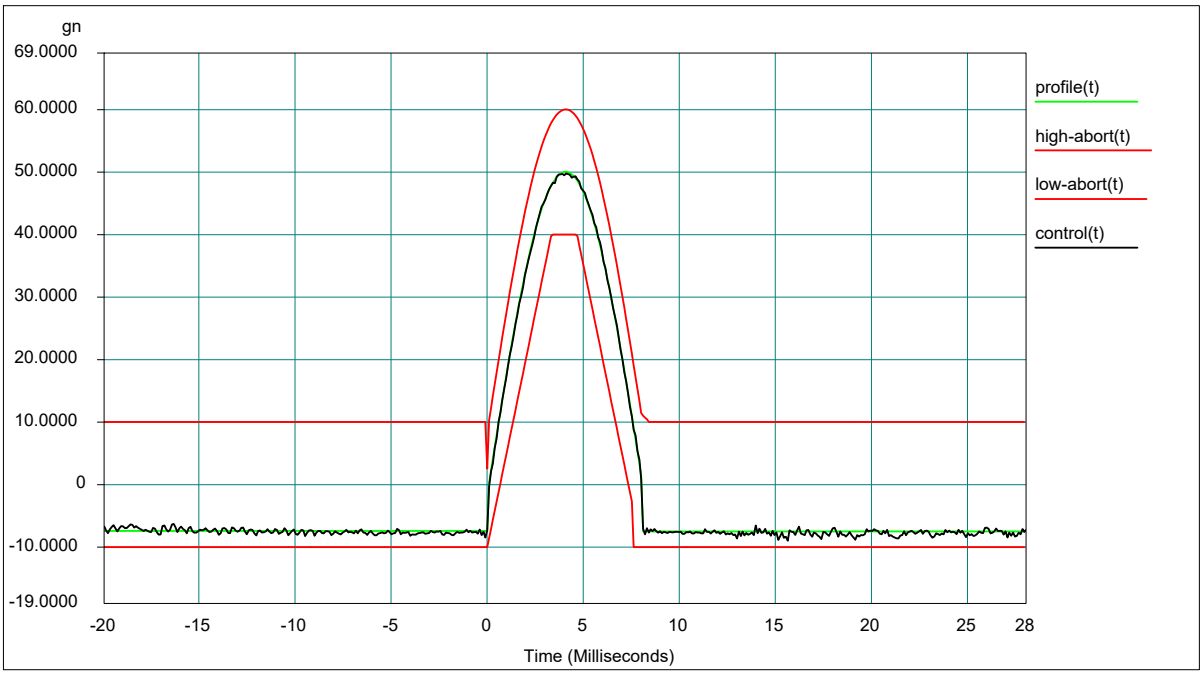
The transfer function of measurement point M1 is given below:



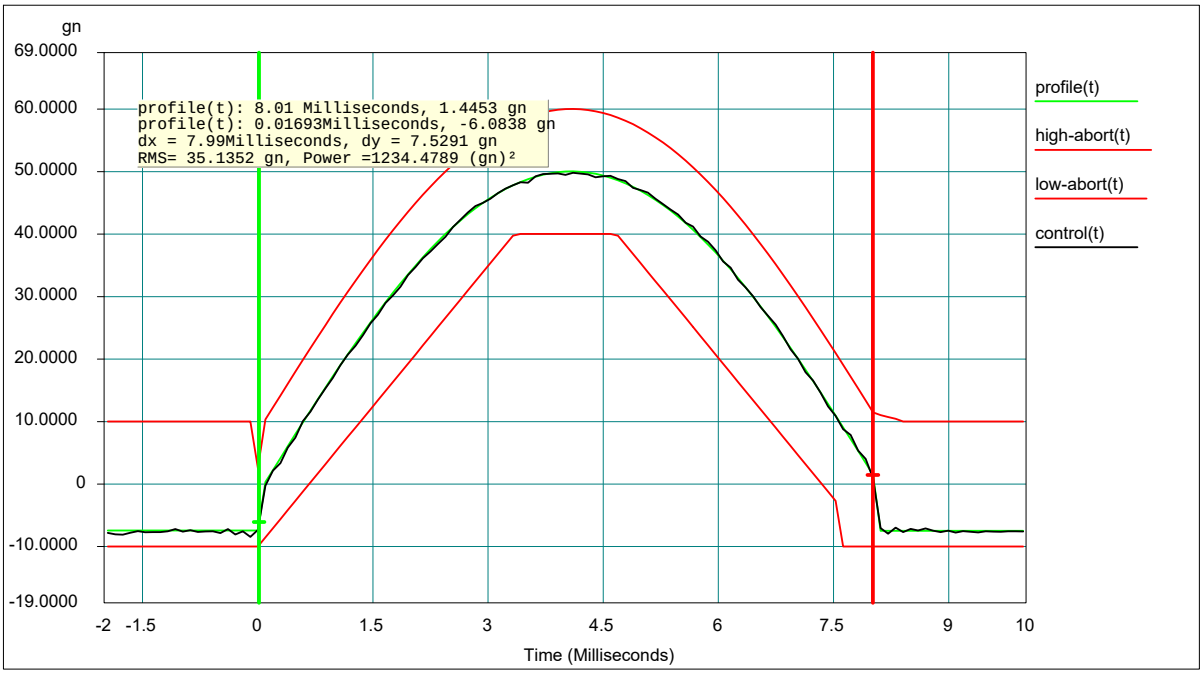
curve 16

7.2.2. Positive shock test:

Control curve is given below:

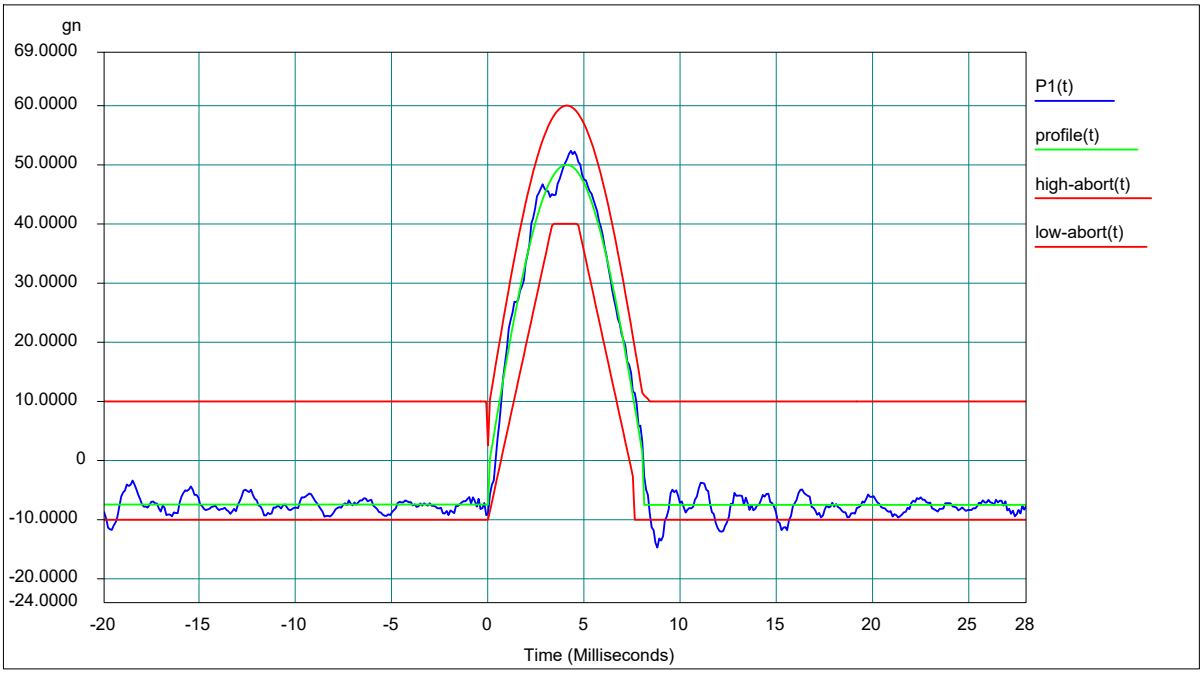


curve 17



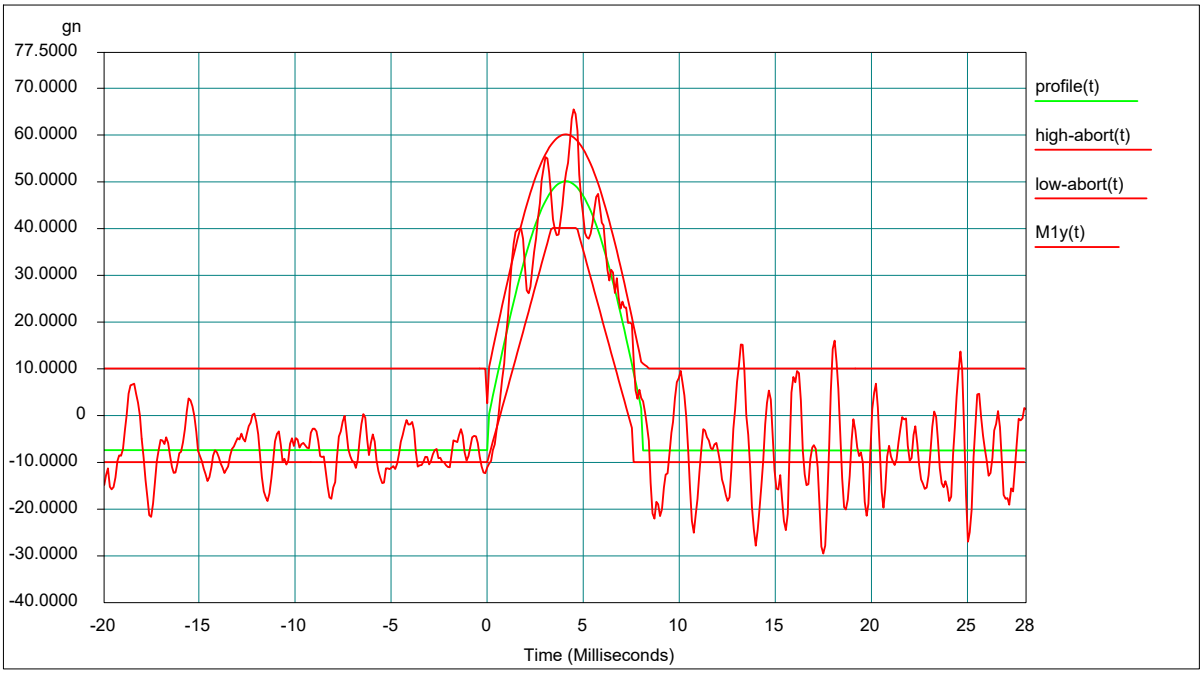
curve 18

Acceleration measurement of P1 point is given below:



curve 19

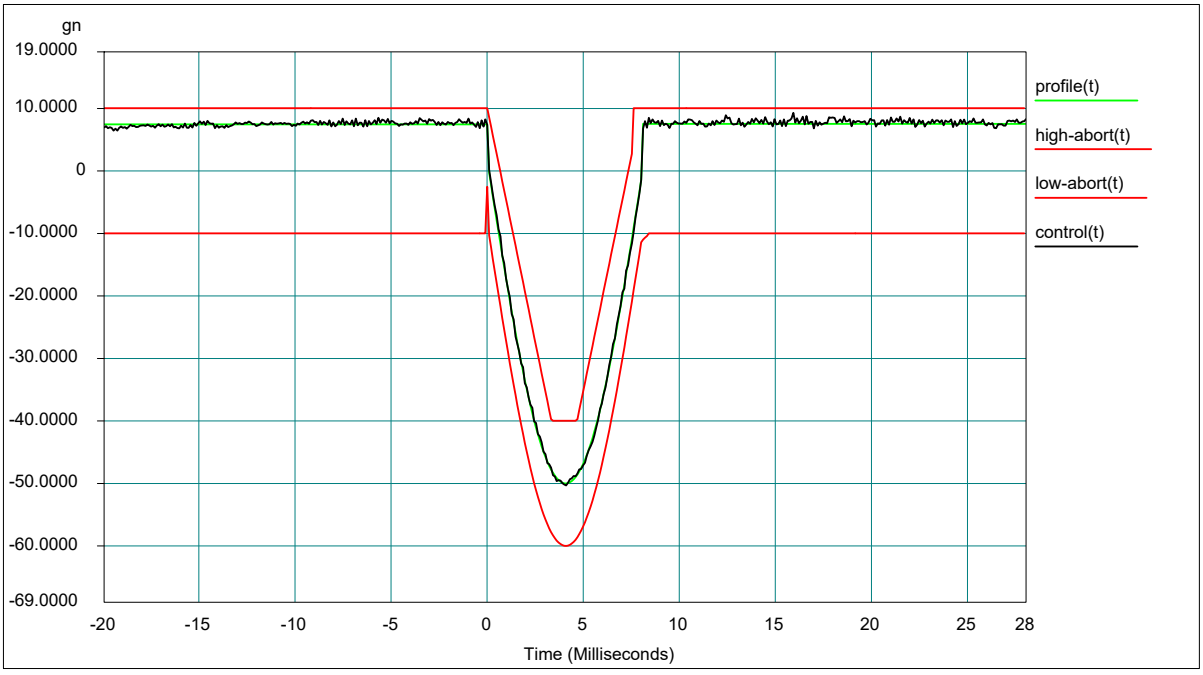
Acceleration measurement of M1 point is given below:



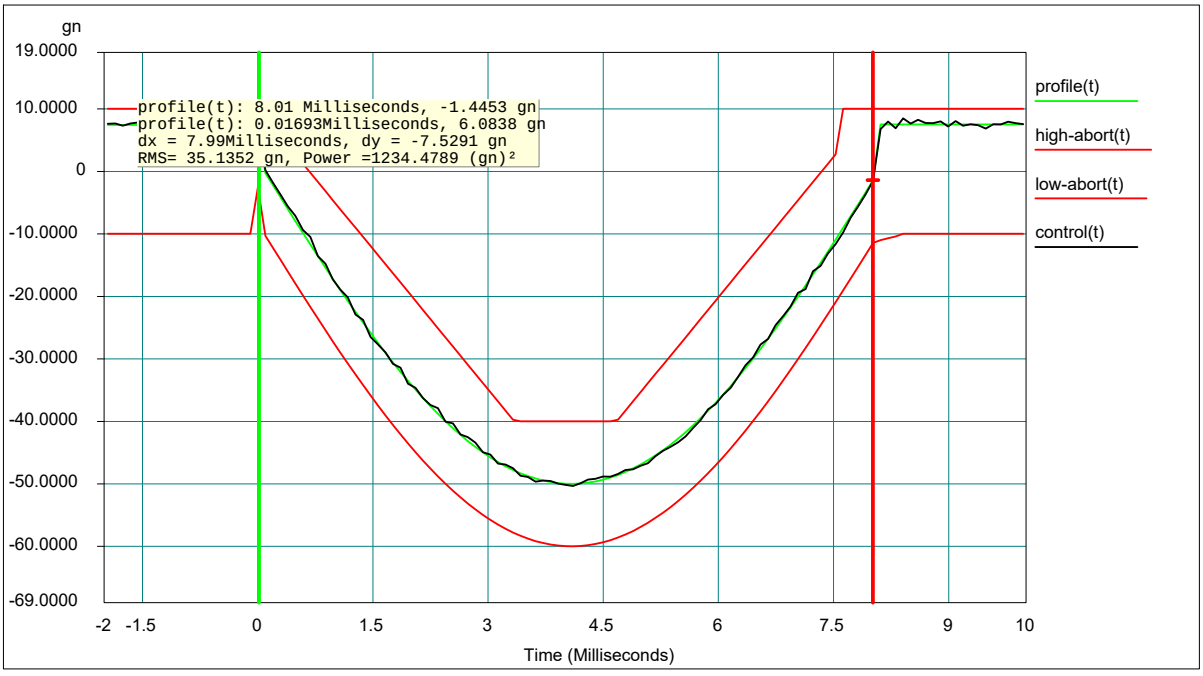
curve 20

7.2.3. Negative shock test:

Control curve is given below:

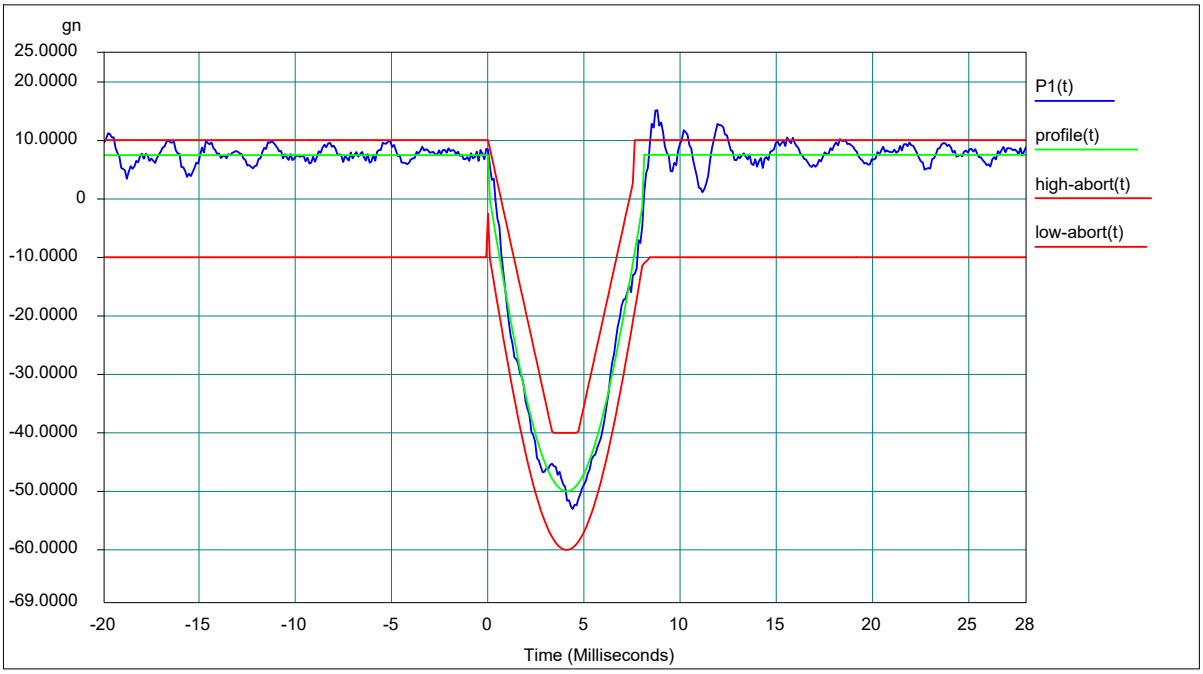


curve 21



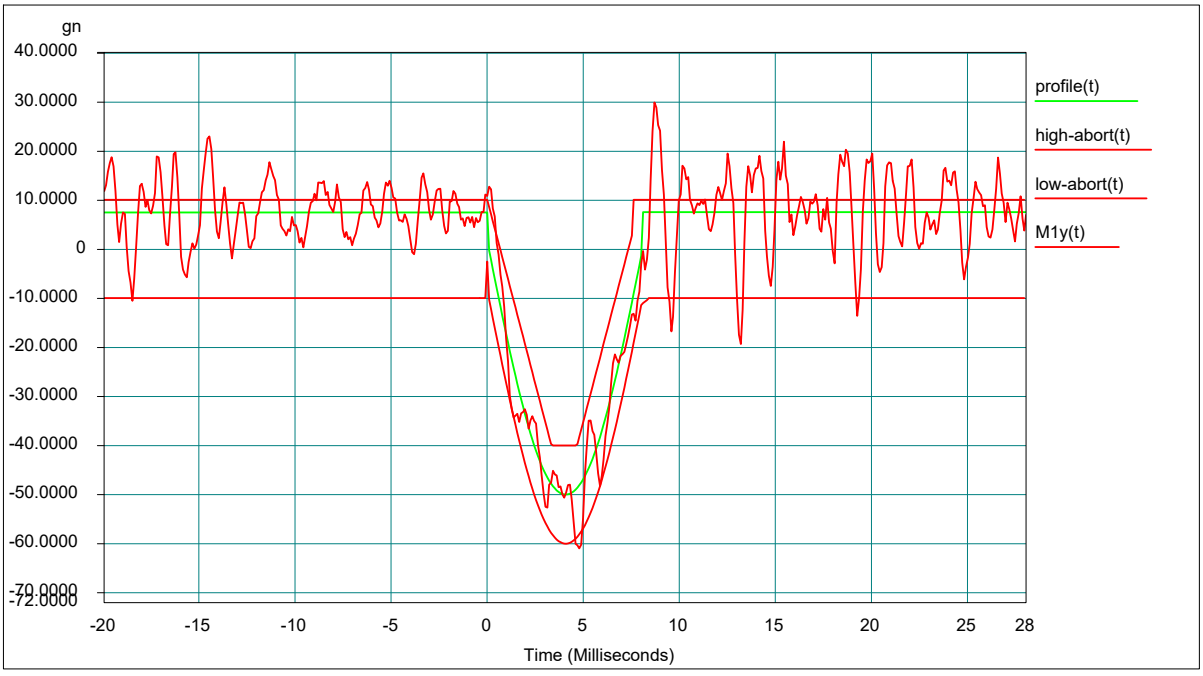
curve 22

Acceleration measurement of P1 point is given below:



curve 23

Acceleration measurement of M1 point is given below:

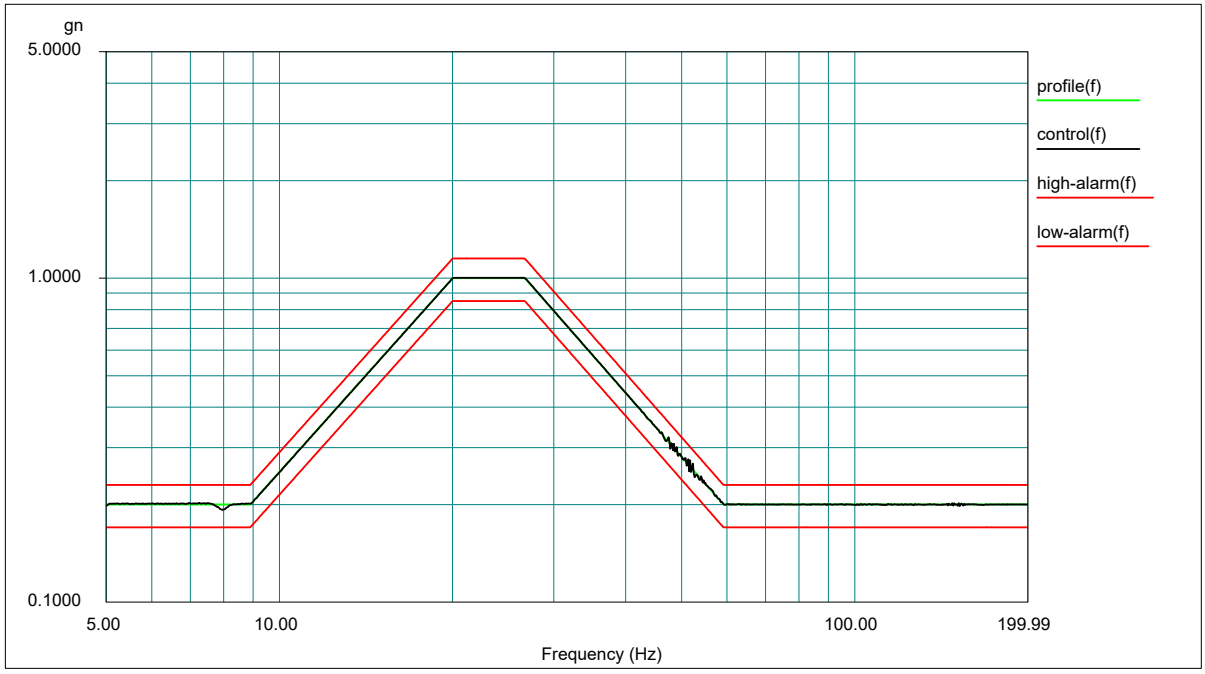


curve 24

7.3. Z AXIS:

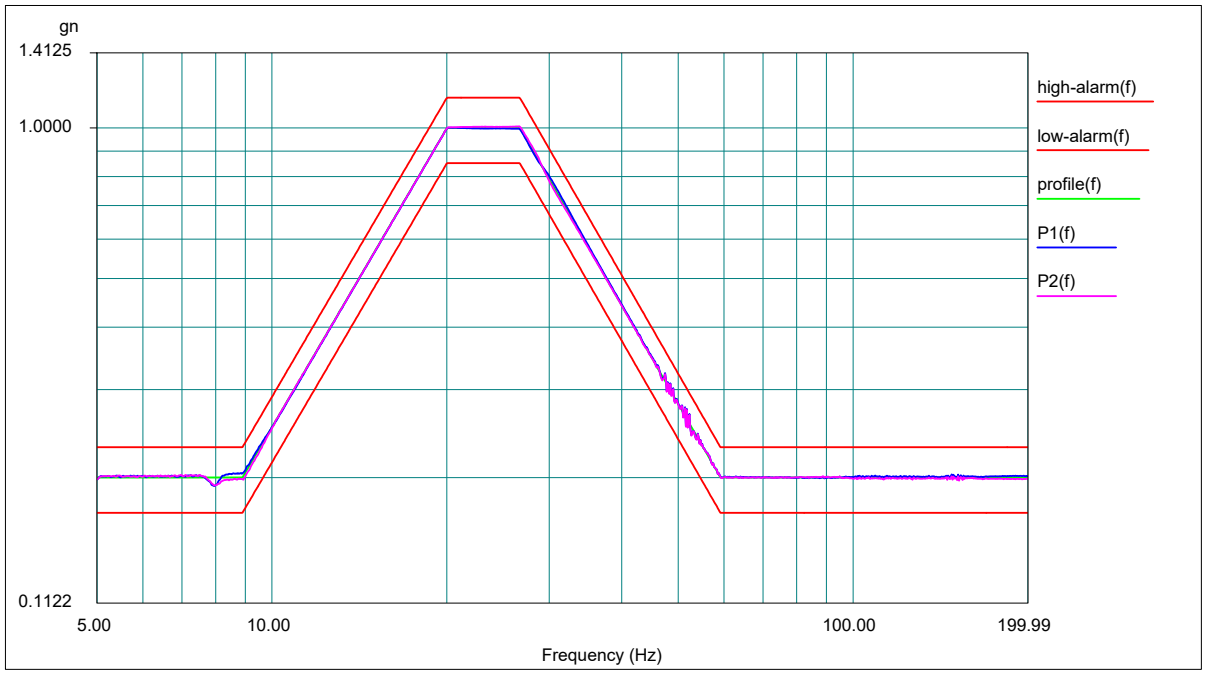
7.3.1. Endurance vibration test:

Control curve is given below:



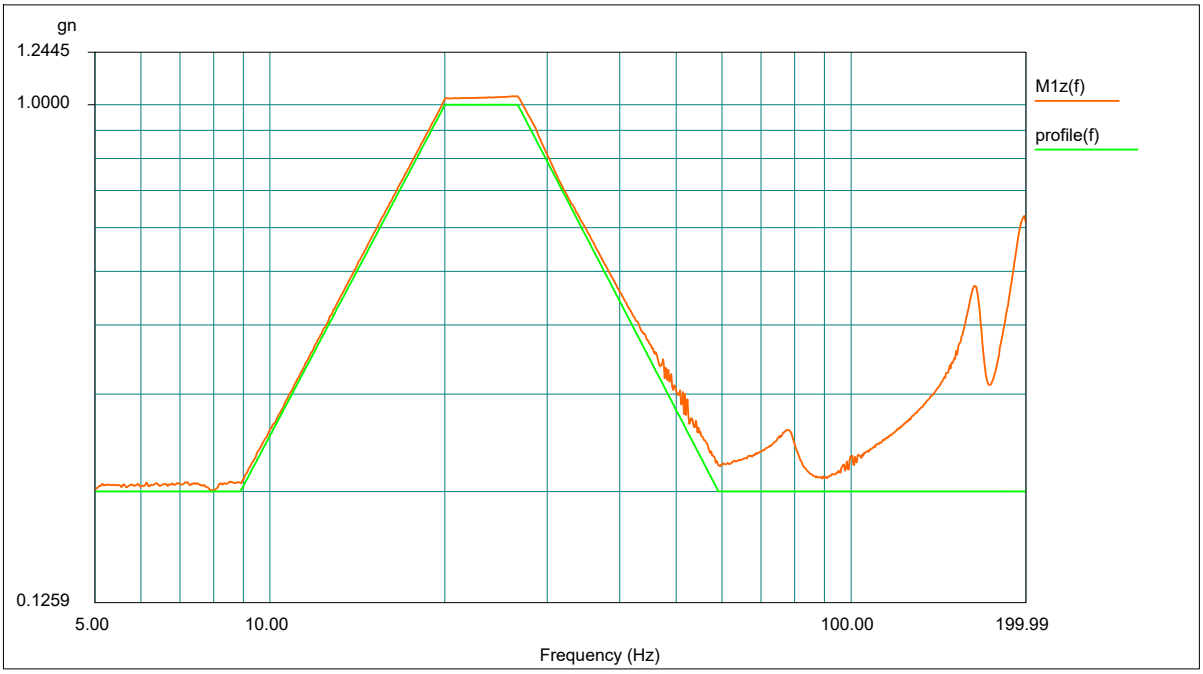
curve 25

Acceleration measurements of P1 and P2 points are given below:



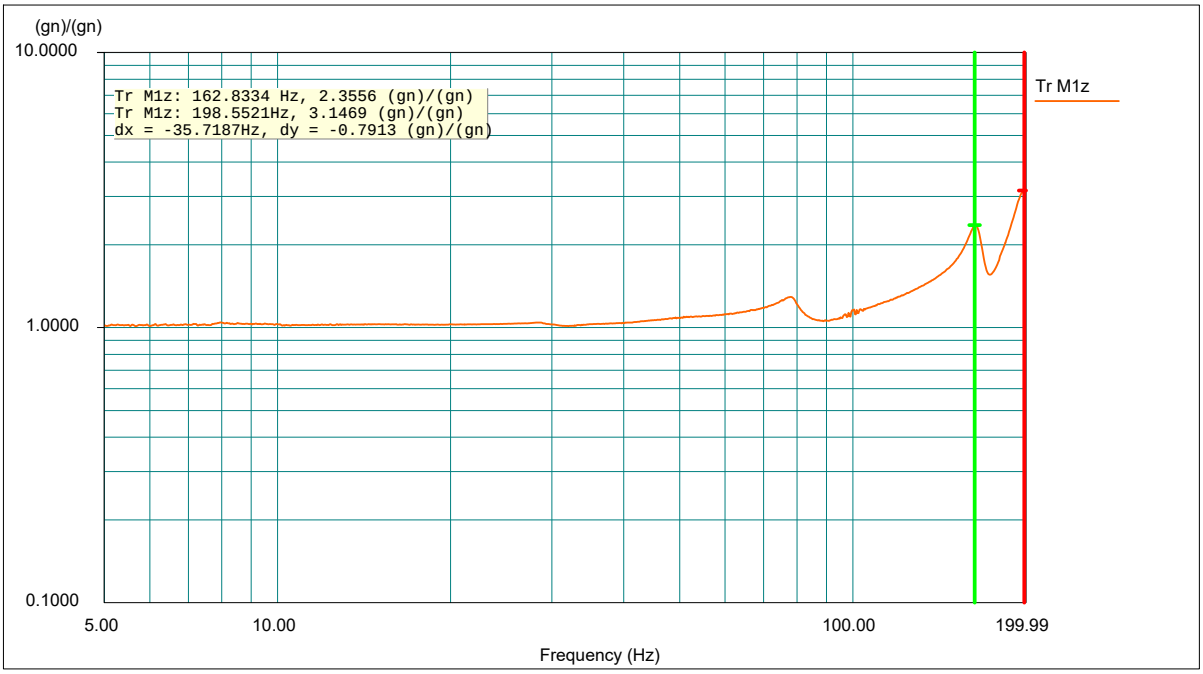
curve 26

Acceleration measurement of measurement point M1 is given below:



curve 27

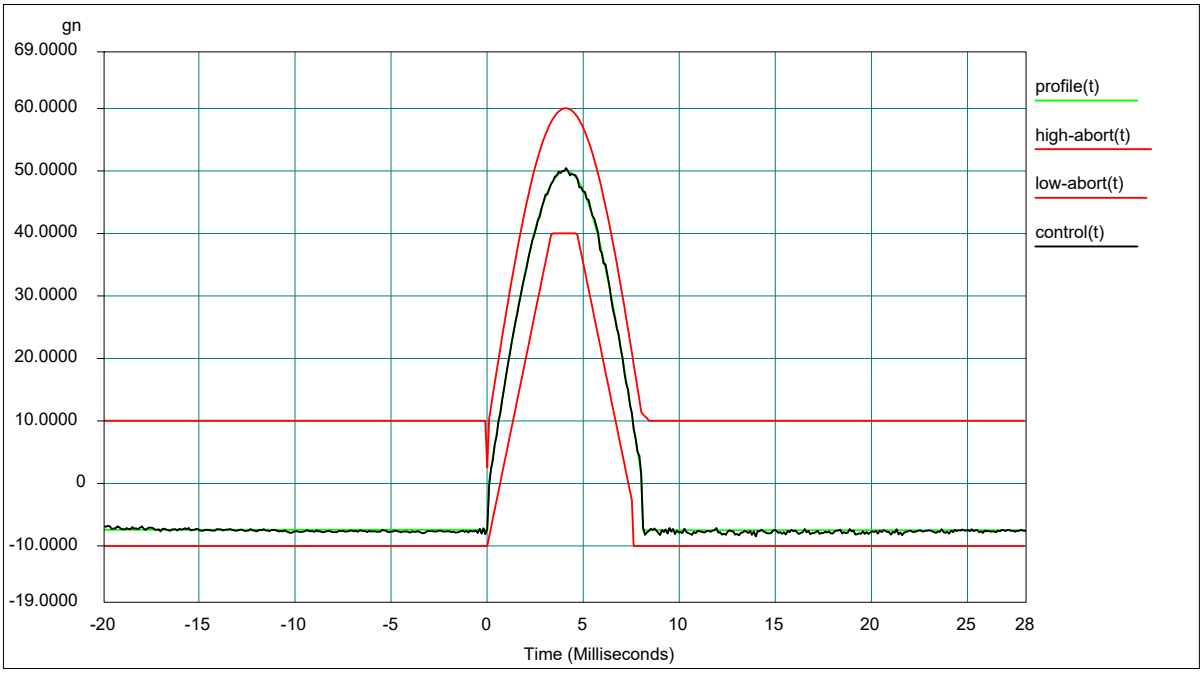
The transfer function of measurement point M1 is given below:



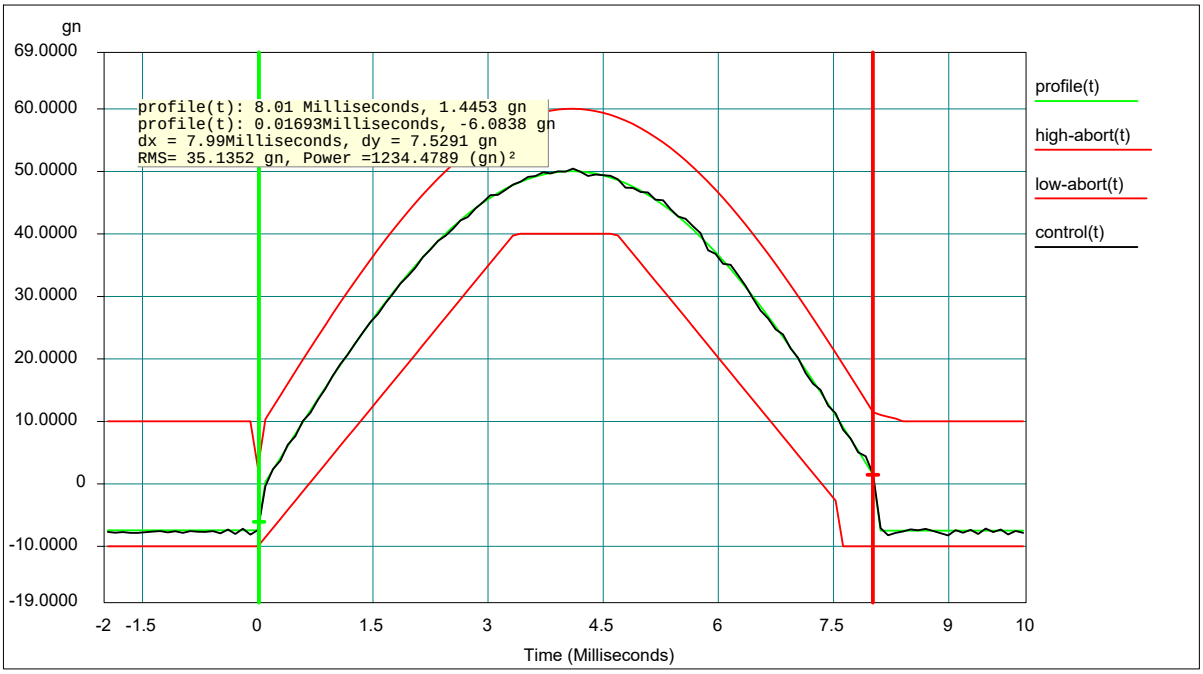
curve 28

7.3.2. Positive shock test:

Control curve is given below:

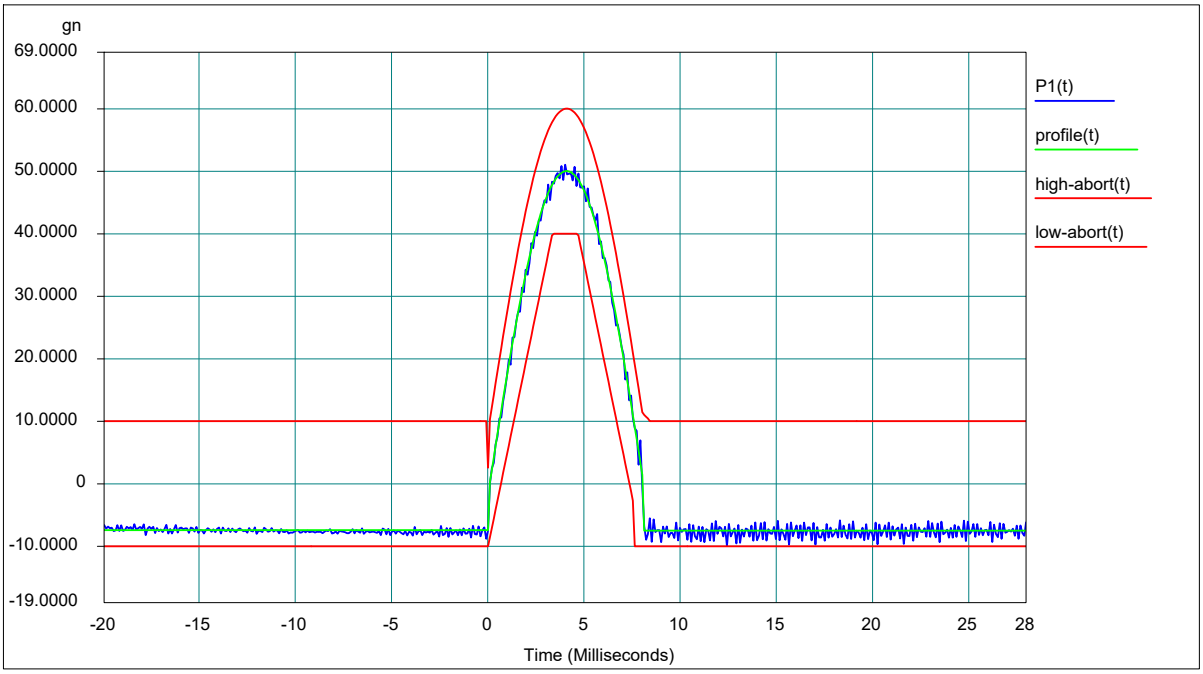


curve 29



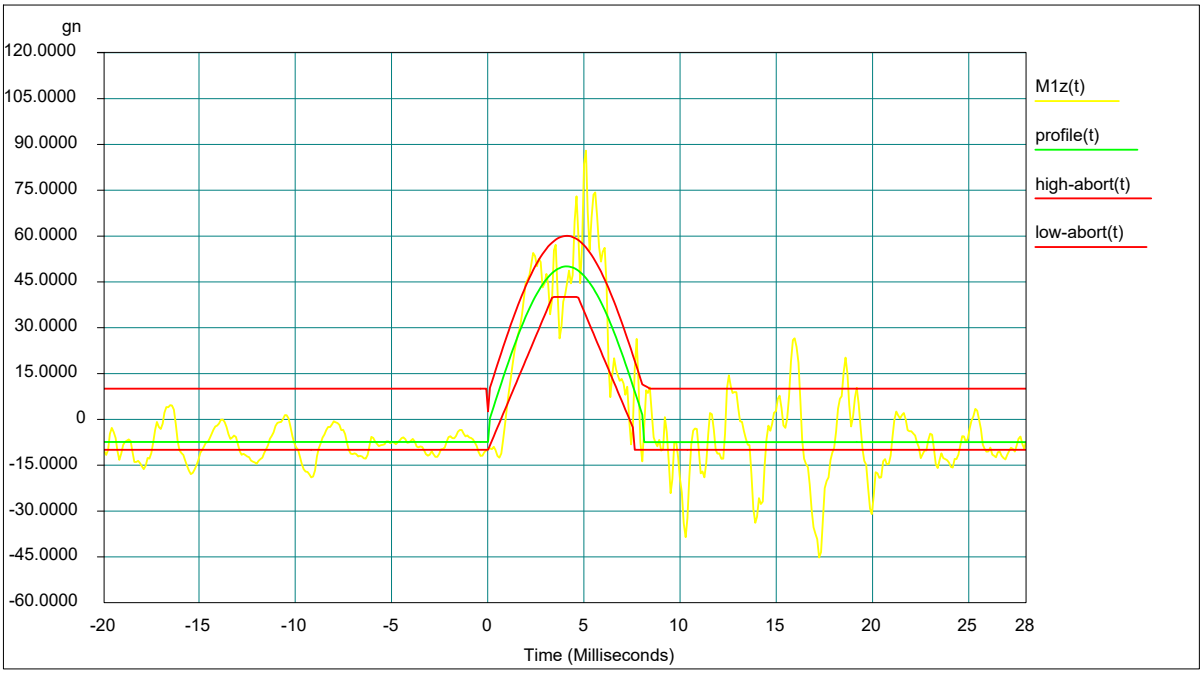
curve 30

Acceleration measurement of P1 point is given below:



curve 31

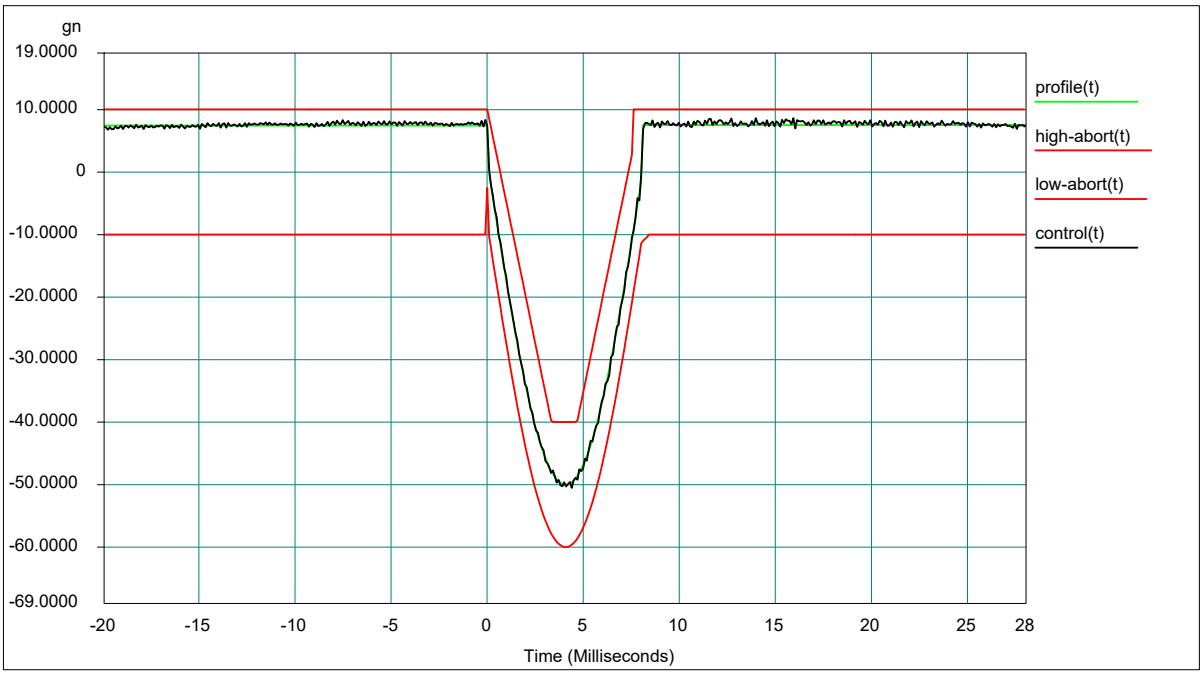
Acceleration measurement of M1 point is given below:



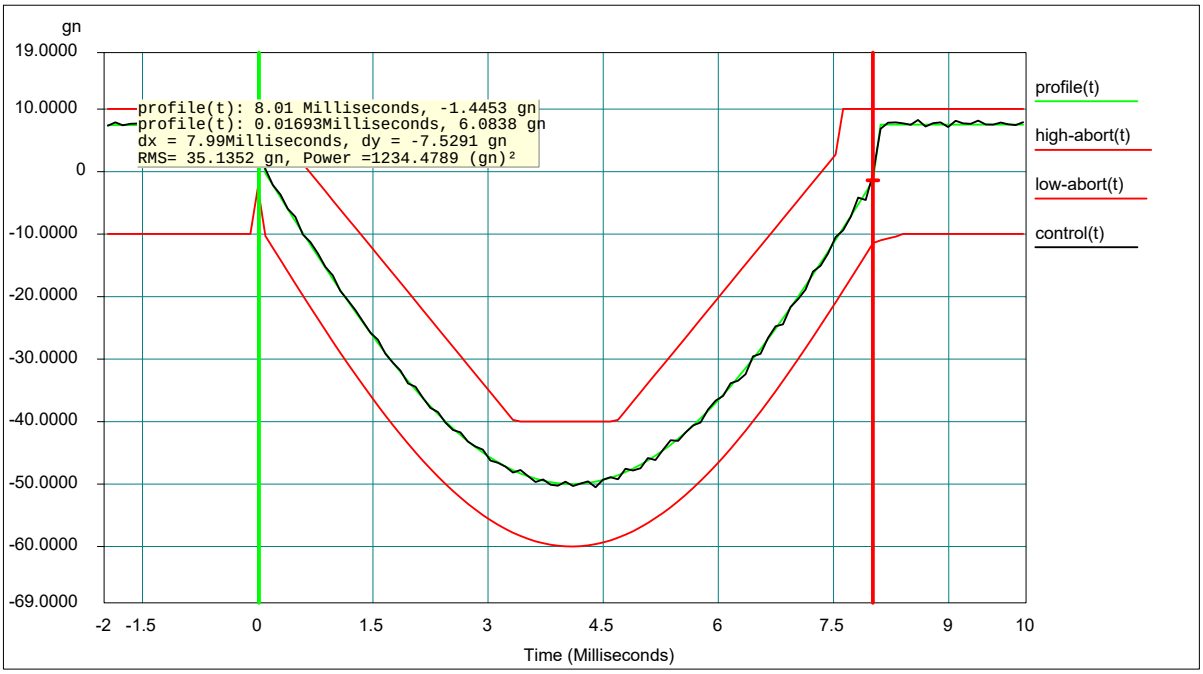
curve 32

7.3.3. Negative shock test:

Control curve is given below:

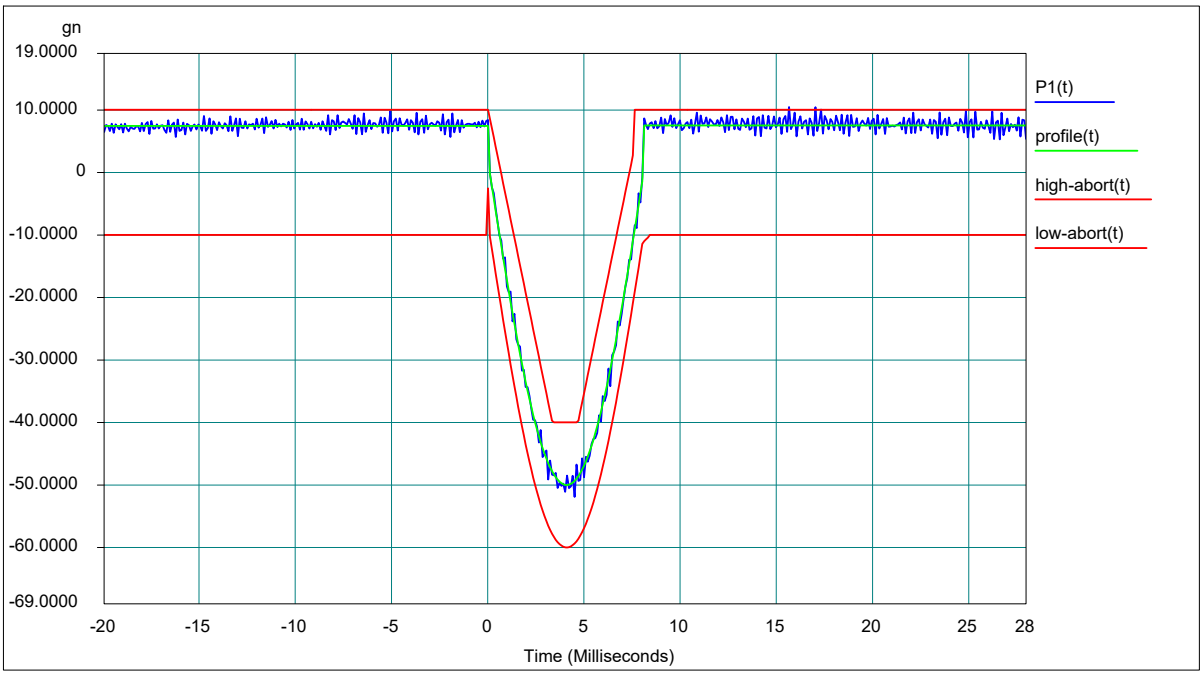


curve 33



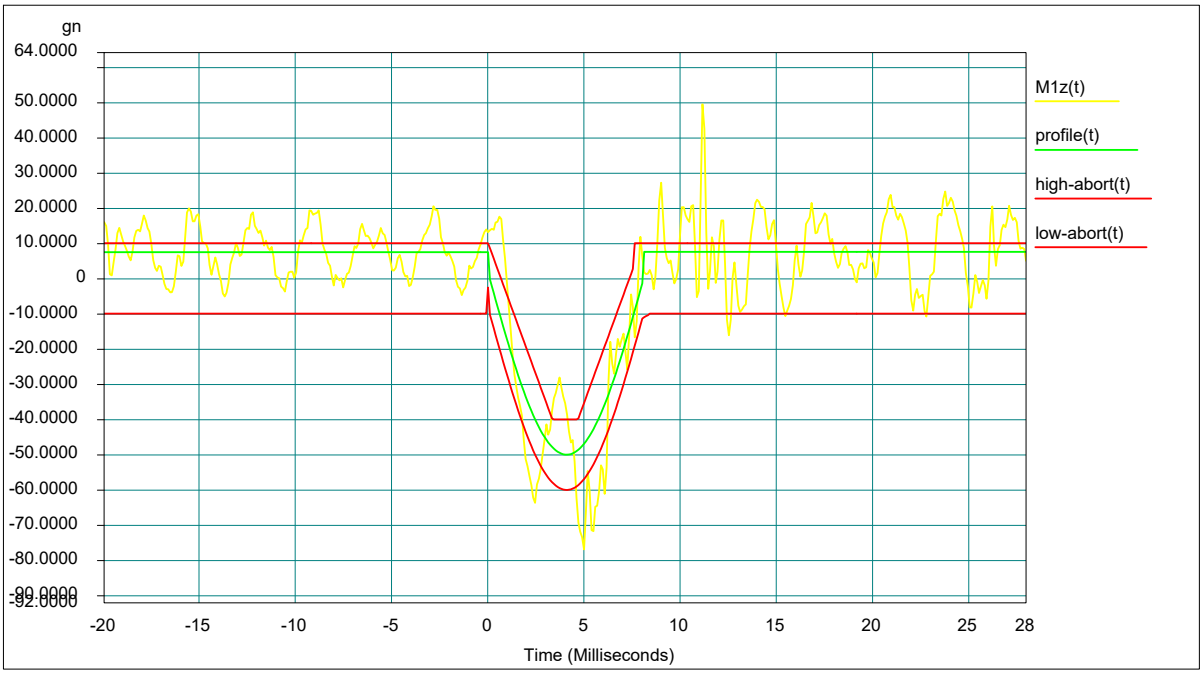
curve 34

Acceleration measurement of P1 point is given below:



curve 35

Acceleration measurement of M1 point is given below:



curve 36