NICOMATIC R&D LABORATORY	QUALIFICATION TEST REPORT	QTR18019a
EMM SERIE ACCORDING TO MIL-DTL-83513G STANDARD		Page : 1 /25
		Qualification status : PASSED

SINUSOIDAL VIBRATION

According to MIL-DTL-83513G §3.5.12 & 4.5.14 and EIA-364-28E test procedure

ISSUE	MODIFICATION	VISA	DATE
a	Original Issue	AJ	21/05/18
b			
c			

	Name	Duty	Date	Visa
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1 Conclusion

The EMM connectors are **qualified** regarding SINUSOIDAL VIBRATION according to MIL-DTL-83513G standard.

2 Technical Features Proposal

EMM connectors:
Vibration Severities: Sinusoidal / 45g / 10 – 2000 – 10 Hz / 4h per axe (3 axes)
The connectors are not showing any evidence of cracking or breaking having undergoes Sinusoidal Vibration Severities.
No signal interruption longer than 1 microsecond.

3 Connate Reports

R-ADE-PMN-17-300962-1 A (00).pdf

4 Information about the tests

4.1 Object

The object of this test is to determine the effects of vibration within the Sinusoidal vibration frequency ranges and magnitudes that may be encountered during the life of the connector.

4.2 Reference documents/Qualification Plan

- MDC.P16020.a
- MIL-DTL-83513G
- EIA-364-28E

4.3 Tested Products

Designation	Article Reference*	Drawing issue*	Batch / DI*	Quantity
C18892-30 (Female, Straight on PCB, E60 guiding)	C18892-30	na	DI7576	20
C18900-30 (Female Straight on PCB, E50)	C18900-30	na	DI7577	20
C18891-30 (Male, Straight on PCB, E10)	C18891-30	na	DI7579	20
C18904-30 (Male, 90° on PCB, E11 guiding)	C18904-30	na	DI7578	20
C18893-30 (Female, 90° on PCB, E61 guiding)	C18893-30	na	DI7580	20
C18901-30 (Female, 90° on PCB, E51 jackscrew)	C18901-30	na	DI7581	20
C18981-30-0250 (Male, on cable AWG30, E01 jackscrew)	C18981-30-0250	na	DI7592	20
C18980-30-0250 (Male, on cable AWG28, E01 jackscrew)	C18980-30-025	na	DI7591	20
C18902-30-0250 (Male, on cable AWG26, E01 jackscrew)	C18902-30-0250	na	DI7588	20
C18979-30-0250 (Male, on cable AWG24, E01 jackscrew)	C18979-30-0250	na	DI7589	20
C18902-30-0250-BP (Male, on cable AWG26, E01 jackscrew BP)	C18902-30-0250-BP	na	DI7586	20
18224-AWG24	18224-AWG24	na	DI7594	25
18224-AWG26	18224-AWG26	na	DI7596	25
18240-AWG28	18240-AWG28	na	DI7597	25
18240-AWG30	18240-AWG30	na	DI7598	25

4.4 Persons present during the tests

Name	Duty
A.BELKORCHIA	Test Technican

4.5 Date and place of the tests

NICOMATIC France Lab. from 07/05/18 to 21/06/18

4.6 Environmental conditions

Ambient temperature: 21 – 24 °C
Pressure: 950 – 975 mbar
Humidity: 25 – 50 % HR

4.7 Incidents during the test

On the 1st pass, they were some problem regarding discontinuity of some connectors. It was coming from the solder parts that have some fault. During the second pass, all the connectors that have failed was retested and had passed the requirement (see Measurements results).

4.8 Test Equipments

Order Nr	Category	Manufacturer	Type	Last validity date	Next validity date
10293	Shaker control system	M+P international	VibPilot VP8	02/27/2018	04/27/2020
07908	Shock bench	MTS	886	N.A	N.A
07926	Spectrum analyzer	M+P international	VibPilot VP8	02/21/2017	04/21/2019
10294	Shaker	LDS/REXROTH	V8-440	03/14/2018	05/14/2019
10280	Accelerometer	PCB Piezotronics	M353B15	07/27/2017	09/27/2019

12288	Accelerometer	PCB Piezotronics	356A32	08/22/2017	10/22/2019
15101	Accelerometer	PCB	M352C65	12/11/2017	02/11/2020
15100	Accelerometer	PCB	M352C65	12/11/2017	02/11/2020
11805	Accelerometer	PCB Piezotronics	M353B15	03/01/2017	05/01/2019
10279	Accelerometer	PCB Piezotronics	M353B15	07/27/2017	09/27/2019

4.9 Test Tooling

Order Nr	Category	Manufacturer	Type	Last validity date	Next validity date
12726	Power supply	EA Elektro-automatik	PS 2084-05B	N.A	N.A
12733	Oscilloscope	Pico Technologie	2405A	N.A	N.A
12734	Oscilloscope	Pico Technologie	2405A	N.A	N.A

5 Requirements according to MIL-DTL-83513G standard

Mated connectors shall not be damaged and there shall be no loosening of parts due to vibration

Counterpart connectors shall be retained in the mated condition and there shall be no interruption of electrical continuity or current flow longer than 1 microsecond.

6 Test Procedure

6.1 Test Procedure according to MIL-DTL-83513G

The connector assembly shall be mounted as specified herein and vibrated in accordance with test procedure EIA-364-28, condition IV

All contacts shall be wired in series with at least 100 milliamperes of current allowed to flow

A suitable instrument shall be employed to monitor the current flow and to indicate any discontinuity of contact or interruption of current flow.

A suitable instrument shall be employed to monitor the current flow and to indicate any discontinuity of contact or interruption of current flow.

6.2 Test Procedure according to EIA-364-28E

6.2.1 Test condition IV [196.1 m/s2 (20 gn) peak]

The specimens, while deenergized or operating under the load conditions specified, shall be subjected to the vibration amplitude, frequency range, and duration specified in 4.1.7.1, 4.1.7.2 and 4.1.7.3, respectively; see figures 2 and 3.

6.2.2 Amplitude

The specimens shall be subjected to a simple harmonic motion having an amplitude of either 1.52 mm (0.06 in) double amplitude (maximum total excursion) or 196.1 m/s2 (20 gn) peak, whichever is less. The tolerance on vibration amplitude shall be ±10%.

6.2.3 Frequency range

The vibration frequency shall be varied logarithmically between the approximate limits of 10 Hz to 2,000 Hz (see 4.1.8).

6.2.4 Sweep time and duration

The entire frequency range of 10 Hz to 2,000 Hz and return to 10 Hz shall be traversed in 20 minutes. This cycle shall be performed 12 times in each of three mutually perpendicular directions (total of 36 times), so that the motion shall be applied for a total period of approximately 12 hours. Interruptions are permitted provided the requirements for rate of change and test duration are met.

Completion of cycling within any separate band is permissible before going to the next band. When the procedure (see 4.1.4.) of this standard is used for the 10 Hz to 55 Hz band, the duration of this portion shall be the same as the duration for this band using logarithmic cycling (approximately 1-1/3 hours in each of three mutually perpendicular directions).

6.2.5 Alternative procedure for use of linear in place of logarithmic change of frequency

Linear rate of change of frequency is permissible under the following conditions:

6.2.5.1 The frequency range above 55 Hz shall be subdivided into no fewer than three bands. The ratio of the maximum frequency to the minimum frequency in each band shall be not less than two (2).

6.2.5.2 The rate of change of frequency in Hz per minute shall be constant within any one band.

6.2.5.3 The ratios of the rate of change of frequency of each band to the maximum frequency of that band shall be approximately equal.

6.2.5.4 Example of alternative procedure

As an example of the computation of rates of change, assume that the frequency spectrum has been divided into three bands, 55 Hz to 125 Hz, 125 Hz to 500 Hz and 500 Hz to 2,000 Hz, in accordance with 4.1.8.1. For each band, let the constant, κ, represent the frequency change (in Hz/minute), divided by the maximum frequency (in Hz). Then the rates of change for the three bands will be 125κ, 500κ and 2,000κ, respectively. The times (in minutes) to traverse the three frequency bands are:

$$\frac{125-55}{125\kappa}, \frac{500-125}{500\kappa} \text{ and } \frac{2{,}000-500}{2{,}000\kappa}$$

Since the minimum total sweep time is 30 minutes,

$$\frac{70}{125\kappa} + \frac{375}{500\kappa} + \frac{1{,}500}{2{,}000\kappa} = 30$$

whence κ = 0.0687/minute.

The required maximum constant rates of frequency change for the three bands are therefore 8.55 Hz per minute, 34.2 Hz per minute and 137 Hz per minute, respectively. The minimum times of traverse of the bands are 8.2 min, 10.9 min and 10.9 min, respectively.

6.3 Test procedure higher than the Standard

6.3.1 INSTRUMENTATION

The vibrations levels are monitored using two mono-axis accelerometers (P1 and P2) located near the fixture points of the equipment.
The record of the channels (controls and measurements) is done by filter method.
The control strategy is averaging.

The shock levels are controlled with 1 mono-axis accelerometer (P1).

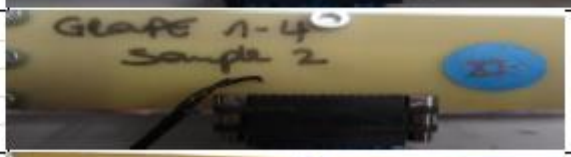
See pictures of the instrumentation in appendix 1.

6.3.2 SCHEDULE

STANDARD	EIA-364-28E: 2006
FREQUENCY RANGE	From 10 Hz to 2000 Hz
ACCELERATION	20g,25g,30g,35g,40g, and 45g
DISPLACEMENT	10Hz to 80Hz : 1,5mm
SWEEP RATE	1 Oct/min
AXE	Y, X and Z
NUMBER OF CYCLES	1
DURATION	20 min

7 Test setup

Connectors :	Pictures :
Connector 1	
Connector 2	
Connector 3	
Connector 4	
Connector 5	
Connector 6	

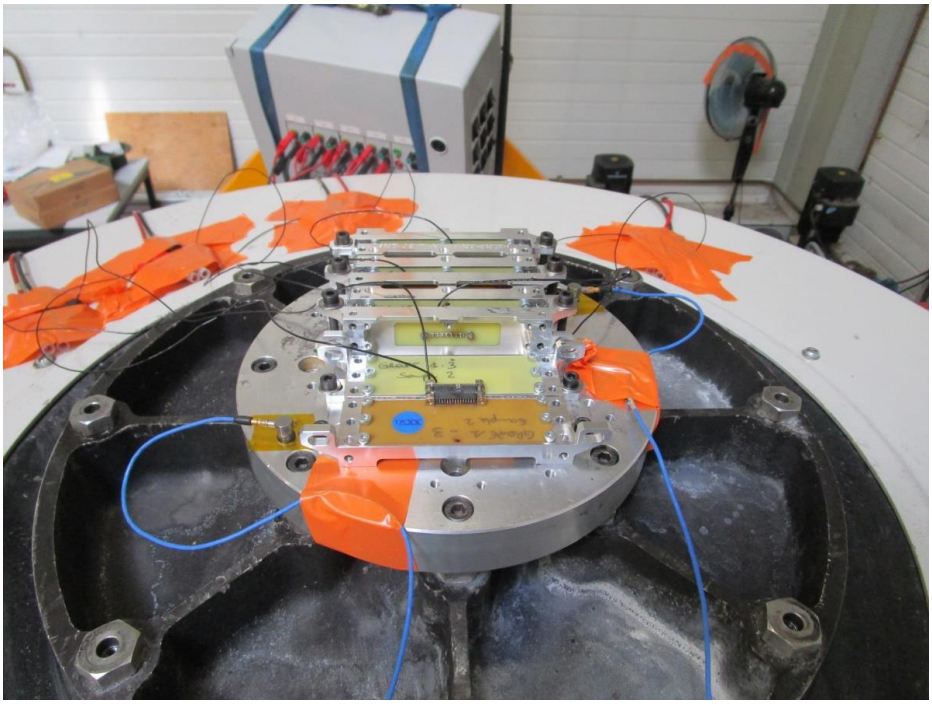
Connectors :	Pictures :
Connector 7	
Connector 8	
Connector 9	
Connector 10	
Connector 11	
Connector 12	

Connectors :	Pictures :
Connector 13	
Connector 14	
Connector 15	
Connector 16	

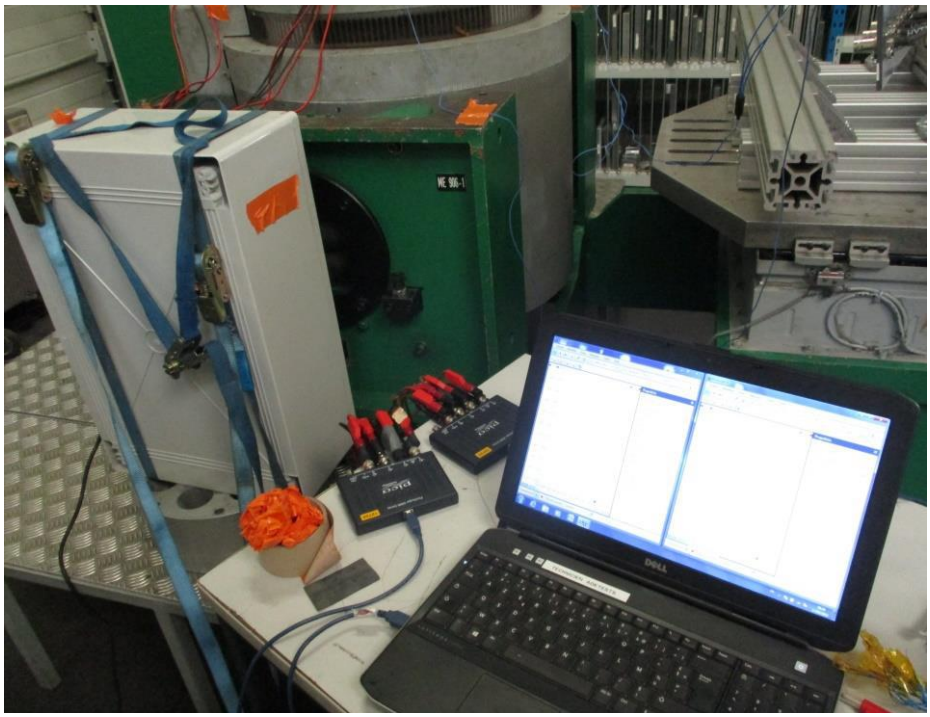
Connectors :	Pictures :
Connector 17	
Connector 18	
Connector 19	
Connector 20	

Connectors :	Pictures :
Connector21	
Connector 22	
Connecteur 23	
Connector 24	

Connectors :	Pictures :
Connector 25	
Connector 26	
Connector 27	
Connector 28	
Connector 29	
Connector 30	



EQUIPMENT UNDER TEST



Functional test bench

8 Measurements results

All the connectors were tested until 45g.
The connectors are not showing any evidence of cracking or breaking having undergoes Sinusoidal Vibration Severities.
No signal interruption longer than 1 microsecond.

Appendix 3: Tables of micro breaking

1st passage:

	Connectors axes			*Comments:*
	X Axis	Y Axis	Z Axis	
1	OK	OK	OK	
2	OK	OK	OK	
3	OK	OK	OK	
4	OK	OK	OK	
5	OK	OK	OK	
6	OK	out of order	OK	
7	OK	OK	OK	
8	OK	OK	OK	
9	OK	OK	OK	
10	OK	OK	OK	
11	OK	OK	OK	
12	OK	OK		redone weld for Y axis
13	OK	OK	OK	redone weld for X axis
14	connector welding			
15	out of order	out of order	OK	low welding
16	connector welding			defeated weld
17	35g 70 hz	40g 900hz	45g 300hz	touch sensitive
18	OK	OK	OK	
19	OK	out of order	40g 400hz	
20	OK	OK	OK	
21	OK	25g 150hz	OK	
22	OK	out of order	30g 400hz et 1600	
23	OK	out of order		
24	OK	out of order	OK	
25	OK	35g 240Hz	out of order after 40g	touch sensitive
26	connector out of order			
27	connector out of order			
28	connector out of order			
29	OK	OK	OK	
30	OK	OK	out of order after 40g	

2nd passage

	Axes Connectors			*Comments:*
	X Axis	Y Axis	Z Axis	
6	OK	OK	OK	
12	OK	OK	OK	
14	OK	OK	OK	
15	OK	OK	OK	
16	OK	OK	OK	
17	OK	OK	OK	No incident during test and no micro breaking
19	OK	OK	OK	
21	OK	OK	OK	
22	OK	OK	OK	
23	OK	OK	OK	
24	OK	OK	OK	
25	OK	OK	OK	
26	OK	OK	OK	
27	OK	OK	OK	
28	OK	OK	OK	
30	OK	OK	OK	

Date/Hours (mm/dd/yyyy)	Nomination of test	Observations	Curves (in appendix)
	Vibrations test		
	Connectors 11 and 12		
05/07/2018	**Z axis**		
03h18 pm	Vibrations sinusoidal amplitude 20g		
03h40 pm	Vibrations sinusoidal amplitude 25g		
04h01 pm	Vibrations sinusoidal amplitude 30g		
04h25 pm	Vibrations sinusoidal amplitude 35g		
04h47 pm	Vibrations sinusoidal amplitude 40g	See the tables of micro breaking in appendix 3	
05/09/2018			
09h47 am	Vibrations sinusoidal amplitude 45g		
	X axis		
10h25 am	Vibrations sinusoidal amplitude 20g		
10h48 am	Vibrations sinusoidal amplitude 25g		
11h10 am	Vibrations sinusoidal amplitude 30g		
11h35 am	Vibrations sinusoidal amplitude 35g		
11h59 am	Vibrations sinusoidal amplitude 40g		
01h32 pm	Vibrations sinusoidal amplitude 45g		
	Connectors 1,2,4,5 and 6		
	X axis		
02h05 pm	Vibrations sinusoidal amplitude 20g		
02h32 pm	Vibrations sinusoidal amplitude 25g		
02h57 pm	Vibrations sinusoidal amplitude 30g		
03h20 pm	Vibrations sinusoidal amplitude 35g		
03h45 pm	Vibrations sinusoidal amplitude 40g		
04h10 pm	Vibrations sinusoidal amplitude 45g		
	Z axis		
04h40 pm	Vibrations sinusoidal amplitude 20g		
05h03 pm	Vibrations sinusoidal amplitude 25g		
05h25 pm	Vibrations sinusoidal amplitude 30g		
05/11/2018			
01h33 pm	Vibrations sinusoidal amplitude 35g		
01h54 pm	Vibrations sinusoidal amplitude 40g	See the tables of micro breaking in appendix 3	
02h18 pm	Vibrations sinusoidal amplitude 45g		
	X axis		
03h04 pm	Vibrations sinusoidal amplitude 20g		
03h29 pm	Vibrations sinusoidal amplitude 25g		
03h54 pm	Vibrations sinusoidal amplitude 30g		
04h18 pm	Vibrations sinusoidal amplitude 35g		
04h41 pm	Vibrations sinusoidal amplitude 40g		
05h05 pm	Vibrations sinusoidal amplitude 45g		
	Connectors 3,19 and 20		
	X axis for 3 and Z axis for 19,20		
05h38 pm	Vibrations sinusoidal amplitude 20g		
05/14/2018			
09h21 am	Vibrations sinusoidal amplitude 25g		
09h44 am	Vibrations sinusoidal amplitude 30g		
10h09 am	Vibrations sinusoidal amplitude 35g		
10h32 am	Vibrations sinusoidal amplitude 40g		

Date/Hours (mm/dd/yyyy)	Nomination of test	Observations	Curves (in appendix)
10h56 am	Vibrations sinusoidal amplitude 45g		
	Connectors 21,22 and 24		
	Z axis		
11h35 am	Vibrations sinusoidal amplitude 20g		
12h03 am	Vibrations sinusoidal amplitude 25g		
01h31 pm	Vibrations sinusoidal amplitude 30g	See the tables of micro breaking in appendix 3	
01h56 pm	Vibrations sinusoidal amplitude 35g		
02h20 pm	Vibrations sinusoidal amplitude 40g		
02h43 pm	Vibrations sinusoidal amplitude 45g		
	Connectors 4,13,14,17,18 and 24		
	Z axis for 13,14,17,18 and X axis for 4,24		
03h30 pm	Vibrations sinusoidal amplitude 20g		
03h52 pm	Vibrations sinusoidal amplitude 25g		
04h20 pm	Vibrations sinusoidal amplitude 30g		
04h43 pm	Vibrations sinusoidal amplitude 35g		
05h06 pm	Vibrations sinusoidal amplitude 40g		
05h29 pm	Vibrations sinusoidal amplitude 45g		
05/15/2018	**Z axis for 9, 24 and X axis for 13,18**		
09h14 am	Vibrations sinusoidal amplitude 20g		
09h39 am	Vibrations sinusoidal amplitude 25g		
10h04 am	Vibrations sinusoidal amplitude 30g		
10h29am	Vibrations sinusoidal amplitude 35g		
10h53 am	Vibrations sinusoidal amplitude 40g		
11h18 am	Vibrations sinusoidal amplitude 45g		
	Z axis for 15, 17, 7, 8 and X axis for 10		
11h55 am	Vibrations sinusoidal amplitude 20g		
01h17 pm	Vibrations sinusoidal amplitude 25g		
01h39 pm	Vibrations sinusoidal amplitude 30g		
02h02 pm	Vibrations sinusoidal amplitude 35g		
02h24 pm	Vibrations sinusoidal amplitude 40g	See the tables of micro breaking in appendix 3	
02h46 pm	Vibrations sinusoidal amplitude 45g		
	Connectors 1,2,3,4,5,7,8,9,10		
05/17/2018	**Y Axis**		
09h15 am	Vibrations sinusoidal amplitude 20g		
09h38 am	Vibrations sinusoidal amplitude 25g		
10h01 am	Vibrations sinusoidal amplitude 30g		
10h23 am	Vibrations sinusoidal amplitude 35g		
10h45 am	Vibrations sinusoidal amplitude 40g		
11h08 am	Vibrations sinusoidal amplitude 45g		
	Connectors 11,12,13,17,18,21,20		
11h59 am	Vibrations sinusoidal amplitude 20g		
01h25 pm	Vibrations sinusoidal amplitude 25g		
01h48 pm	Vibrations sinusoidal amplitude 30g		
02h10 pm	Vibrations sinusoidal amplitude 35g		
02h33 pm	Vibrations sinusoidal amplitude 40g		
02h55 pm	Vibrations sinusoidal amplitude 45g		
	X axis for 25,29,30,7,8,23 and Z axis for 10		

Date/Hours (mm/dd/yyyy)	Nomination of test	Observations	Curves (in appendix)
03h45 pm	Vibrations sinusoidal amplitude 20g		
04h07 pm	Vibrations sinusoidal amplitude 25g		
04h29 pm	Vibrations sinusoidal amplitude 30g		
04h51 pm	Vibrations sinusoidal amplitude 35g	See the tables of micro breaking in appendix 3	
05h14 pm	Vibrations sinusoidal amplitude 40g		
05h37 pm	Vibrations sinusoidal amplitude 45g		
05/18/2018	**Y axis for 25,29,30 and Z axis for 23**		
08h25 am	Vibrations sinusoidal amplitude 20g		
08h48 am	Vibrations sinusoidal amplitude 25g		
09h10 am	Vibrations sinusoidal amplitude 30g		
09h32 am	Vibrations sinusoidal amplitude 35g		
09h55 am	Vibrations sinusoidal amplitude 40g		
10h17 am	Vibrations sinusoidal amplitude 45g		
	Z axis for 29,30		
11h10 am	Vibrations sinusoidal amplitude 20g		
11h32 am	Vibrations sinusoidal amplitude 25g		
11h55 am	Vibrations sinusoidal amplitude 30g		
01h17 pm	Vibrations sinusoidal amplitude 35g		
01h39 pm	Vibrations sinusoidal amplitude 40g		
02h02 pm	Vibrations sinusoidal amplitude 45g		
	2nd passage		
	Z axis		
06/18/2018	**Connectors 12,14,16,17,19**		
02h40 pm	Vibrations sinusoidal amplitude 20g		
03h02 pm	Vibrations sinusoidal amplitude 25g		
03h25 pm	Vibrations sinusoidal amplitude 30g		
03h47 pm	Vibrations sinusoidal amplitude 35g		
04h10 pm	Vibrations sinusoidal amplitude 40g		
04h35 pm	Vibrations sinusoidal amplitude 45g		
06/19/2018	**Connectors 22,25,26,27,28**		
08h37 am	Vibrations sinusoidal amplitude 20g		
08h59 am	Vibrations sinusoidal amplitude 25g		
09h22 am	Vibrations sinusoidal amplitude 30g	See the tables of micro breaking in appendix 3	
09h44 am	Vibrations sinusoidal amplitude 35g		
10h06 am	Vibrations sinusoidal amplitude 40g		
10h28 am	Vibrations sinusoidal amplitude 45g		
	Connector 30		
11h20 am	Vibrations sinusoidal amplitude 20g		
11h43 am	Vibrations sinusoidal amplitude 25g		
12h05 am	Vibrations sinusoidal amplitude 30g		
01h25 pm	Vibrations sinusoidal amplitude 35g		
01h47 pm	Vibrations sinusoidal amplitude 40g		
02h09 pm	Vibrations sinusoidal amplitude 45g		
	X axis		
	Connectors 14,15,16,26		
03h05 pm	Vibrations sinusoidal amplitude 20g		
03h27 pm	Vibrations sinusoidal amplitude 25g		
03h50 pm	Vibrations sinusoidal amplitude 30g		

Date/Hours (mm/dd/yyyy)	Nomination of test	Observations	Curves (in appendix)
04h12 pm	Vibrations sinusoidal amplitude 35g		
04h35 pm	Vibrations sinusoidal amplitude 40g		
04h57 pm	Vibrations sinusoidal amplitude 45g		
06/20/2018	**Connectors 17,27,28**		
09h17 am	Vibrations sinusoidal amplitude 20g		
09h39 am	Vibrations sinusoidal amplitude 25g	See the tables of micro breaking in appendix 3	
10h02 am	Vibrations sinusoidal amplitude 30g		
10h24 am	Vibrations sinusoidal amplitude 35g		
10h45 am	Vibrations sinusoidal amplitude 40g		
11h07 am	Vibrations sinusoidal amplitude 45g		
	Y axis		
	Connectors 24,27,28		
11h58 am	Vibrations sinusoidal amplitude 20g		
01h23 pm	Vibrations sinusoidal amplitude 25g		
01h45 pm	Vibrations sinusoidal amplitude 30g		
02h07 pm	Vibrations sinusoidal amplitude 35g		
02h28 pm	Vibrations sinusoidal amplitude 40g		
02h51 pm	Vibrations sinusoidal amplitude 45g		
	Connectors 23,25,26		
03h37 pm	Vibrations sinusoidal amplitude 20g		
03h59 pm	Vibrations sinusoidal amplitude 25g		
04h21 pm	Vibrations sinusoidal amplitude 30g		
04h43 pm	Vibrations sinusoidal amplitude 35g		
05h04 pm	Vibrations sinusoidal amplitude 40g		
05h26 pm	Vibrations sinusoidal amplitude 45g		
06/21/2018	**Connectors 16,17,19,21,22**		
08h12 am	Vibrations sinusoidal amplitude 20g		
08h34 am	Vibrations sinusoidal amplitude 25g		
08h56 am	Vibrations sinusoidal amplitude 30g	See the tables of micro breaking in appendix 3	
09h17 am	Vibrations sinusoidal amplitude 35g		
09h39 am	Vibrations sinusoidal amplitude 40g		
10h01 am	Vibrations sinusoidal amplitude 45g		
	Connectors 6,14,15		
10h52 am	Vibrations sinusoidal amplitude 20g		
11h14 am	Vibrations sinusoidal amplitude 25g		
11h36 am	Vibrations sinusoidal amplitude 30g		
11h59 am	Vibrations sinusoidal amplitude 35g		
01h25 pm	Vibrations sinusoidal amplitude 40g		
01h47 pm	Vibrations sinusoidal amplitude 45g		

9 Visual Inspection

Required by the applicable standard ?			
YES		NO	☐

**********END OF REPORT**********

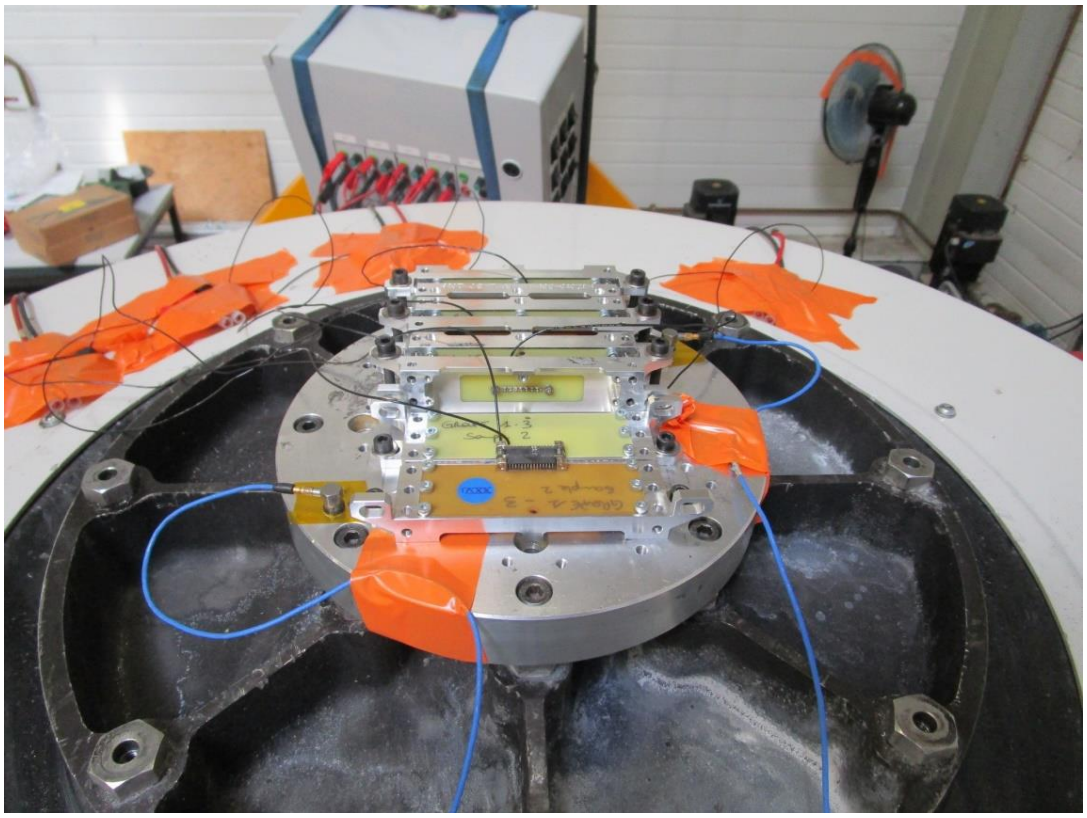
10 APPENDIX

Internal use only ?			
YES	☐	NO	☒

10.1 The Laboratory Advice

10.2 SPATIAL REFERENCE DEFINITION AND FIXATION

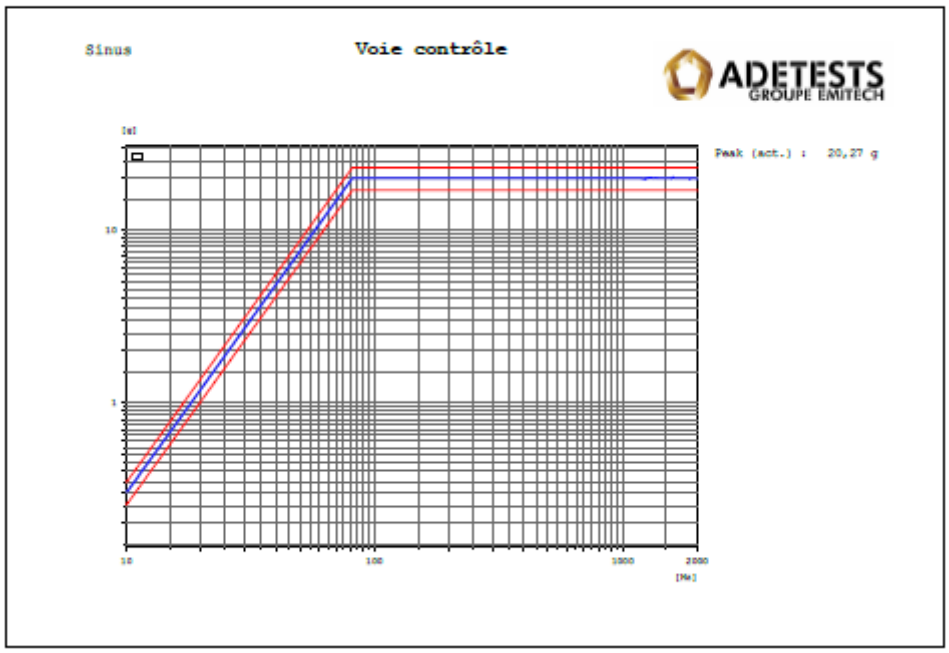
The equipment is rigidly fixed on a tool provided by NICOMATIC Company.
This tool is fastened on a disc or a square provided by ADETESTS Company which is fixed on the electrodynamics shaker of ADETESTS Company.



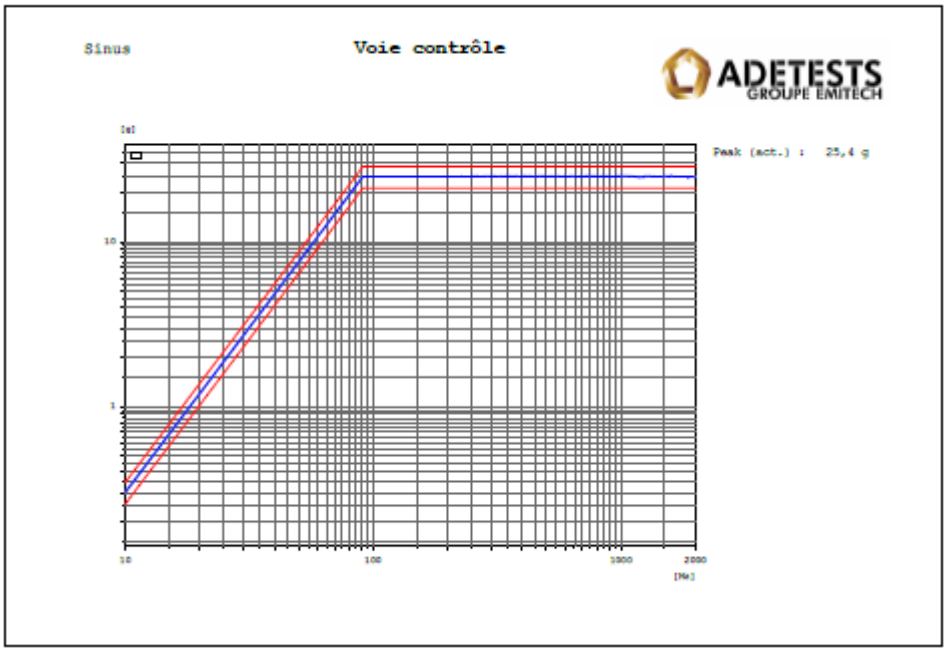
10.3 MECHANICAL CURVES

Vibrations test :

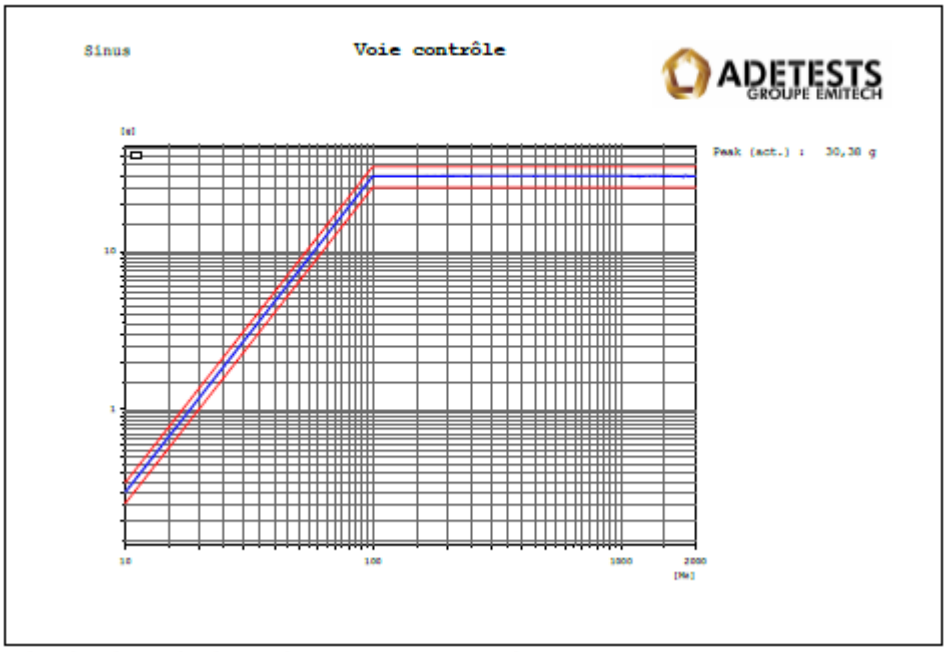
Vibration test 20g :



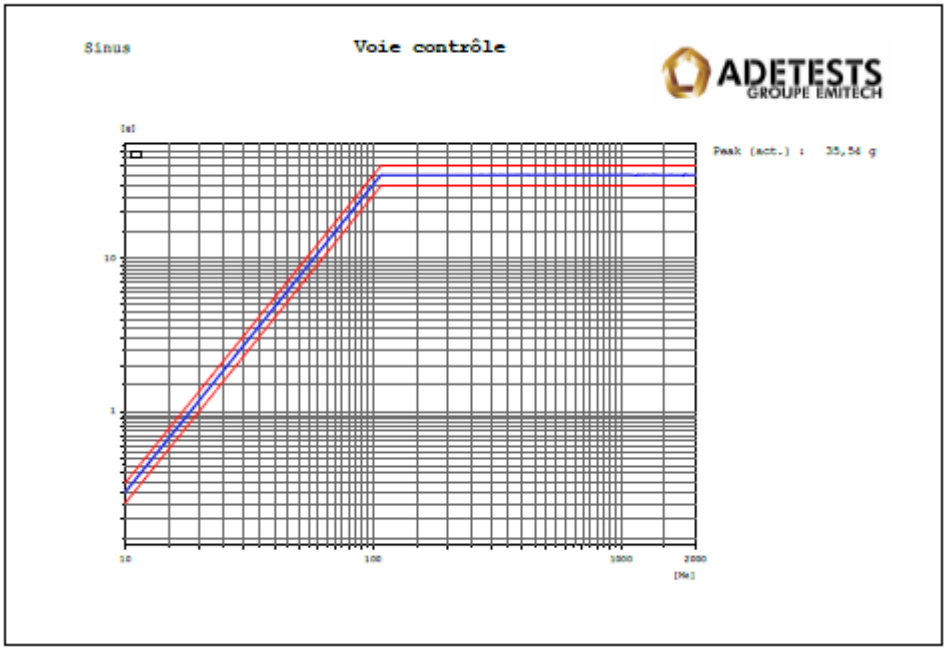
Vibration test 25g :



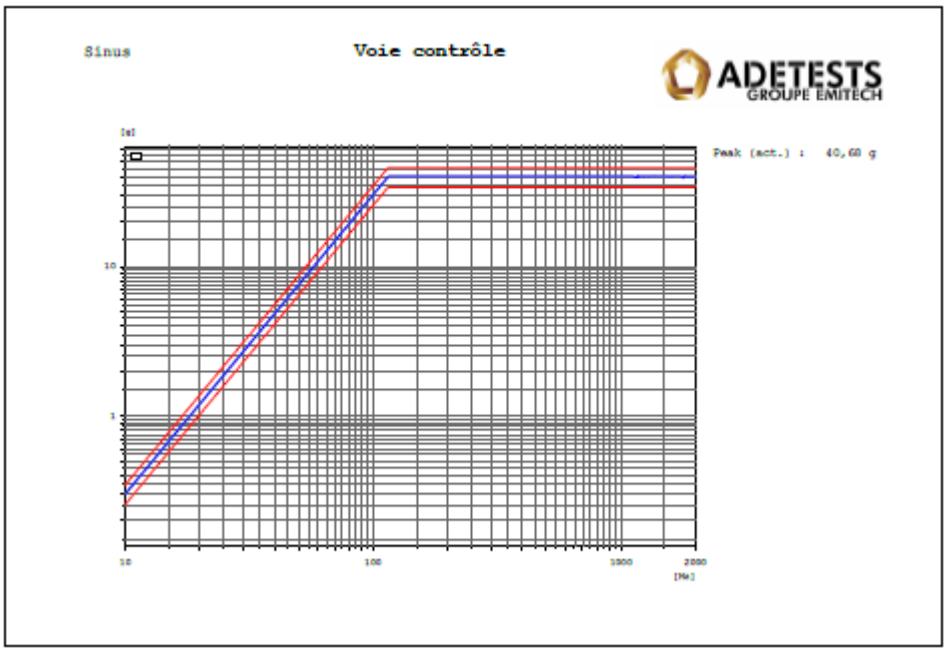
Vibration test 30g :



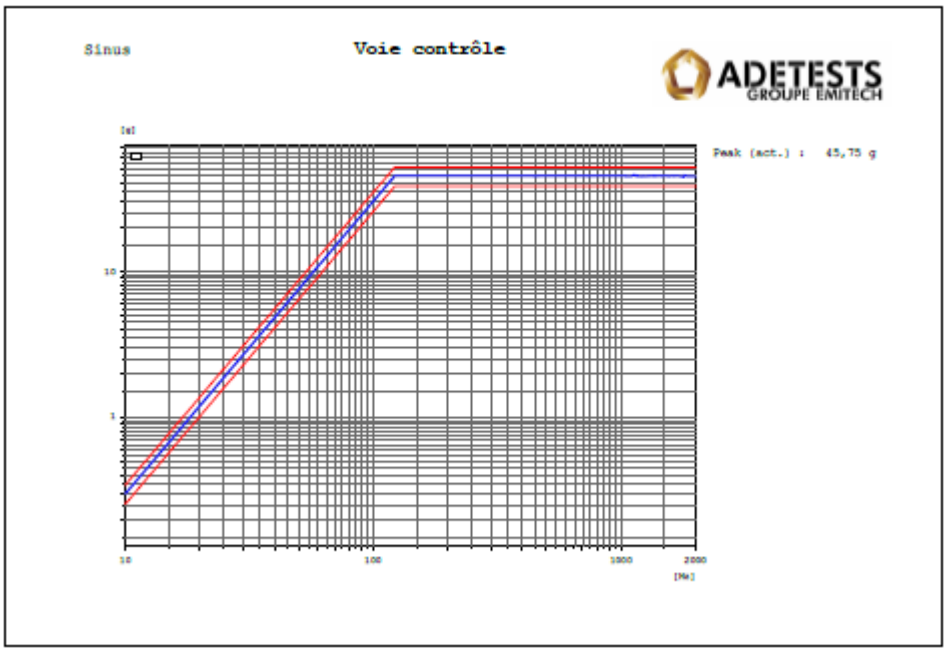
Vibration test 35g :



Vibration test 40g :



Vibration test 45g :



**********END OF APPENDIX**********