



Oppdragsgiver <i>Client</i> Nortek AS Vangkroken 2 1351 Rud		Utførende enhet/lab. <i>Department/laboratory responsible</i> Teknologisk Institutt as Environmental Test Laboratory P.O. Box 1019 NO - 3601 KONGSBERG	
Rapportnr. <i>Report no.</i> 3000-16-024152			
Tittel <i>Title</i> Environmental Test Report Vibration test Signature 250			
Dato <i>Date</i> 14.06.2016	Utarbeidet av <i>Prepared by</i>  Joachim Ski Torp	Godkjent av <i>Approved by</i> Erik Haugejorden  Technical Manager	Innleveringsdato for prøve <i>Date of receipt of test object</i> 13.06.2016 Prøvetaking utført av TI <i>Sampling by TI</i> Nei <i>No</i>
Revisjonsnr. <i>Revision no.</i> -	Konfig.kont. <i>Config.contr.</i> Ja <i>Yes</i>	Antall sider <i>No. of pages</i> 9	Ant. vedlegg <i>No. of append.</i> 2
Kopi nr. <i>Copy no.</i>	Akkreditert test (ISO 17025) <i>Accredited test (ISO 17025)</i> Ja <i>Yes</i>	Kundens ref. <i>Client's ref.</i> Bengt Large	Bestillingsnr. <i>Order no.</i> Vibrasjon Signature 250
Fordeling <i>Distribution</i> Bengt Large, Nortek; 1 pdf-file.			

Akkreditering innebærer at laboratoriet oppfyller de krav Norsk Akkreditering stiller til kompetanse og prøvingsystemer for de prøvinger akkrediteringen omfatter. Dette innebærer også at laboratoriet har et tilfredsstillende kvalitetssikringssystem og nødvendig sporbarhet til akkrediterte eller nasjonale laboratorier. Prøvingsresultatene gjelder ute lukkede de prøvede objekter. Utdrag av rapporten må ikke gjengis uten skriftlig godkjenning fra Teknologisk Institutt as.

Accreditation implies that the laboratory meets the requirements set by Norwegian Accreditation concerning competence and testing system for all the testing contained in the accreditation. It also states that the laboratory has a satisfactory quality assurance system and traceability to accredited or national laboratories. The results relate only to the items tested. The report shall not be reproduced except in full, without the written approval of the institute.

Contents

1. Scope.....	3
2. Reference Documents	3
3. Test Procedure.....	3
4. Results	4
5. Conclusion	4

Appendix 1: Test Equipment.

Appendix 2: Test Records.

1. Scope

The Environmental Test Laboratory at Teknologisk Institutt AS has performed vibration test on Signature 250 S/N: D-0214 for Nortek AS. The test was performed 13.06.2016 and 14.06.2016.

The test was executed under accreditation granted by Norwegian Accreditation, accreditation no. Test 006, and was based on the general test requirements specified in IEC 60068-1 / IEC 60068-2-64.

The following personnel were involved in the testing:

Erik Haugejorden, Teknologisk Institutt AS.

Joachim Ski Torp, Teknologisk Institutt AS.

Bengt Large, Nortek AS.

2. Reference Documents

1. KS Handbook, Quality Manual for Teknologisk Institutt.
2. Environmental test report: 3010-09-0048, Teknologisk Institutt AS.
3. IEC 60068-1 General requirements, edition 7.0. 2013-10
4. IEC 60068-2-64 Test Fh: Vibration, broad band random and guidance, edition 2.0. 2008-04

3. Test Procedure

The environmental test equipment used during test with calibration status and measurement uncertainty figures is given in Appendix 1. The test item were mounted on the shaker as shown in figures 1, 4 and 7. The test item were not powered during test. A visual inspection was performed after test. Functional test was performed at Nortek after test. The positions of control and response accelerometers are shown in figures 2, 3, 5, 6, 8 and 9.

MP1: Control accelerometer.

MP2: Response accelerometer on test item.

The following test parameters were used:

Frequency range: 10 - 500Hz.
Excitation level: 10 - 200 Hz: 0.03 g²/Hz.
200 - 500 Hz: 0.01 g²/Hz.

Grms: 2.95

Duration: 30 minutes in each of the 3 axes.

The recorded input and response records are given in Appendix 2.

4. Results

The test items were not operational during test. Mechanical inspection and functional tests were performed at Nortek after the test. Test results are evaluated by Nortek.

5. Conclusion

The test items were not operational during test. Mechanical inspection and functional tests were performed at Nortek after the test. Test results are evaluated by Nortek.

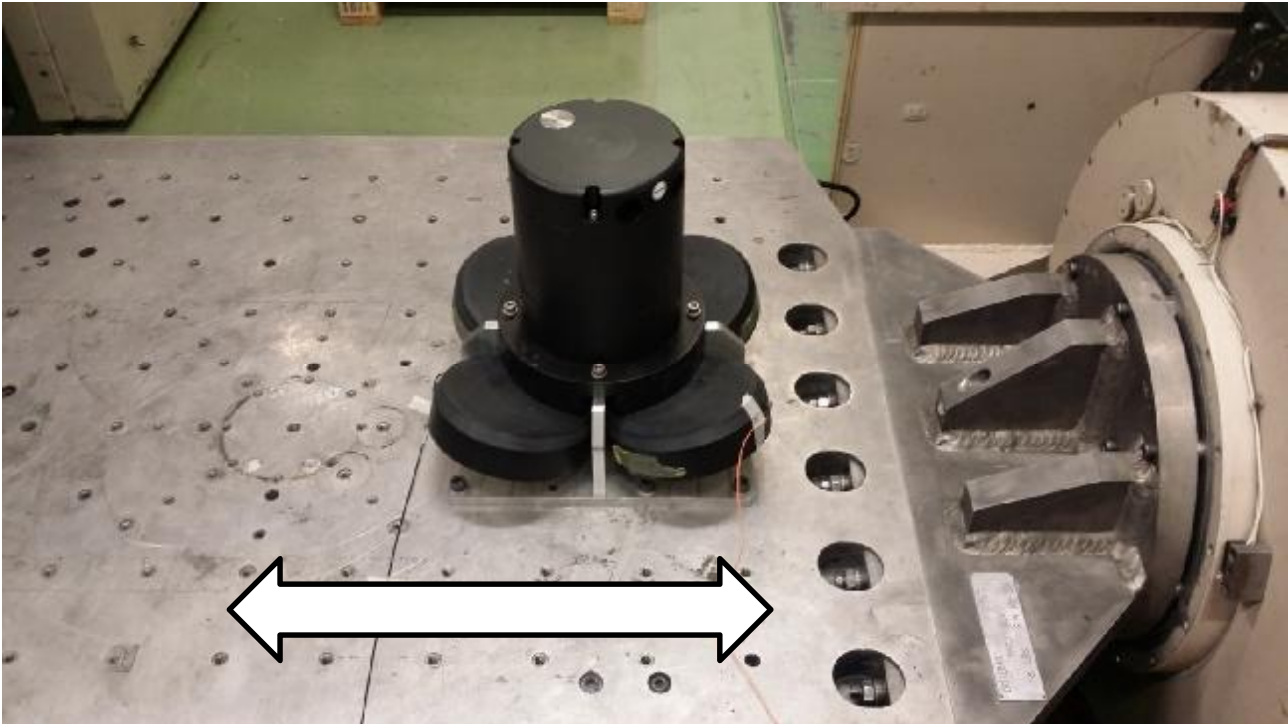


Figure 1 - Test item placed in X-axis

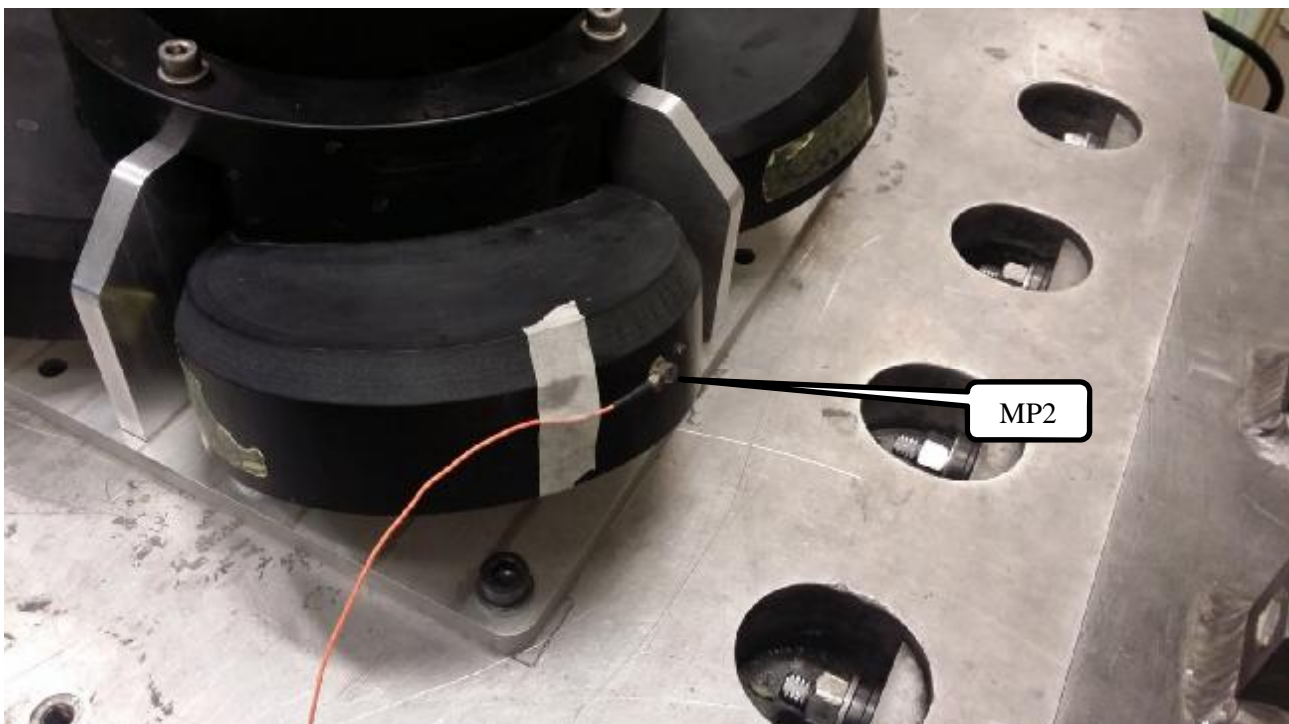


Figure 2 - MP2 in X-axis

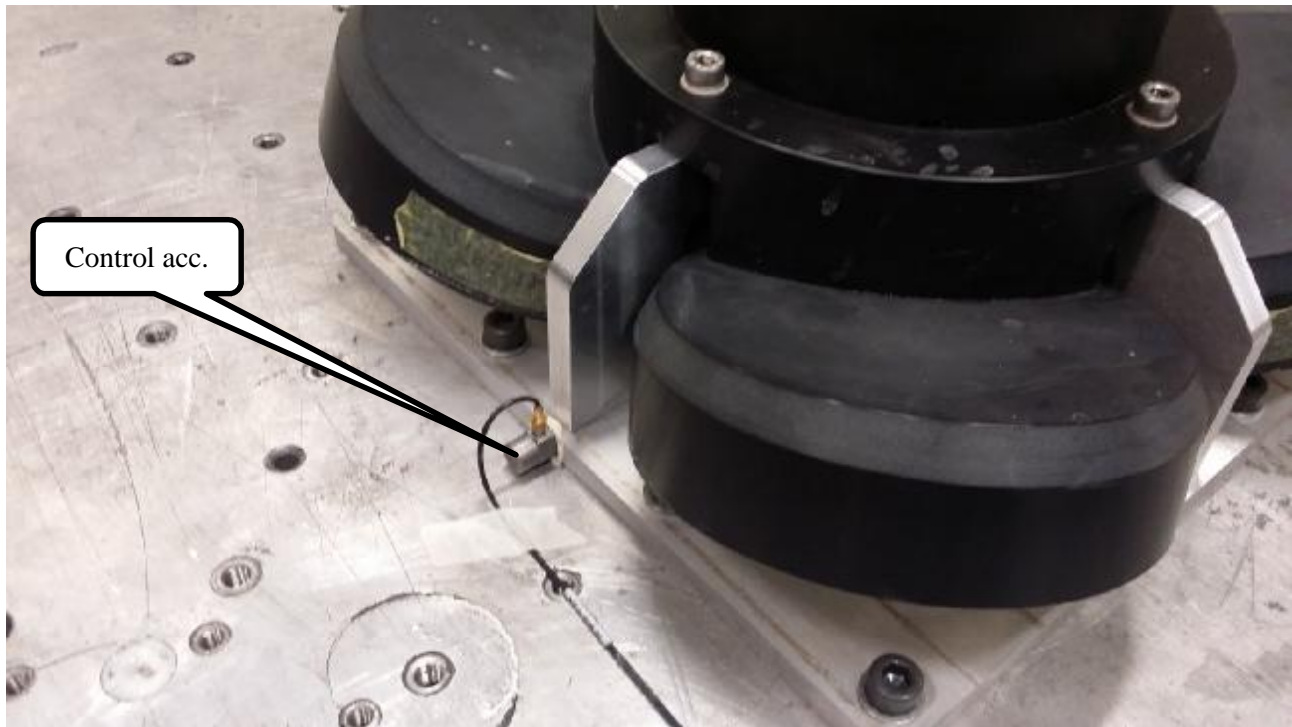


Figure 3 - Control accelerometer in X-axis

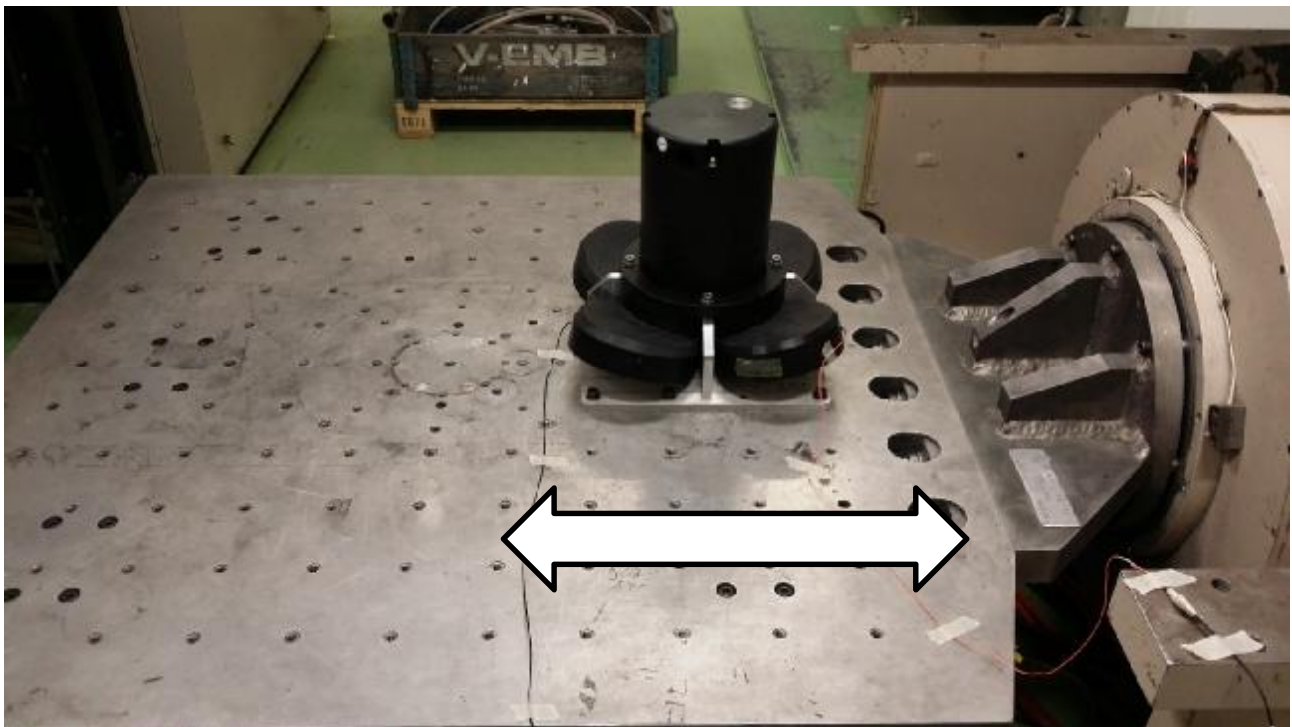


Figure 4 - Test item placed in Y-axis

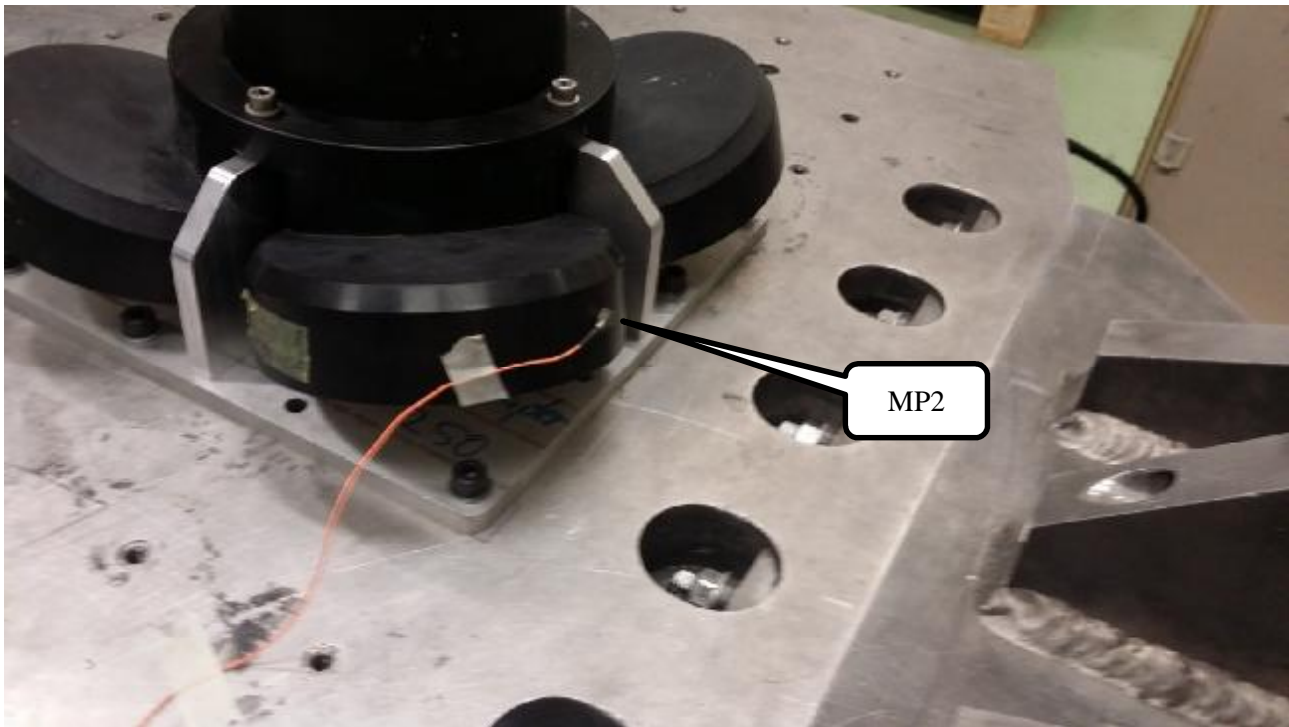


Figure 5 - MP2 in Y-axis

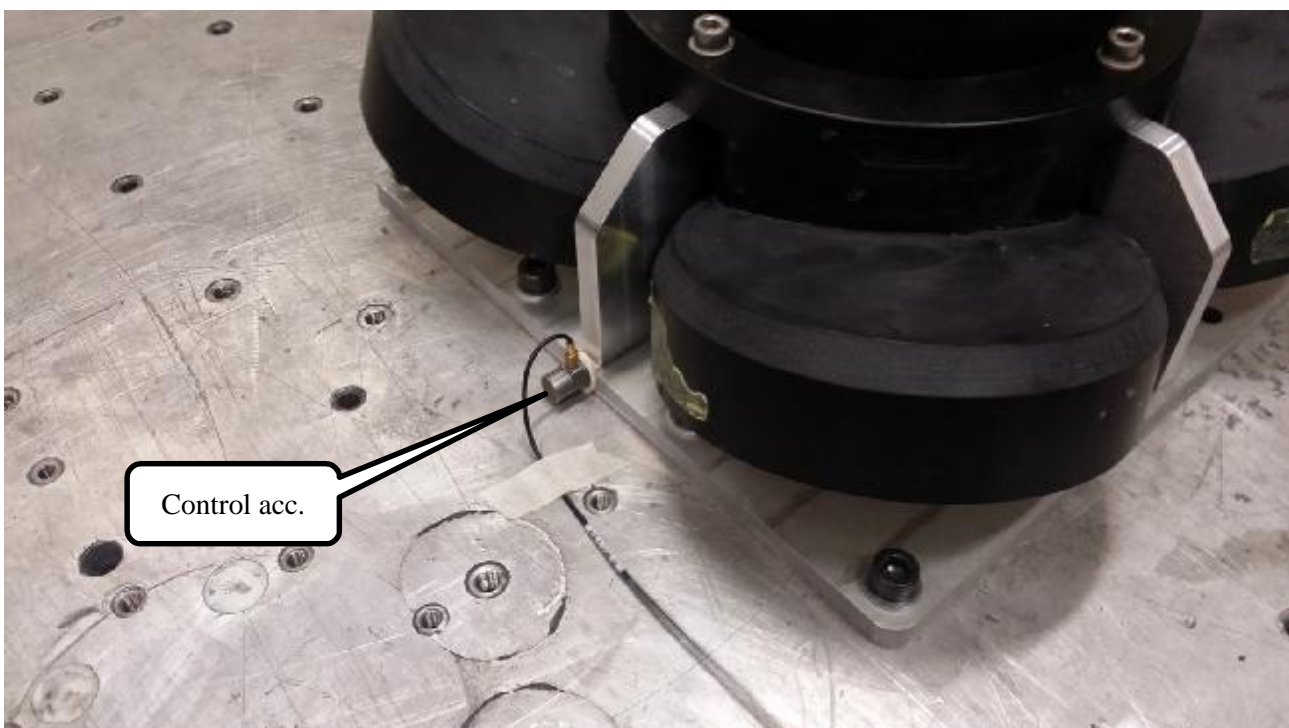


Figure 6 - Control accelerometer in Y-axis

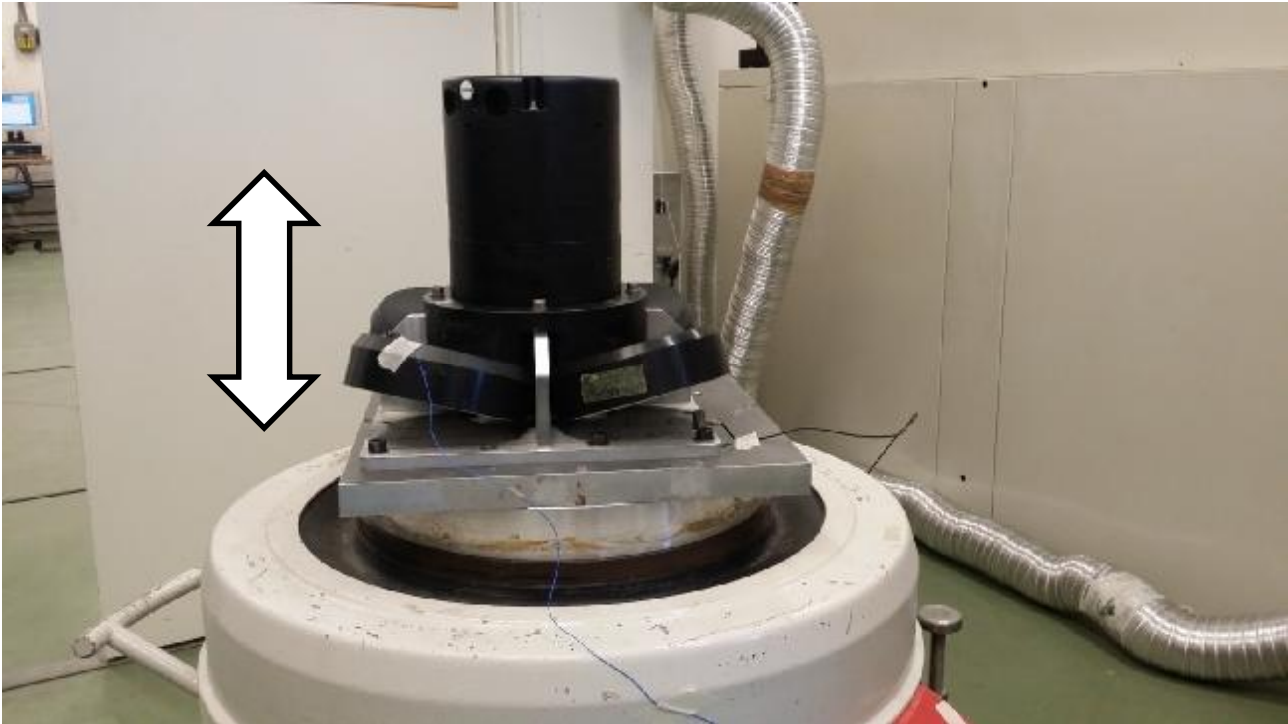


Figure 7 - Test item placed in Z-axis

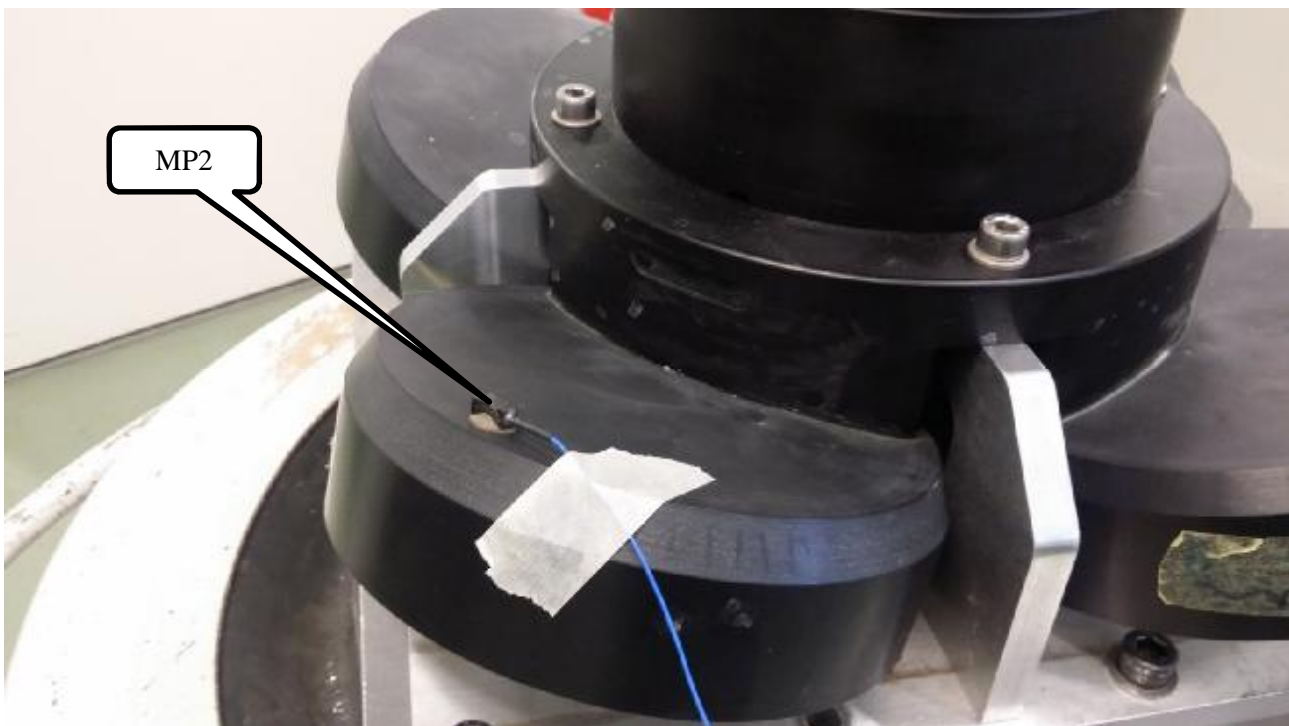


Figure 8 - MP2 in Z-axis



Figure 9 - Control accelerometer in Z-axis

Appendix 1

Test Equipment

Vibrator

Int.no.0883	Vibrator	LDS 964 LS	Cal.: N.A.	
	Amplifier	LE 4014 E	Cal.: N.A.	
Int.no TI126424	Vibration control sys	Spider 80 S	Cal.: 18.01.16	Interval: 12 months
Int.no TI126423	Vibration control sys	Spider 80 M	Cal.: 18.01.16	Interval: 12 months
Int.no.02017	Vibrator	LDS V810	Cal.: N.A	
	Amplifier	LDS	Cal.: N.A	
Int.no TI126422	Vibration control sys	Spider 80 M	Cal.: 15.12.15	Interval: 12 months
Int.no. 440495	Accelerometer	2079297	Cal.: 17.12.15	Interval: 12 months
Int.no. 440491	Accelerometer	59979	Cal.: 26.11.15	Interval: 12 months
Int.no. 175417	Accelerometer	C196900	Cal.: 07.04.16	Interval: 12 months
Int.no. 171852	Accelerometer	C141500	Cal.: 21.09.15	Interval: 12 months

Vibration fixtures were supplied by Nortek.

Table 1: Measurement uncertainty figures.

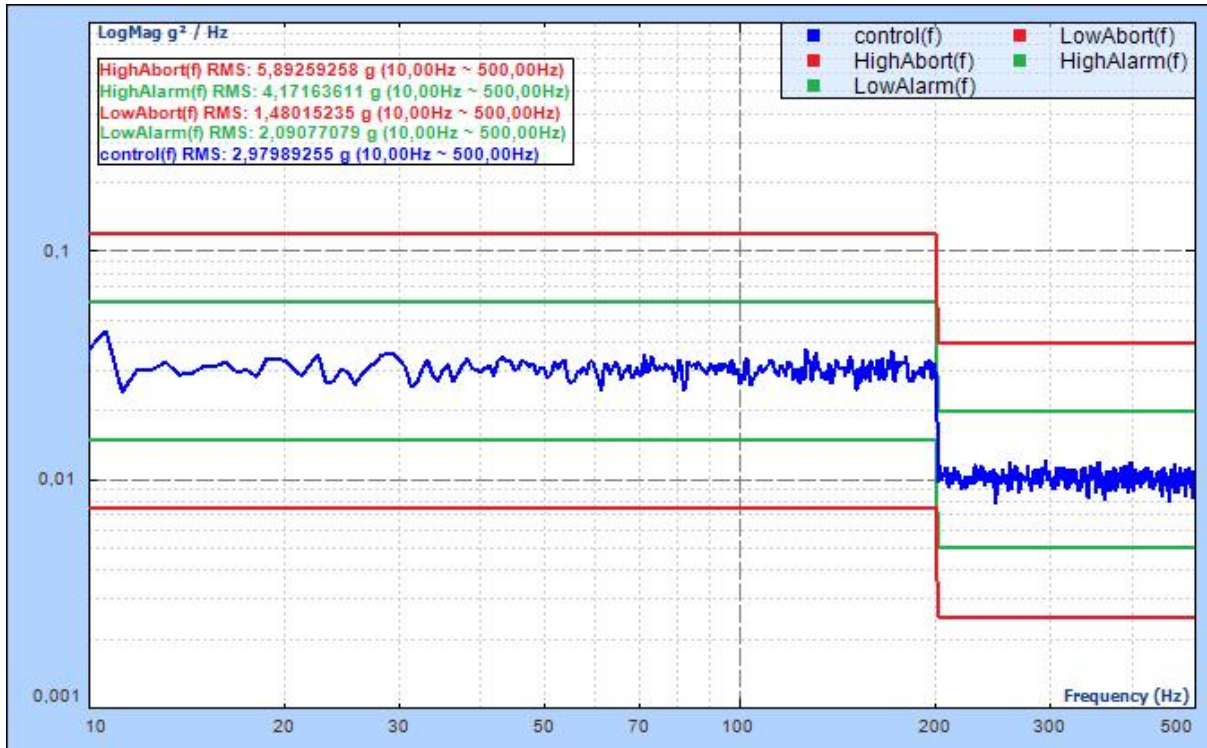
Parameter	Uncertainty	Cover factor k	Remarks
Acceleration	+/- 2,95 %	2	Figures based on specification and figures from calibration of individual items in measurement chain.
Frequency	+/- 0.01 %	2	Figures based on specification.

* Details from measurement uncertainty calculations can be forwarded on request.

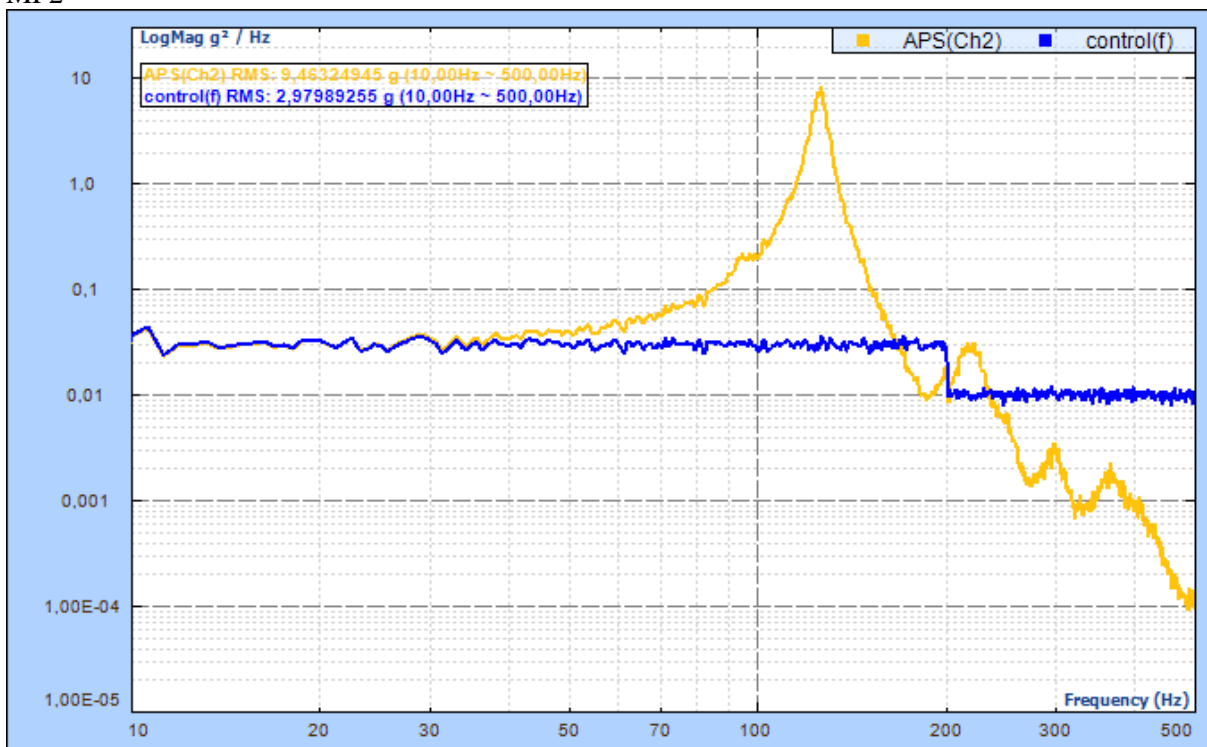
Appendix 2

Test Records

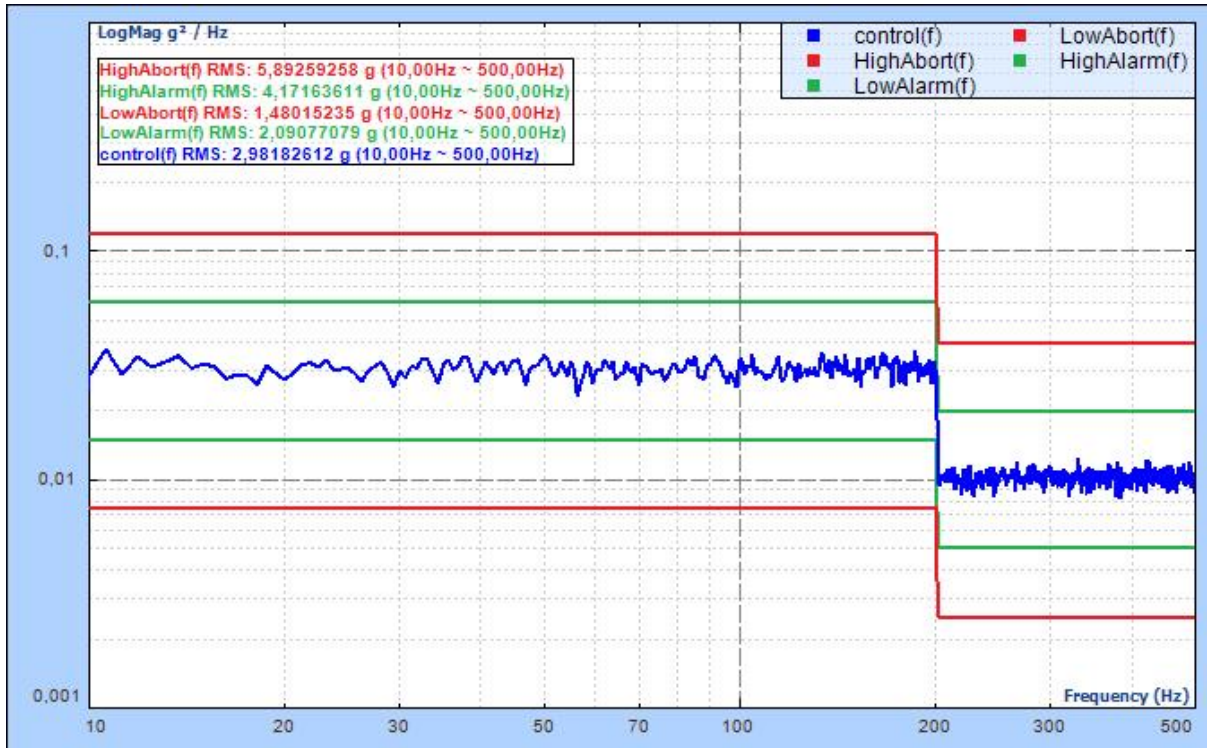
Run 1 – X-axis



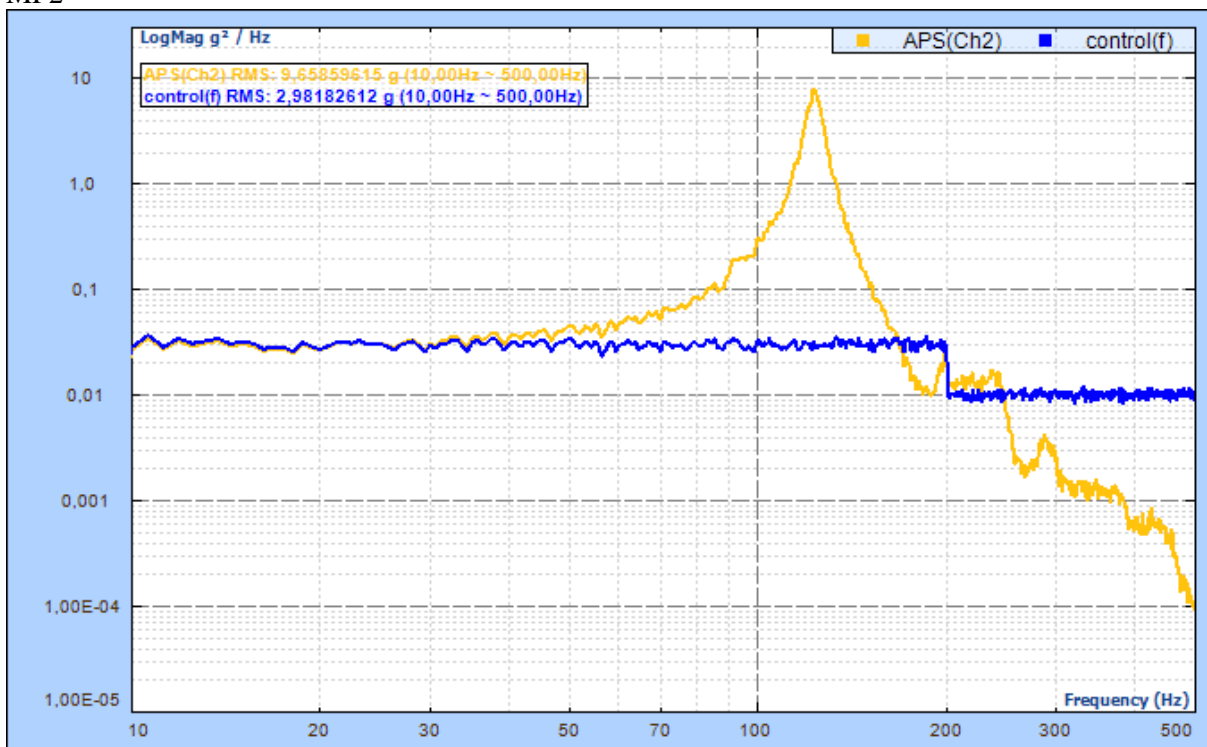
MP2



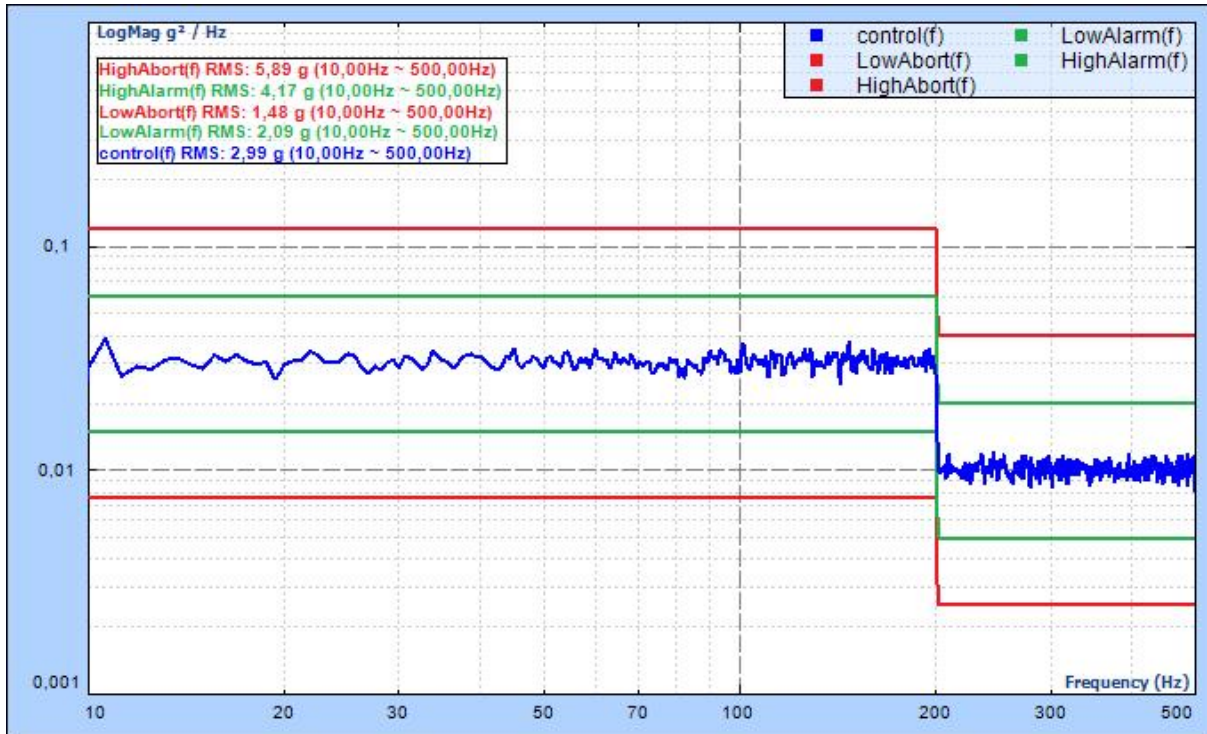
Run 2 – Y-axis



MP2



Run 1 – Z-axis



MP2

