MTR Corporation Limited

Kwun Tong Line Extension (KTE)

Ground-borne Noise Review Report (Phase 1 and Phase 2)

| Verified by: | | |
|--------------|-----------------------------------|--|
| Position: | Independent Environmental Checker | |
| Date: | 5 Nov 2014 | |

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Certified by: ______ Position: _____Environmental Team Leader

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NOISE REVIEW REPORT

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October 2014

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NOISE REVIEW REPORT

MTR Corporation Limited

Ground-borne Noise Review Report for KTE

October 2014

Reference 0132172

| For and on behalf of ERM-Hong Kong, Limited | | |
|--|-----------------|--|
| Approved by | : Frank Wan | |
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| | | |

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1 INTRODUCTION

1.1 BACKGROUND

The Kwun Tong Line Extension (KTE) is a ~2.6km extension of the existing MTR Kwun Tong Line service from the Yau Ma Tei Station (YMT) to a new terminus station at Whampoa via the Ho Man Tin Station (HOM).

The Environmental Impact Assessment (EIA) Report of the KTE was approved on 19 August 2010, Register No.: AEIAR-154/2010 (the approved KTE EIA Report). According to Condition 4.2 of the Environmental Permit (EP-399/2010/B), the Permit Holder is responsible for carrying out the review of the proposed mitigation measure for operation groundborne noise (GBN) (including the verification of the Line Source Response (LSR) and ground vibration condition) assumed in the approved EIA Report. A Review Report shall be submitted to justify the adequacy of the operation GBN mitigation measures proposed in the approved KTE EIA Report.

ERM-Hong Kong, Limited (ERM) is commissioned by MTR Corporation Limited (MTRCL) as the Environmental Term Consultant. ERM is supported by Wilson Acoustics Limited (WAL) who acts as the GBN specialist.

1.2 PURPOSE OF THIS REPORT

According to the submitted KTE Ground-Borne Noise Review Plan, measurements are proposed to be conducted at NSR12 (Methodist Primary School at 10-12 Wylie Road), NSR14 (Shun Man House, Oi Man Estate) and NSR26 (Wing Fu Building, Whampoa Estate) to verify the ground conditions. The review of GBN impact was separated into two phases. Phase 1 covers the section from DN CH10+400 to CH9+200, NSR 1 to NSR12 sit along this section. Phase 2 covers the section from DN CH9+200 to CH7+891, NSR 13 to NSR 62 sit along this section.

The Review Report of Phase 1 was submitted in March 2014, GBN of NSR12 was reviewed in the report.

This *GBN Review Report* incorporate the measurement results and updated GBN assessment of Phase 1 and Phase 2. It is used to justify the adequacy of the updated mitigation measures for operation GBN along the KTE alignment.

ALIGNMENT DRAWING AND GEOLOGICAL PROFILE

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The GBN assessment is based on the alignment drawing and geological profile updated on 03 January 2012, and received from MTRC on 16 May 2013, as shown in *Figure 2.1* to *Figure 2.3*, respectively.







TRAIN INDUCED GROUNDBORNE NOISE ASSESSMENT METHODOLOGY

According to the approved KTE EIA Report, the methodology for the vibration and groundborne railway noise assessment is in accordance with the procedures outlined in *The Transit Noise and Vibration Impact Assessment* published by US Department of Transportation Federal Transit Administration (FTA Manual) for detailed vibration analysis.

The GBN level at the identified NSRs was calculated as follows:

L = FDL + TIL + TOC + TCF + LSR + BCF + BVR + CTN + SAF

where:

L = GBN level, in dB re 20μ Pa

FDL = Force density level, in dB re $1N/m^{0.5}$

- TIL = trackform attenuation or insertion loss, relative level
- TOC = turnout and crossover factor
- TCF = vibration coupling between the tunnel and the ground for soil based tunnels, relative level
- LSR = line source transfer mobility, in dB re $(nm/s)/(N/m^{0.5})$
- BCF = adjustment to account for building coupling loss, in dB
- BVR = building vibration amplification within the structure, in dB
- CTN = conversion from vibration to noise within the building, in dB
- SAF = 10dB safety factor to account for wheel/rail condition and uncertainties in ground conditions, in dB

This *Review Report* updates the LSRs used in GBN assessment for the three NSRs.

4 MEASUREMENT AND ANALYSIS PROCEDURES

4.1 PSR MEASUREMENT AND ANALYSIS PROCEDURE FOR NSR12 AND NSR14

Vibration measurements were conducted during drill rig excavation at West Island Line (WIL), NSR12 and NSR14 of Kwun Tong Line Extension (KTE) on 9 May 2013, 15 March 2013 and 16 April 2014, respectively. The vibration measurement results are used to estimate the point source response at NSR12 and NSR14 of KTE. The principle employed in the estimation is described below. More details of measurement and analysis procedures can be referenced to the GBN Review Plan.

The vibration level (Vibr) arising from drill rig excavation is given by logarithmic addition of drill rig excitation force (FDL) and vibration transfer mobility of the ground, which is the Point Source Responce (PSR).

Vibr $WIL = FDL_{WIL} + PSR_{WIL}$ Vibr $KTE = FDL_{KTE} + PSR_{KTE}$

The drill rigs used for the construction of WIL and KTE are identical, i.e. Atlas Boomer 352 (specification of the drill rig has been provided in *Annex B*). It can be deduced that FDL_{WIL} and FDL_{KTE} are the same. Therefore the difference in PSR at the two locations is directly given by the difference in vibration level.

 $\Delta PSR = Vibr_{WIL} - Vibr_{KTE}$

The PSR at WIL site (**PSR**_{WIL}) has been determined by borehole impact test at WIL D028 (impact depth 44.3m) during EIA stage of WIL. Therefore PSR at NSR12 and NSR14 of KTE site (**PSR**_{KTE}) can be estimated based on the measured drill rig vibration level, respectively.

After estimating the PSR, the Line Source Response (LSR) is calculated from numerical integration of the PSR at each impact point along the alignment according to the equation below:

$$LSR(s,d,f) = 10 \log \left[\int_{-l/2}^{l/2} 10^{PSR(\sqrt{s^2 + d^2 + y^2}, f)/10} dy \right]$$

where

s = perpendicular setback
l = train length
d= tunnel depth
f= frequency

The deployments of accelerometers at WIL, NSR12 and NSR14 KTE are shown in *Figure 4.1* to *Figure 4.3* respectively. Photos showing the locations of vibration sensors deployed at WIL, NSR12 and NSR14 of KTE are provided in *Figures 4.4* to *Figures 4.6* respectively.







Figure 4.3

KTE NSR14, Drill-rig and Measurement Locations

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Figure 4.6

KTE NSR14 Sensor Deployment Photos

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PSR Measurement and Analysis Procedure for NSR26

4.2

Following the Review Plan, hammer impact tests was conducted at eight points inside the tunnel next to NSR26 of KTE on 28 Aug 2014. The results are used to determine the LSR at NSR26 of KTE.

One pneumatic impact hammer was employed in the hammer impact test. A force transducer was located at the base of the hammer to measure the force applied to the tunnel invert. Accelerometers were placed at 3 setbacks on the ground level to pick up the vibration signals simultaneously.

The PSR is calculated from dividing the vibration signal by the force signal at each individual 1/3 octave band. The LSR is calculated from numerical integration of the PSR at each impact point along the alignment according to the equation below:

$$LSR(s,d,f) = 10 \log \left[\int_{-l/2}^{l/2} 10^{PSR(\sqrt{s^2 + d^2 + y^2}, f)/10} dy \right]$$

where
s = perpendicular setback

1 = train length

d= tunnel depth

By invoking the assumption that the ground is transversely isotropic along the alignment over the length of the train, LSR can be determined from a single hammer impact point. In this verification test, hammer impact test was conducted at 8 points along the alignment inside the tunnel, so as to take into account possible geological variations along the alignment.

The 8 hammer impact points cover 70 m in length along the alignment, which is the closest section to NSR26. Accelerometers were deployed at 3 locations on pavements and the staircase of NSR26. To enhance the measurement accuracy at frequencies below 160Hz, an additional Endevco Model 86 accelerometer was deployed at NSR26 staircase.

Hammer impact points and sensor deployment locations are shown in *Figure* 4.7. Photos showing the hammer impact test at 8 selected points are provided in *Figures* 4.8 and 4.9. Photos showing the locations of vibration sensors at NSR26 are provided in *Figures* 4.10 and 4.11.





Hammer Impact Point 1



Hammer Impact Point 2



Hammer Impact Point 3



Hammer Impact Point 4

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Figure 4.8

KTE NSR26 Hammer Impact Test Photos, Point 1 to 4



Hammer Impact Point 5



Hammer Impact Point 7



Hammer Impact Point 6



Hammer Impact Point 8

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Figure 4.9

KTE NSR26 Hammer Impact Test Photos, Point 5 to 8





Sensor (1), (2) and Indevco

Figure 4.11

KTE NSR26 Sensor Deployment Photos, Close-up Shot

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5 MEASUREMENT RESULTS

5.1 NSR12 MEASUREMENT RESULT

For NSR12, the measured vibration level at various slant distances at WIL and KTE sites are compared and shown in *Figure 5.1, 5.3* and *5.5*, while the estimated PSR for the corresponding slant distances are shown in *Figure 5.2, 5.4* and *5.6*.

The updated LSRs for downtrack and uptrack are shown in *Figure 5.7* and *5.8* respectively, in comparison with the LSRs adopted in EIA.

5.2 NSR14 MEASUREMENT RESULT

For NSR14, the measured vibration level at various slant distances at WIL and KTE sites are compared and shown in *Figure 5.9, 5.11* and *5.13*, while the estimated PSR for the corresponding slant distances are shown in *Figure 5.10*, *5.12* and *5.14*.

The updated LSRs for downtrack and uptrack are shown in *Figure 5.15* and *5.16* respectively, in comparison with the LSRs adopted in EIA. The sensors were deployed on the building foundation, which indicates that BCF and BVR-Amplification have been included in the updated LSRs. For direct comparison, the updated LSRs are compared with LSRs adopted in EIA, which include the BCF and BVR-Amplification.

5.3 NSR26 MEASUREMENT RESULT

For NSR26, the 3 PSR datasets measured from 3 locations at KTE sites are shown in *Figures 5.17* to *5.19*, respectively. Wherein, the PSR dataset from the sensor deployed at staircase of the building is selected to calculate the LSR for GBN prediction. The reason is that the said PSR was measured on the building foundation, which provides more accurate result in GBN prediction.

The updated LSR for downtrack are shown in *Figure 5.20*, in comparison with the LSR adopted in EIA. The BCF and BVR-Amplification have been included in the updated LSR, for direct comparison, the LSR of EIA is provided with these two factors included.



Figure 5.1 Vibration Level of WIL and KTE NSR12 at 49m



Figure 5.3 Vibration Level of WIL and KTE NSR12 at 52m



Figure 5.2 PSR Result of WIL and KTE NSR12 at 49m



Figure 5.4 PSR Result of WIL and KTE NSR12 at 52m

Figures 5.1 to 5.4

WIL and KTE NSR12 - Vibration Measurement Results and PSR Results at 49m and 52m

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Figure 5.5 Vibration Level of WIL and KTE NSR12 at 55m



Figure 5.6 PSR Result of WIL and KTE NSR12 at 55m

Figures 5.5 & 5.6

WIL and KTE NSR14 - Vibration Measurement Results and PSR Results at 55m

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Figure 5.11 Vibration Level of WIL and KTE NSR14 at 52m



Figure 5.10 PSR Result of WIL and KTE NSR14 at 49m



Figure 5.12 PSR Result of WIL and KTE NSR14 at 52m

Figure 5.9 to 5.12

WIL and KTE NSR14 - Vibration Measurement Results and PSR Results at 49m and 52m

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Figure 5.13 Vibration Level of WIL and KTE NSR14 at 55m



Figure 5.14 PSR Result of WIL and KTE NSR14 at 55m

Figure 5.13 to 5.14

WIL and KTE NSR14 - Vibration Measurement Result and PSR Result at 55m

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GROUNDBORNE NOISE ASSESSMENT RESULTS

The GBN prediction has been updated following EIA's methodology. The results are summarized in *Table 6.1*. Detailed calculations of NSR12, NSR14 and NSR26 GBN predictions are shown in *Annex A*. The assumptions and calculations follow the approved KTE EIA Report.

| | | EIA's | Updated | Noise |
|---------|-----------------------------------|------------|------------|-------------|
| | | Prediction | Prediction | Criteria |
| | Lmax, dBA | 50 | 39 | 85 |
| NCD10 | Leq, 30min (day and evening), dBA | 43 | 30 | 55 |
| NSK12 | Leq, 30min (night), dBA | 40 | 27 | $N/A^{(a)}$ |
| | Leq, 24hr, dBA | 42 | 29 | N/A |
| | Lmax, dBA | 38 | 47 | 85 |
| NICD14 | Leq, 30min (day and evening), dBA | 31 | 40 | 55 |
| IN5K14 | Leq, 30min (night), dBA | 28 | 37 | 45 |
| | Leq, 24hr, dBA | 30 | 39 | N/A |
| | Lmax, dBA | 52 | 39 | 85 |
| NCDO | Leq, 30min (day and evening), dBA | 42 | 31 | 55 |
| 1131(20 | Leq, 30min (night), dBA | 42 | 28 | 45 |
| | Leq, 24hr, dBA | 41 | 29 | N/A |
| Note: | | | | |

Table 6.1Groundborne Noise Prediction Result of NSR12, NSR14 and NSR26, Including

10dB Safety Factor

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(a) Methodist School has no sensitive use at nigh-time period.

The updated GBN level at NSR12 is lower than that predicted in the approved EIA report. As shown in *Figures 5.2, 5.4* and *5.6*, the vibration level at WIL is significantly higher at the high frequency range above 160Hz, which implies the WIL site has more effective vibration transmission at high frequencies. This results in a lower PSR for NSR12 above 160Hz and thus a lower predicted groundborne noise level.

The updated GBN level at NSR14 is higher than that predicted in the approved EIA report, which implies the actual ground condition is found to be favourable for vibration transmission than that assumed in the approved KTE EIA Report. As shown in *Figures 5.15* and *5.16*, the updated LSR levels at 315Hz (12dB higher) and 400Hz (15 dB higher) are significantly higher, which leads to the higher prediction at GBN level. Nevertheless, the updated GBN is still within the statutory requirements.

The updated prediction of operational GBN levels of NSR26 are lower than that predicted in the approved KTE EIA Report. This is because the actual ground condition is found to be less favourable for vibration transmission than that assumed in the approved KTE EIA Report.

CONCLUSIONS

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Vibration measurements were conducted during drill rig excavation at West Island Line (WIL) and Kwun Tong Line Extension (KTE). The measurement results were used to estimate the point source response at NSR12 and NSR14 of KTE, and update operational GBN noise prediction result.

Hammer impact test was conducted inside the tunnel near NSR26 of KTE, which identified as one of the most critical NSR with respect to operational ground-borne noise impact identified in the approved KTR EIA Report. The LSR are determined and the operational GBN prediction for NSR26 had been updated using the determined LSR.

The updated groundborne noise level at NSR12 and NSR26 are lower than that predicted in the EIA. The updated groundborne noise levels at NSR14 is higher than EIA prediction. Nevertheless, including 10dB safety factor, they are still within the statutory requirements.

In summary, the GBN mitigation measures proposed in the approved KTE EIA Report are considered to be adequate.

Annex A

Detailed GBN Calculation Results

| NSR No. | 12 | | | | Down T | rack Ch | ainage | 9+280 | Vertica | al Distan | ce (m) | 48 | Horizor | tal Setba | ack (m) | 18 | Spe | eed (km | /h) | 68 |
|-----------------------------|-------------------------------------|-----------|----------|-------|--------|---------|--------------|-------|---------------|---------------|---------|----------|---------|-----------|------------|-------|-------|---------|--------|-------|
| Location | Methodist Primary Sch | ool, 10-1 | L2 Wylie | Road | Up Tra | ack Cha | inage | 9+320 | Vertica | al Distan | ce (m) | 48 | Horizor | tal Setba | ack (m) | 10 | Spe | eed (km | /h) | 69 |
| | | | , | | | | | | 1/30 | ctave Ba | nd Cent | er Fregu | Jency | | | | | | | |
| | | 6.3 | 8 | 10 | 12.5 | 16 | 20 | 25 | 31.5 | 40 | 50 | 63 | 80 | 100 | 125 | 160 | 200 | 250 | 315 | 400 |
| YMT-Turnback Calculation | | | | | | | | | | | | | | | | | | | | |
| FDL | dB re N/m ^{1/2} | 62.1 | 62.9 | 63.4 | 64.2 | 57.4 | 58.4 | 64.1 | 61.2 | 64.2 | 59.3 | 57.2 | 61.3 | 64.3 | 65.1 | 64.6 | 60.7 | 62.9 | 58.7 | 55.0 |
| TIL (25kN/mm Baseplate) | dB | 2.5 | 1.5 | 0.0 | 0.0 | -1.0 | -4.0 | -5.0 | -3.0 | -3.0 | 0.0 | -9.0 | -13.0 | -10.0 | -12.0 | -12.0 | -12.5 | -12.0 | -10.0 | -5.0 |
| TOC | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TCF | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| LSR | dB re (nm/s)/(N/m ^{1/2}) | 0.0 | 0.0 | 2.1 | 3.4 | 16.6 | 9.6 | 7.0 | 6.2 | 8.0 | -0.3 | 0.0 | 3.7 | -7.9 | -1.0 | -8.3 | -9.7 | -13.3 | 1.0 | 4.4 |
| BCF | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| BVR-Amplification | dB | 1.0 | 2.0 | 3.0 | 3.8 | 5.0 | 6.0 | 6.0 | 6.0 | 6.0 | 5.8 | 5.4 | 5.2 | 5.0 | 4.8 | 4.0 | 3.0 | 2.0 | 1.0 | 0.7 |
| BVR-Floor Attenuation | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0. |
| CTN | dB | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27. |
| SAF | dB | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Lmax | dB | 48.6 | 49.4 | 51.5 | 54.5 | 61.1 | 53.0 | 55.1 | 53.5 | 58.2 | 47.8 | 36.6 | 40.2 | 34.4 | 39.9 | 31.4 | 24.5 | 22.6 | 33.8 | 38.8 |
| Lmax | dBA | 35.8 | | | | | | | | | | | | | | | | | | |
| YMT - WHA Calculation | | | | | | | | | | | | | | | | | | | | |
| FDL | dB re N/m ^{1/2} | 62.1 | 62.9 | 63.4 | 64.2 | 57.4 | 58.4 | 64.1 | 61.2 | 64.2 | 59.3 | 57.2 | 61.3 | 64.3 | 65.1 | 64.6 | 60.7 | 62.9 | 58.7 | 55.6 |
| TIL (25kN/mm Baseplate) | dB | 2.5 | 1.5 | 0.0 | 0.0 | -1.0 | -4.0 | -5.0 | -3.0 | -3.0 | 0.0 | -9.0 | -13.0 | -10.0 | -12.0 | -12.0 | -12.5 | -12.0 | -10.0 | -5.0 |
| тос | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TCF | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| LSR | dB re (nm/s)/(N/m ^{1/2}) | 0.0 | 0.0 | 2.1 | 3.4 | 16.6 | 9.6 | 7.0 | 6.2 | 8.0 | -0.3 | 0.0 | 3.7 | -7.9 | -1.0 | -8.3 | -9.7 | -13.3 | 1.0 | 4.4 |
| BCF | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| BVR-Amplification | dB | 1.0 | 2.0 | 3.0 | 3.8 | 5.0 | 6.0 | 6.0 | 6.0 | 6.0 | 5.8 | 5.4 | 5.2 | 5.0 | 4.8 | 4.0 | 3.0 | 2.0 | 1.0 | 0. |
| BVR-Floor Attenuation | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| CTN | dB | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27. |
| SAF | dB | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Lmax | dB | 48.6 | 49.4 | 51.5 | 54.5 | 61.1 | 53.0 | 55.1 | 53.5 | 58.2 | 47.8 | 36.6 | 40.2 | 34.4 | 39.9 | 31.4 | 24.5 | 22.6 | 33.8 | 38.8 |
| Lmax | dBA | 35.8 | | | | | | | | | | | | | | | | | | |
| | 1 | | | | | | | | | | | | | | | | | | | |
| Turnback-YMT Calculation | | | | | | | | | | | | | | | | | | | | |
| FDL | dB re N/m ^{*/*} | 62.3 | 63.1 | 63.6 | 64.4 | 57.6 | 58.6 | 64.3 | 61.4 | 64.4 | 59.5 | 57.4 | 61.5 | 64.5 | 65.3 | 64.8 | 60.9 | 63.1 | 58.9 | 55.8 |
| TIL (25kN/mm Baseplate) | dB | 2.5 | 1.5 | 0.0 | 0.0 | -1.0 | -4.0 | -5.0 | -3.0 | -3.0 | 0.0 | -9.0 | -13.0 | -10.0 | -12.0 | -12.0 | -12.5 | -12.0 | -10.0 | -5.0 |
| 100 | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ICF | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| LSR | dB re (nm/s)/(N/m*/*) | 0.0 | 0.0 | 2.3 | 4.2 | 16.9 | 9.5 | 7.7 | 6.7 | 8.6 | 0.0 | 0.2 | 6.9 | -3.5 | 5.2 | 6.5 | -1.7 | -5.5 | 2.0 | 4.4 |
| BCF | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| BVR-Amplification | dB | 1.0 | 2.0 | 3.0 | 3.8 | 5.0 | 6.0 | 6.0 | 6.0 | 6.0 | 5.8 | 5.4 | 5.2 | 5.0 | 4.8 | 4.0 | 3.0 | 2.0 | 1.0 | 0. |
| BVR-Floor Attenuation | dB | 0.0 | 0.0 | 27.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 27.0 | 0.0 | 0.0 | 0.0 | 0.0 | 27.0 | 0.0 | 0.0 | 0.0 | 27.0 |
| | dB | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 |
| SAF | dB | 10.0 | 10.0 | E1.0 | 10.0 | 10.0 | 10.0 E2.1 | 10.0 | 10.0 E 4 1 | 10.0 | 10.0 | 27.0 | 10.0 | 28.0 | 10.0 | 10.0 | 22.7 | 20.6 | 24.0 | 10. |
| LIIIdX | dBA | 40.0 | 49.0 | 51.9 | 55.4 | 01.5 | 35.1 | 55.9 | 54.1 | 59.0 | 40.5 | 57.0 | 45.0 | 30.9 | 40.5 | 40.5 | 52.7 | 50.0 | 54.9 | 50. |
| WHA - YMT Calculation | UDA | 30.3 | | | | | | | | | | | | | | | | | | |
| | dD as N /as 1/2 | (2.2 | C2 1 | 62.6 | 64.4 | F7.0 | 50.0 | 64.2 | C1 4 | 64.4 | 50.5 | F7.4 | C1 F | 64.5 | 65.2 | 64.0 | 60.0 | C2 1 | 50.0 | |
| TIL (25kN/mm Pacanlata) | dB | 02.3 | 03.1 | 0.60 | 04.4 | 57.6 | 58.0 | .5.0 | 01.4 _2 0 | 04.4 , 2 0 | 59.5 | 57.4 | 12.0 | -10.0 | -12.0 | -12.0 | _12 F | 12.0 | 20.9 | 55.0 |
| TOC | dB | 2.5 | 1.5 | 0.0 | 0.0 | 0.1- | -4.0 | -5.0 | -5.0 | -5.0 | 0.0 | -9.0 | -12.0 | - 10.0 | -12.0 | 0.0 | -12.5 | -12.0 | - 10.0 | -5. |
| TCF | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | dD as (ass (a) ((b) (1/2) | 0.0 | 0.0 | 0.0 | 0.0 | 10.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0. |
| | de re (rim/s)/(N/m ^{-/-}) | 0.0 | 0.0 | 2.3 | 4.2 | 10.9 | 9.5 | /./ | b./ | 8.6 | 0.0 | 0.2 | 6.9 | -3.5 | 5.2 | 6.5 | -1./ | -5.5 | 2.0 | 4.4 |
| BVR-Amplification | dB | 1.0 | 2.0 | 3.0 | 3.0 | 5.0 | 6.0 | 6.0 | 6.0 | 6.0 | 5.0 | 5.0 | 5.0 | 5.0 | 1.9 | 1.0 | 3.0 | 2.0 | 1.0 | 0. |
| BVR-Floor Attenuation | dB | 1.0 | 2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.0 | 0.0 | 4.0 0 0 | 4.0 | 0.0 | 2.0 | 1.0 | 0. |
| CTN | dB | -27 0 | -27 0 | -27 0 | -27 0 | -27 0 | -27 0 | -27 0 | -27 0 | -27 0 | -27 0 | -27 0 | -27 0 | -27 0 | -27 0 | -27 0 | -27 0 | -27 0 | -27 0 | -27 |
| SAF | dB | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10 |
| Lmax | dB | 48.8 | 49.6 | 51.9 | 55.4 | 61.5 | 53.1 | 55.9 | 54.1 | 59.0 | 48.3 | 37.0 | 43.6 | 38.9 | 46.3 | 46.3 | 32.7 | 30.6 | 34.9 | 38 |
| Lmax | dBA | 38.5 | +5.0 | 51.5 | 55.4 | 51.5 | 55.1 | 55.5 | 54.1 | 55.0 | 10.5 | 57.0 | 45.0 | 50.5 | .0.5 | 70.5 | 52.7 | 50.0 | 54.5 | |
| Total Prediction Noise leve | 1 | 0010 | | | - I | | | I I | | | | | | | | | | | | |
| Lmax | dBA | 39 | | | | | | | | | | | | | | | | | | |
| Leg,30min (day) | dBA | 30 | | | | | | | | | | | | | | | | | | |
| Leq,30min (night) | dBA | 27 | | | | | | | | | | | | | | | | | | |
| Leq,24hr | dBA | 29 | | | | | | | | | | | | | | | | | | |
| | | | • | | | | | | | | | | | | | | | | | |

Detailed GBN Calculation of NSR12, Methodist Primary School at 10-12 Wylie Road



Date 13 Oct 2014

| NSR No. | 14 | | | | Down T | rack Cha | inage | 8+970 | Vertica | al Distan | ce (m) | 49 | Horizon | tal Setba | ack (m) | 3 | Sp | eed (km | /h) | 66 |
|--|------------------------------------|-----------|-------|-------|--------|-----------|-------|-------|---------|-----------|--------------|----------|---------|-----------|---------|---------------|-------|---------|-------|-----|
| Location | Shun Man House, Oi M | an Estata | a | | Up Tra | ack Chaiı | nage | 9+000 | Vertica | al Distan | ce (m) | 49 I | Horizon | tal Setba | ack (m) | 0 | Sp | eed (km | /h) | 61 |
| | | | | | | | | | 1/30 | ctave Ba | nd Cente | er Frequ | ency | | | | | | | |
| | | 6.3 | 8 | 10 | 12.5 | 16 | 20 | 25 | 31.5 | 40 | 50 | 63 | 80 | 100 | 125 | 160 | 200 | 250 | 315 | 400 |
| YMT-Turnback Calculation | | | | | | | | | | | | | | | | | | | | |
| FDL | dB re N/m ^{1/2} | 61.9 | 62.7 | 63.2 | 64.0 | 57.2 | 58.2 | 63.9 | 61.0 | 64.0 | 59.1 | 57.0 | 61.1 | 64.1 | 64.9 | 64.4 | 60.5 | 62.7 | 58.5 | 55 |
| TIL (25kN/mm Baseplate) | dB | 2.5 | 1.5 | 0.0 | 0.0 | -1.0 | -4.0 | -5.0 | -3.0 | -3.0 | 0.0 | -9.0 | -13.0 | -10.0 | -12.0 | -12.0 | -12.5 | -12.0 | -10.0 | - 5 |
| тос | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | (|
| TCF | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | (|
| LSR | dB re (nm/s)/(N/m ^{1/2}) | -17.8 | -12.6 | -10.1 | -9.4 | -0.9 | -0.7 | 3.4 | 4.7 | 12.1 | 13.0 | 7.8 | 16.1 | 8.7 | -1.5 | 14.5 | 6.0 | 0.2 | 17.5 | 19 |
| BCF | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| BVR-Amplification | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1 |
| BVR-Floor Attenuation | dB | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | - |
| CTN | dB | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -2 |
| SAF | dB | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 1 |
| Lmax | dB | 27.6 | 32.5 | 34.0 | 35.6 | 36.3 | 34.4 | 43.3 | 43.7 | 54.1 | 53.1 | 36.8 | 45.2 | 43.8 | 32.4 | 47.8 | 35.0 | 31.9 | 47.0 | 5 |
| Lmax | dBA | 47.1 | | | | | - | | | | | | - | | | | | | | - |
| YMT - WHA Calculation | | | | | | | | | | | | | | | | | | | | |
| FDL | dB re N/m ^{1/2} | 61 9 | 62.7 | 63.2 | 64 N | 57.2 | 58.2 | 63 0 | 61 0 | 64.0 | 59.1 | 57.0 | 61 1 | 64 1 | 64 Q | 64 / | 60 5 | 62.7 | 58 5 | 5 |
| TIL (25kN/mm Basenlate) | dB | 2 5 | 1 5 | 0.0 | 0.0 | -1.0 | -4 0 | -5.0 | -3.0 | -3.0 | 0.0 | -9.0 | -13.0 | -10.0 | -12 0 | -12 0 | -12 5 | -12 0 | -10.0 | - |
| TOC | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.0 | |
| TCF | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| ISR | dB re (nm/s)/(N/m ^{1/2}) | -17 9 | -12.6 | -10.1 | _9.4 | -0.0 | -0.7 | 3.4 | 0.0 | 12 1 | 13.0 | 7.9 | 16.1 | 87 | -1 5 | 14 5 | 6.0 | 0.0 | 17 5 | 1 |
| BCF | dB | -11.0 | -12.0 | -10.1 | - 9.4 | -0.9 | -0.7 | 0.4 | 4.7 | 12.1 | 13.0 | 7.0 | 10.1 | 0.7 | -1.2 | 14.5 | 0.0 | 0.2 | 17.5 | 1 |
| BVR-Amplification | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| BVIN-MIIIpIIIICation | dB | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | |
| | dB | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | - |
| CAR | dB | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -2 |
| SAF | dB | 27.6 | 22.5 | 24.0 | 25.6 | 26.2 | 24.4 | 10.0 | 10.0 | 10.0 | 10.0 52.1 | 26.9 | 10.0 | 10.0 | 22.4 | 10.0 | 25.0 | 21.0 | 10.0 | 1 |
| Lilidx | dBA | 47.0 | 52.5 | 54.0 | 55.0 | 50.5 | 54.4 | 43.3 | 45.7 | 54.1 | 55.1 | 50.6 | 45.2 | 45.6 | 52.4 | 47.0 | 55.0 | 51.9 | 47.0 | 3 |
| FDL | dB re N/m ^{1/2} | 61.2 | 62.0 | 62.5 | 63.3 | 56.5 | 57.5 | 63.2 | 60.3 | 63.3 | 58.4 | 56.3 | 60.4 | 63.4 | 64.2 | 63.7 | 59.8 | 62.0 | 57.8 | 5 |
| TIL (25kN/mm Baseplate) | dB | 2.5 | 1.5 | 0.0 | 0.0 | -1.0 | -4.0 | -5.0 | -3.0 | -3.0 | 0.0 | -9.0 | -13.0 | -10.0 | -12.0 | -12.0 | -12.5 | -12.0 | -10.0 | -) |
| тос | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| TCF | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1 |
| LSR | dB re (nm/s)/(N/m ^{1/2}) | -17.7 | -12.6 | -10.1 | -9.3 | -0.7 | -0.7 | 4.0 | 5.4 | 12.4 | 13.5 | 7.9 | 16.2 | 9.2 | -1.4 | 14.7 | 6.8 | 0.8 | 17.7 | 1 |
| BCF | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| BVR-Amplification | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| BVR-Floor Attenuation | dB | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | - |
| CTN | dB | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -2 |
| SAF | dB | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 1 |
| Lmax | dB | 26.9 | 31.9 | 33.4 | 35.0 | 35.8 | 33.8 | 43.2 | 43.7 | 53.7 | 52.9 | 36.2 | 44.6 | 43.6 | 31.8 | 47.4 | 35.1 | 31.8 | 46.5 | 4 |
| Lmax | dBA | 46.6 | | | | | | | | | | | | | | | | | | |
| WHA - YMT Calculation | | | | | | | | | | | | | | | | | | | | |
| FDL | dB re N/m ^{1/2} | 61.3 | 62.0 | 62.5 | 63.3 | 56.5 | 57.5 | 63.2 | 60.3 | 63.3 | 58.4 | 56.3 | 60.4 | 63.4 | 64.2 | 63.7 | 59.8 | 62.0 | 57.8 | 5 |
| TIL (25kN/mm Baseplate) | dB | 2,5 | 1.5 | 0.0 | 0,0 | -1.0 | -4.0 | -5,0 | -3,0 | -3,0 | 0.0 | -9.0 | -13.0 | -10.0 | -12,0 | -12.0 | -12.5 | -12.0 | -10.0 | - |
| TOC | dB | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0.0 | 0.0 | 0.0 | 0.0 | 0,0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| TCF | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| LSR | dB re (nm/s)/(N/m ^{1/2}) | -17.7 | -12.6 | -10.1 | -9.3 | -0.7 | -0.7 | 4,0 | 5.4 | 12.4 | 13.5 | 7.9 | 16.2 | 9,2 | -1.4 | 14.7 | 6.8 | 0.8 | 17.7 | 1 |
| BCF | dB | 0,0 | 0,0 | 0.0 | 0,0 | 0,0 | 0.0 | 0,0 | 0,0 | 0,0 | 0.0 | 0.0 | 0.0 | 0,0 | 0,0 | 0.0 | 0.0 | 0.0 | 0,0 | - |
| BVR-Amplification | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| BVR-Floor Attenuation | dB | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | - |
| CTN | dB | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27 0 | -27.0 | -27.0 | -2 |
| SAF | dB | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 1 |
| Imax | dB | 27 1 | 21.0 | 33 1 | 35.0 | 35.9 | 22.9 | 12.0 | 10.0 | 52.7 | 52.0 | 36.2 | 41.6 | 73 E | 21.9 | 10.0 /17 / | 25 1 | 21.0 | 46 5 | 1 |
| MITTER A | 10.0 | 46.9 | 5.10 | JJ.4 | 55.0 | 55.0 | 55.0 | +5.2 | +3.7 | JJ.7 | 32.3 | JU.2 | -+4.0 | +3.0 | 31.0 | +7.4 | 33.1 | 51.0 | -0.5 | 4 |
| Imax | IdBA | | | | | | | | | | | | | | | | L | 1 | | |
| Lmax | dBA | | | | | | | | | | | | | | | | | | | |
| Lmax Total Prediction Noise level | dBA | | | | | | | | | | | | | | | | | | | |
| Lmax Total Prediction Noise level Lmax | dBA dBA | 47 | | | | | | | | | | | | | | | | | | |
| Lmax Total Prediction Noise level Lmax Leq,30min (day) Leq.20min (dicht) | dBA dBA dBA | 47 | | | | | | | | | | | | | | | | | | |

Detailed GBN Calculation of NSR14, Shun Man House, Oi Man Estate



Date 13 Oct 2014

| NSR No. | 26 | | | | Down 1 | rack Cha | inage | 7+900 | Vertica | al Distan | ice (m) | 24.9 | Horizon | tal Setba | ack (m) | 5 | Spe | eed (km | /h) | 69 |
|--|--|--|---|---|---|---|--|--|--|---|---|--|--|--|--|---|--|---|--|---|
| Location | Block R, Wing Fu Buildi | ng, Wha | mpoa Es | state | Up Tr | ack Chaiı | nage | - | Vertica | al Distan | ice (m) | - | Horizon | tal Setba | ack (m) | - | Spe | eed (km | /h) | 53 |
| | | | | | | | | | 1/3 0 | ctave Ba | and Cent | er Frequ | lency | | | | | | | |
| | | 6.3 | 8 | 10 | 12.5 | 16 | 20 | 25 | 31.5 | 40 | 50 | 63 | 80 | 100 | 125 | 160 | 200 | 250 | 315 | 400 |
| YMT-Turnback Calculation | | | | | | | | | | | | | | | | | | | | |
| FDL | dB re N/m ^{1/2} | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999. |
| TIL (25kN/mm Baseplate) | dB | 2.5 | 1.5 | 0.0 | 0.0 | -1.0 | -4.0 | -5.0 | -3.0 | -3.0 | 0.0 | -9.0 | -13.0 | -10.0 | -12.0 | -12.0 | -12.5 | -12.0 | -10.0 | -5. |
| TOC | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0. |
| TCF | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0. |
| LSR | dB re (nm/s)/(N/m ^{1/2}) | 4.6 | -1.7 | 9.0 | 9.0 | 13.0 | 3.5 | -0.5 | -1.1 | -2.3 | -0.1 | -3.0 | 0.9 | -9.7 | -9.6 | -9.2 | -6.8 | -3.8 | -0.7 | 0. |
| BCF | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0. |
| BVR-Amplification | dB | 1.0 | 2.0 | 3.0 | 3.8 | 5.0 | 6.0 | 6.0 | 6.0 | 6.0 | 5.8 | 5.4 | 5.2 | 5.0 | 4.8 | 4.0 | 3.0 | 2.0 | 1.0 | 0. |
| BVR-Floor Attenuation | dB | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2. |
| CTN | dB | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27. |
| SAF | dB | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10. |
| Lmax | dB | 33.5 | 28.3 | 38.7 | 40.3 | 37.7 | 27.7 | 30.9 | 29.7 | 36.4 | 36.0 | 26.8 | 24.4 | 35.1 | 30.8 | 24.3 | 27.4 | 29.6 | 26.8 | 29. |
| Lmax | dBA | 28.2 | | | | | | | | | | | | | | | | | | |
| YMT - WHA Calculation | | | | | | | | | | | | | | | | | | | | |
| FDL | dB re N/m ^{1/2} | 62.3 | 63.1 | 63.6 | 64.4 | 57.6 | 58.6 | 64.3 | 61.4 | 64.4 | 59.5 | 57.4 | 61.5 | 64.5 | 65.3 | 64.8 | 60.9 | 63.1 | 58.9 | 55. |
| TIL (25kN/mm Baseplate) | dB | 2.5 | 1.5 | 0.0 | 0.0 | -1.0 | -4.0 | -5.0 | -3.0 | -3.0 | 0.0 | -9.0 | -13.0 | -10.0 | -12.0 | -12.0 | -12.5 | -12.0 | -10.0 | -5. |
| TOC | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0. |
| TCF | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0. |
| LSR | dB re (nm/s)/(N/m ^{1/2}) | 29.6 | 29.5 | 28.4 | 22.1 | 31.2 | 28.6 | 23.5 | 17.0 | 15.9 | 20.0 | 5.6 | 3.2 | 10.6 | 7.3 | 6.5 | 12.8 | 10.2 | 3.1 | 1. |
| BCF | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0. |
| BVR-Amplification | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0. |
| BVR-Floor Attenuation | dB | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2.0 | -2. |
| CTN | dB | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27.0 | -27. |
| SAF | dB | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10. |
| Lmax | dB | 75.4 | 75.0 | 72.9 | 67.4 | 68.7 | 64.1 | 63.8 | 56.4 | 58.2 | 60.5 | 35.0 | 32.7 | 46.1 | 41.6 | 40.3 | 42.2 | 42.3 | 32.9 | 33. |
| Lmax | dBA | 38.8 | | | | | | | | | | | | | | | | | | |
| FDL | dB re N/m ^{1/2} | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999.0 | -999. |
| TIL (25kN/mm Basepiate) | dB | 2.5 | 1.5 | 0.0 | 0.0 | -1.0 | -4.0 | -5.0 | -3.0 | -3.0 | 0.0 | -9.0 | -13.0 | -10.0 | -12.0 | -12.0 | -12.5 | -12.0 | -10.0 | -5. |
| TOC | dB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0. |
| | ub | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.5 | -0.5 | -1.1 | -2.2 | -0.1 | -2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0. |
| | $dP = (nm/c)/(N/m^{1/2})$ | 16 | 17 | 0.0 | 0.0 | 12/11 | 5.3 | -11-7 | -1.1 | -2.5 | -0.1 | | () () | | | 0.2 | 6 9 | 20 | | 0.1 |
| | dB re (nm/s)/(N/m ^{1/2}) | 4.6 | -1.7 | 9.0 | 9.0 | 13.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -3.0 | 0.9 | -9.7 | -9.0 | -9.2 | -6.8 | -3.8 | -0.7 | 0. |
| BV/R-Amplification | dB re (nm/s)/(N/m ^{1/2}) dB | 4.6 0.0 | -1.7 | 9.0 0.0 | 9.0 | 13.0 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.9 | -9.7 | -9.0 | -9.2 0.0 | -6.8 | -3.8 | -0.7 | 0.0 |
| BVR-Amplification | dB re (nm/s)/(N/m ^{1/2}) dB dB dB | 4.6 0.0 1.0 | -1.7 0.0 2.0 | 9.0 0.0 3.0 | 9.0 0.0 3.8 | 13.0 0.0 5.0 | 0.0 6.0 | 0.0 6.0 | 0.0 | 0.0 6.0 | 0.0 | -3.0 0.0 5.4 | 0.9 | -9.7 | -9.0 0.0 4.8 | -9.2 0.0 4.0 | -6.8 0.0 3.0 | -3.8 0.0 2.0 | -0.7 0.0 1.0 | 0.0 |
| BVR-Amplification BVR-Floor Attenuation | dB re (nm/s)/(N/m ^{1/2}) dB dB dB dB | 4.6 0.0 1.0 -2.0 | -1.7 0.0 2.0 -2.0 | 9.0 0.0 3.0 -2.0 | 9.0 0.0 3.8 -2.0 | 13.0 0.0 5.0 -2.0 | 0.0 6.0 -2.0 | 0.0 6.0 -2.0 | 0.0 6.0 -2.0 | 0.0 6.0 -2.0 | 0.0 5.8 -2.0 | -3.0 0.0 5.4 -2.0 | 0.9 0.0 5.2 -2.0 -27.0 | -9.7 0.0 5.0 -2.0 | -3.0 0.0 4.8 -2.0 | -9.2 0.0 4.0 -2.0 | -6.8 0.0 3.0 -2.0 | -3.8 0.0 2.0 -2.0 | -0.7 0.0 1.0 -2.0 | 0.0 |
| BVR-Amplification BVR-Floor Attenuation CTN SAF | dB re (nm/s)/(N/m ^{1/2}) dB dB dB dB dB dB | 4.6 0.0 1.0 -2.0 -27.0 10.0 | -1.7 0.0 2.0 -2.0 -27.0 10.0 | 9.0 0.0 3.0 -2.0 -27.0 10.0 | 9.0 0.0 3.8 -2.0 -27.0 10.0 | 13.0 0.0 5.0 -2.0 -27.0 10.0 | 0.0 6.0 -2.0 -27.0 10.0 | 0.0 6.0 -2.0 -27.0 10.0 | 0.0 6.0 -2.0 -27.0 10.0 | 0.0 6.0 -2.0 -27.0 10.0 | 0.0 5.8 -2.0 -27.0 10.0 | -3.0 0.0 5.4 -2.0 -27.0 10.0 | 0.9 0.0 5.2 -2.0 -27.0 10.0 | -9.7 0.0 5.0 -2.0 -27.0 10.0 | -3.0 0.0 4.8 -2.0 -27.0 10.0 | -9.2 0.0 4.0 -2.0 -27.0 10.0 | -6.8 0.0 3.0 -2.0 -27.0 10.0 | -3.8 0.0 2.0 -2.0 -27.0 10.0 | -0.7 0.0 1.0 -2.0 -27.0 10.0 | 0.0 |
| BVR-Amplification BVR-Floor Attenuation CTN SAF Imax | dB re (nm/s)/(N/m ^{1/2}) dB dB dB dB dB dB dB dB | 4.6 0.0 -2.0 -27.0 10.0 32.9 | -1.7 0.0 2.0 -2.0 -27.0 10.0 28.6 | 9.0 0.0 3.0 -2.0 -27.0 10.0 38.1 | 9.0 0.0 3.8 -2.0 -27.0 10.0 39.9 | 13.0 0.0 5.0 -2.0 -27.0 10.0 37.2 | 0.0 6.0 -2.0 -27.0 10.0 28.0 | 0.0 6.0 -2.0 -27.0 10.0 32.3 | 0.0 6.0 -2.0 -27.0 10.0 31.3 | 0.0 6.0 -2.0 -27.0 10.0 37.8 | 0.0 5.8 -2.0 -27.0 10.0 37.1 | -3.0 0.0 5.4 -2.0 -27.0 10.0 28.8 | 0.9 0.0 5.2 -2.0 -27.0 10.0 25.6 | -9.7 0.0 5.0 -2.0 -27.0 10.0 36.1 | -3.0 0.0 4.8 -2.0 -27.0 10.0 32.1 | -9.2 0.0 4.0 -2.0 -27.0 10.0 25.7 | -6.8 0.0 3.0 -2.0 -27.0 10.0 28.5 | -3.8 0.0 2.0 -2.0 -27.0 10.0 30.7 | -0.7 0.0 1.0 -2.0 -27.0 10.0 27.9 | 0.0 0.0 -2.0 -27.0 10.0 30.1 |
| BVR-Amplification BVR-Floor Attenuation CTN SAF Lmax Lmax | dB re (nm/s)/(N/m ^{1/2}) dB dB dB dB dB dB dB dB dB | 4.6 0.0 -2.0 -27.0 10.0 32.9 29.4 | -1.7 0.0 2.0 -2.0 -27.0 10.0 28.6 | 9.0 0.0 3.0 -2.0 -27.0 10.0 38.1 | 9.0 0.0 3.8 -2.0 -27.0 10.0 39.9 | 13.0 0.0 5.0 -2.0 -27.0 10.0 37.2 | 0.0 6.0 -2.0 -27.0 10.0 28.0 | 0.0 6.0 -2.0 -27.0 10.0 32.3 | 0.0 6.0 -2.0 -27.0 10.0 31.3 | 0.0 6.0 -2.0 -27.0 10.0 37.8 | 0.0 5.8 -2.0 -27.0 10.0 37.1 | -3.0 0.0 5.4 -2.0 -27.0 10.0 28.8 | 0.9 0.0 5.2 -2.0 -27.0 10.0 25.6 | -9.7 0.0 5.0 -2.0 -27.0 10.0 36.1 | -3.6 0.0 4.8 -2.0 -27.0 10.0 32.1 | -9.2 0.0 4.0 -2.0 -27.0 10.0 25.7 | -6.8 0.0 3.0 -2.0 -27.0 10.0 28.5 | -3.8 0.0 2.0 -2.0 -27.0 10.0 30.7 | -0.7 0.0 1.0 -2.0 -27.0 10.0 27.9 | 0.0 0.0 -2.0 -27.0 10.0 30.7 |
| BVR-Amplification BVR-Floor Attenuation CTN SAF Lmax Lmax WHA - YMT Calculation | dB re (nm/s)/(N/m ^{1/2}) dB dB dB dB dB dB dB dB | 4.6 0.0 1.0 -2.0 -27.0 10.0 32.9 29.4 | -1.7 0.0 2.0 -2.0 -27.0 10.0 28.6 | 9.0 0.0 3.0 -2.0 -27.0 10.0 38.1 | 9.0 0.0 3.8 -2.0 -27.0 10.0 39.9 | 13.0 0.0 5.0 -2.0 -27.0 10.0 37.2 | 0.0 6.0 -2.0 -27.0 10.0 28.0 | 0.0 6.0 -2.0 -27.0 10.0 32.3 | 0.0 6.0 -2.0 -27.0 10.0 31.3 | 0.0 6.0 -2.0 -27.0 10.0 37.8 | 0.0 5.8 -2.0 -27.0 10.0 37.1 | -3.0 0.0 5.4 -2.0 -27.0 10.0 28.8 | 0.9 0.0 5.2 -2.0 -27.0 10.0 25.6 | -9.7 0.0 5.0 -2.0 -27.0 10.0 36.1 | -3.6 0.0 4.8 -2.0 -27.0 10.0 32.1 | -9.2 0.0 4.0 -2.0 -27.0 10.0 25.7 | -6.8 0.0 3.0 -2.0 -27.0 10.0 28.5 | -3.8 0.0 2.0 -2.0 -27.0 10.0 30.7 | -0.7 0.0 1.0 -2.0 -27.0 10.0 27.9 | 0.1 0.7 -2.1 -27.1 10.1 30.7 |
| BVR-Amplification BVR-Floor Attenuation CTN SAF Lmax WHA - YMT Calculation FDL | dB re (nm/s)/(N/m ^{1/2}) dB dB dB dB dB dB dB dBA dB re N/m ^{1/2} | 4.6 0.0 1.0 -2.0 -27.0 10.0 32.9 29.4 60.0 | -1.7 0.0 2.0 -2.0 -27.0 10.0 28.6 60.8 | 9.0 0.0 -2.0 -27.0 10.0 38.1 | 9.0 0.0 3.8 -2.0 -27.0 10.0 39.9 62.1 | 13.0 0.0 5.0 -27.0 10.0 37.2 55.3 | 0.0 6.0 -2.0 -27.0 10.0 28.0 | 0.0 6.0 -2.0 -27.0 10.0 32.3 | 0.0 6.0 -2.0 -27.0 10.0 31.3 59.1 | 0.0 6.0 -2.0 -27.0 10.0 37.8 62.1 | 0.0 5.8 -2.0 -27.0 10.0 37.1 | -3.0 0.0 5.4 -2.0 -27.0 10.0 28.8 | 0.9 0.0 5.2 -2.0 -27.0 10.0 25.6 | -9.7 0.0 5.0 -2.0 -27.0 10.0 36.1 | -3.0 0.0 4.8 -2.0 -27.0 10.0 32.1 | -9.2 0.0 4.0 -2.0 -27.0 10.0 25.7 | -6.8 0.0 3.0 -2.0 -27.0 10.0 28.5 | -3.8 0.0 2.0 -2.0 -27.0 10.0 30.7 | -0.7 0.0 1.0 -2.0 -27.0 10.0 27.9 | 0.1 0.1 -2.1 -27.1 10.1 30.7 |
| BVR-Amplification BVR-Floor Attenuation CTN SAF Lmax WHA - YMT Calculation FDL II (25kN/mm Basenlate) | dB re (nm/s)/(N/m ^{1/2}) dB dB dB dB dB dB dB dBA dBA | 4.6 0.0 1.0 -2.0 -27.0 10.0 32.9 29.4 60.0 2 5 | -1.7 0.0 2.0 -2.0 -27.0 10.0 28.6 60.8 1.5 | 9.0 0.0 -2.0 -27.0 10.0 38.1 61.3 0.0 | 9.0 0.0 3.8 -2.0 -27.0 10.0 39.9 62.1 0.0 | 13.0 0.0 5.0 -2.0 -27.0 10.0 37.2 55.3 -1.0 | 0.0 6.0 -2.0 -27.0 10.0 28.0 56.3 -4.0 | 0.0 0.0 6.0 -2.0 -27.0 10.0 32.3 62.0 -5.0 | 0.0 6.0 -2.0 -27.0 10.0 31.3 59.1 -3.0 | 0.0 6.0 -2.0 -27.0 10.0 37.8 62.1 -3.0 | 0.0 5.8 -2.0 -27.0 10.0 37.1 57.2 0.0 | -3.0 0.0 5.4 -2.0 -27.0 10.0 28.8 55.1 -9.0 | 0.9 0.0 5.2 -2.0 -27.0 10.0 25.6 59.2 -13.0 | -9.7 0.0 5.0 -2.0 -27.0 10.0 36.1 62.2 -10.0 | -9.0 0.0 4.8 -2.0 -27.0 10.0 32.1 63.0 -12.0 | -9.2 0.0 4.0 -2.0 -27.0 10.0 25.7 62.5 -12.0 | -6.8 0.0 3.0 -2.0 -27.0 10.0 28.5 58.6 -12.5 | 3.8 0.0 2.0 -2.0 -27.0 10.0 30.7 60.8 -12.0 | -0.7 0.0 1.0 -2.0 -27.0 10.0 27.9 56.6 -10.0 | 0.1 0.1 -2.1 -27.1 10.1 30.2 53.2 |
| BVR-Amplification BVR-Floor Attenuation CTN SAF Lmax WHA - YMT Calculation FDL TIL (25kN/mm Baseplate) TOC | dB re (nm/s)/(N/m ^{1/2}) dB dB dB dB dB dB dB dB dBA dB re N/m ^{1/2} dB dB dB dB | 4.6 0.0 1.0 -2.0 -27.0 10.0 32.9 29.4 60.0 2.5 0.0 | -1.7 0.0 2.0 -2.0 -27.0 10.0 28.6 60.8 1.5 0.0 | 9.0 0.0 -2.0 -27.0 10.0 38.1 61.3 0.0 | 9.0 0.0 3.8 -2.0 -27.0 10.0 39.9 62.1 62.1 0.0 | 13.0 0.0 5.0 -2.0 -27.0 10.0 37.2 55.3 -1.0 0.0 | 0.0 6.0 -2.0 -27.0 10.0 28.0 56.3 -4.0 0.0 | 0.0 6.0 -2.0 -27.0 10.0 32.3 62.0 -5.0 0.0 | 0.0 6.0 -2.0 -27.0 10.0 31.3 59.1 -3.0 0.0 | 0.0 6.0 -2.0 10.0 37.8 62.1 -3.0 0 0 | 0.0 5.8 -2.0 -27.0 10.0 37.1 57.2 0.0 0.0 | -3.0 0.0 5.4 -27.0 10.0 28.8 55.1 -9.0 0.0 | 0.9 0.0 5.2 -2.0 -27.0 10.0 25.6 59.2 -13.0 0.0 | -9.7 0.0 5.0 -2.0 -27.0 10.0 36.1 62.2 -10.0 0.0 | -9.0 0.0 4.8 -2.0 -27.0 10.0 32.1 63.0 -12.0 0.0 | -9.2 0.0 4.0 -2.0 -27.0 10.0 25.7 62.5 -12.0 0.0 | -6.8 0.0 3.0 -2.0 -27.0 10.0 28.5 58.6 -12.5 0.0 | 3.8 0.0 2.0 -2.0 -27.0 10.0 30.7 60.8 -12.0 0.0 | -0.7 0.0 1.0 -2.0 -27.0 10.0 27.9 56.6 -10.0 0.0 | 0.1 0.7 -2.0 -27.1 10.0 30.7 53.1 -5.1 |
| BVR-Amplification BVR-Floor Attenuation CTN SAF Lmax Umax WHA - YMT Calculation FDL TIL (25KN/mm Baseplate) TOC TCF | dB re (nm/s)/(N/m ^{1/2}) dB dB dB dB dB dB dB dB dB dB | 4.6 0.0 -2.0 -27.0 10.0 32.9 29.4 60.0 2.5 0.0 | -1.7 0.0 2.0 -2.0 -27.0 10.0 28.6 60.8 1.5 0.0 0.0 | 9.0 0.0 -2.0 -27.0 10.0 38.1 61.3 0.0 0.0 | 9.0 0.0 3.8 -2.0 -27.0 10.0 39.9 62.1 62.1 0.0 0.0 | 13.0 0.0 5.0 -2.0 -27.0 10.0 37.2 55.3 -1.0 0.0 | 0.0 6.0 -2.0 -27.0 10.0 28.0 56.3 -4.0 0.0 | 0.0 0.0 -2.0 -27.0 10.0 32.3 62.0 -5.0 0.0 0.0 | 0.0 6.0 -2.0 -27.0 10.0 31.3 59.1 -3.0 0.0 | 0.0 6.0 -2.0 -27.0 10.0 37.8 62.1 -3.0 0.0 | 0.0 5.8 -2.0 -27.0 10.0 37.1 57.2 0.0 0.0 0.0 | -3.0 0.0 5.4 -2.0 -27.0 10.0 28.8 55.1 -9.0 0.0 | 0.9 0.0 5.2 -2.0 -27.0 10.0 25.6 - 59.2 -13.0 0.0 | -9.7 0.0 5.0 -2.0 -27.0 10.0 36.1 62.2 -10.0 0.0 0.0 | -9.0 0.0 4.8 -2.0 -27.0 10.0 32.1 63.0 -12.0 0.0 | -9.2 0.0 -2.0 -27.0 10.0 25.7 62.5 -12.0 0.0 | -6.8 0.0 3.0 -2.0 -27.0 10.0 28.5 58.6 -12.5 0.0 0.0 | 3.8 0.0 -2.0 -27.0 10.0 30.7 60.8 -12.0 0.0 | -0.7 0.0 1.0 -2.0 -27.0 10.0 27.9 56.6 -10.0 0.0 0.0 | 0.1 0.1 -2.1 -27.1 10.1 30.1 53.1 -5.1 0.1 |
| BUR-Amplification BVR-Floor Attenuation CTN SAF Lmax WHA - YMT Calculation FDL TLI (25KN/mm Baseplate) TOC TCF LSR | dB re (nm/s)/(N/m ^{1/2}) dB dB dB dB dB dB dB dB dB dB | 4.6 0.0 -2.0 -27.0 10.0 32.9 29.4 60.0 2.5 0.0 0.0 0.0 2.9.6 | -1.7 0.0 2.0 -2.0 -27.0 10.0 28.6 60.8 1.5 0.0 0.0 0.0 29.5 | 9.0 0.0 -2.0 -27.0 10.0 38.1 61.3 0.0 0.0 0.0 0.0 0.0 0.28.4 | 9.0 0.0 3.8 -2.0 -27.0 10.0 39.9 62.1 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.22.1 | 13.0 0.0 5.0 -2.0 -27.0 10.0 37.2 55.3 -1.0 0.0 0.0 31.2 | 0.0 6.0 -2.0 -27.0 10.0 28.0 56.3 -4.0 0.0 0.0 28.6 | 0.0 0.0 -2.0 -27.0 10.0 32.3 62.0 -5.0 0.0 0.0 0.0 23.5 | 0.0 6.0 -2.0 -27.0 31.3 59.1 -3.0 0.0 0.0 17.0 | 0.0 6.0 -2.0 -27.0 10.0 37.8 62.1 -3.0 0.0 0.0 0.0 0.0 | 0.0 5.8 -2.0 -27.0 10.0 37.1 57.2 0.0 0.0 0.0 0.0 0.0 0.0 | -3.0 0.0 5.4 -2.0 -27.0 10.0 28.8 55.1 -9.0 0.0 0.0 0.0 0.0 | 0.9 0.0 5.2 -2.0 -27.0 10.0 25.6 59.2 -13.0 0.0 0.0 0.0 3.2 | -9.7 0.0 5.0 -2.0 -27.0 10.0 36.1 62.2 -10.0 0.0 0.0 10.6 | -9.0 0.0 4.8 -2.0 -27.0 10.0 32.1 63.0 -12.0 0.0 0.0 0.0 0.0 | -9.2 0.0 -2.0 -27.0 10.0 25.7 62.5 -12.0 0.0 0.0 0.0 6.5 | -6.8 0.0 3.0 -2.0 -27.0 10.0 28.5 58.6 -12.5 0.0 0.0 0.0 12.8 | 3.8 0.0 2.0 -27.0 10.0 30.7 60.8 -12.0 0.0 0.0 10.2 | -0.7 0.0 1.0 -2.0 -27.0 10.0 27.9 56.6 -10.0 0.0 0.0 0.0 3.1 | 0.1 0.1 -2.1 -27.1 10.1 30.1 53.1 -5.1 0.1 0.1 |
| BUR-Amplification BVR-Floor Attenuation CTN SAF Lmax WHA - YMT Calculation FDL TIL (25kN/mm Baseplate) TOC TCF LSR BCF | dB re (nm/s)/(N/m ^{1/2}) dB dB dB dB dB dB dB dB dB dB | 4.6 0.0 -2.0 -27.0 10.0 32.9 29.4 60.0 2.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | -1.7 0.0 2.0 -2.0 10.0 28.6 60.8 1.5 0.0 0.0 29.5 0.0 | 9.0 0.0 -2.0 -27.0 10.0 38.1 61.3 0.0 0.0 0.0 0.0 0.0 0.0 0.2 8.4 0.0 | 9.0 0.0 3.8 -2.0 -27.0 10.0 39.9 62.1 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 13.0 0.0 5.0 -2.0 -27.0 10.0 37.2 55.3 -1.0 0.0 0.0 31.2 0.0 | 0.0 6.0 -2.0 -27.0 10.0 28.0 56.3 -4.0 0.0 0.0 28.6 0.0 | 0.0 0.0 -2.0 -27.0 10.0 32.3 62.0 -5.0 0.0 0.0 23.5 0.0 | 0.0 6.0 -2.0 -27.0 31.3 59.1 -3.0 0.0 0.0 17.0 0.0 | 0.0 6.0 -2.0 -27.0 10.0 37.8 62.1 -3.0 0.0 0.0 0.0 15.9 0.0 | 0.0 5.8 -2.0 -27.0 10.0 37.1 57.2 0.0 0.0 0.0 20.0 0.0 | -3.0 0.0 5.4 -2.0 -27.0 10.0 28.8 55.1 -9.0 0.0 0.0 0.0 0.0 0.0 0.0 | 0.9 0.0 5.2 -2.0 -27.0 10.0 25.6 59.2 -13.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | -9.7 0.0 5.0 -2.0 -27.0 10.0 36.1 62.2 -10.0 0.0 0.0 10.6 0.0 | -3.6 0.0 4.8 -2.0 -27.0 10.0 32.1 63.0 -12.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 9.2 0.0 4.0 -2.0 -27.0 10.0 25.7 62.5 -12.0 0.0 0.0 6.5 0.0 | -6.8 0.0 3.0 -2.0 -27.0 10.0 28.5 58.6 -12.5 0.0 0.0 0.0 0.0 12.8 0.0 | 3.8 0.0 -2.0 -27.0 10.0 30.7 60.8 -12.0 0.0 0.0 10.2 0.0 | -0.7 0.0 1.0 -2.0 -27.0 10.0 27.9 56.6 -10.0 0.0 0.0 0.0 0.0 0.0 0.0 | 0.1 0.1 -2.1 -27.1 10.1 30.7 53.1 -5.1 0.1 0.1 0.1 0.1 |
| BVR-Amplification BVR-Floor Attenuation CTN SAF Lmax WHA - YMT Calculation FDL TIL (25kN/mm Baseplate) TOC TCF LSR BCF BVR-Amplification | dB re (nm/s)/(N/m ^{1/2}) dB dB dB dB dB dB dB dB dB dB | 4.6 0.0 -2.0 -27.0 10.0 32.9 29.4 60.0 2.5 0.0 0.0 0.0 2.9 6 0.0 0.0 0.0 0.0 | -1.7 0.0 2.0 -27.0 10.0 28.6 60.8 1.5 0.0 0.0 29.5 0.0 0.0 0.0 | 9.0 0.0 3.0 -2.0 -27.0 10.0 38.1 61.3 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | 9.0 0.0 3.8 -2.0 -27.0 10.0 39.9 62.1 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 13.0 0.0 5.0 -2.0 -27.0 10.0 37.2 55.3 -1.0 0.0 0.0 31.2 0.0 0.0 | 0.0 6.0 -2.0 -27.0 10.0 28.0 56.3 -4.0 0.0 0.0 28.6 0.0 0.0 | 0.0 6.0 -2.0 -27.0 10.0 32.3 62.0 -5.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 0.0 6.0 -2.0 -27.0 10.0 31.3 59.1 -3.0 0.0 0.0 0.0 17.0 0.0 0.0 0.0 | 0.0 6.0 -2.0 10.0 37.8 62.1 -3.0 0.0 0.0 15.9 0.0 0.0 0.0 | 0.0 5.8 -2.0 -27.0 10.0 37.1 57.2 0.0 0.0 0.0 0.0 20.0 0.0 0.0 0.0 | -3.0 0.0 5.4 -2.0 -27.0 10.0 28.8 55.1 -9.0 0.0 0.0 0.0 5.6 0.0 0.0 | 0.9 0.0 5.2 -2.0 -27.0 10.0 25.6 59.2 -13.0 0.0 0.0 3.2 0.0 0.0 | -9.7 0.0 5.0 -2.0 -27.0 10.0 36.1 62.2 -10.0 0.0 0.0 10.6 0.0 0.0 0.0 | 9.0 0.0 4.8 -2.0 -27.0 10.0 32.1 63.0 -12.0 0.0 0.0 0.0 7.3 0.0 0.0 | 9.2 0.0 4.0 -2.0 -27.0 10.0 25.7 62.5 -12.0 0.0 0.0 6.5 0.0 0.0 0.0 | -6.8 0.0 3.0 -2.0 10.0 28.5 58.6 -12.5 0.0 0.0 0.0 12.8 0.0 0.0 0.0 | 3.8 0.0 -2.0 -27.0 10.0 30.7 60.8 -12.0 0.0 0.0 10.2 0.0 0.0 0.0 | -0.7 0.0 1.0 -2.0 -27.0 10.0 27.9 556.6 -10.0 0.0 0.0 3.1 0.0 0.0 | 0.1 0.1 -27.1 10.1 30.7 53.1 -5.1 0.1 0.1 0.1 0.1 0.1 0.1 |
| BVR-Amplification BVR-Floor Attenuation CTN CTN Lmax Umax WHA - YMT Calculation FDL TIL (25kN/mm Baseplate) TOC TCF LSR BCF BVR-Amplification BVR-Floor Attenuation | dB re (nm/s)/(N/m ^{1/2}) dB dB dB dB dB dB dB dB dB dB | 4.6 0.0 1.0 -27.0 10.0 32.9 29.4 60.0 2.5 0.0 0.0 29.6 0.0 0.0 0.0 0.0 0.0 0.0 | -1.7 0.0 2.0 -2.0 10.0 28.6 60.8 1.5 0.0 0.0 29.5 0.0 0.0 0.0 0.0 0.0 0.2.0 | 9.0 0.0 3.0 -2.0 10.0 38.1 61.3 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | 9.0 0.0 3.8 -2.0 -27.0 10.0 39.9 62.1 0.0 0.0 0.0 22.1 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | 13.0 0.0 5.0 -2.0 -27.0 10.0 37.2 55.3 -1.0 0.0 0.0 0.0 31.2 0.0 0.0 0.0 0.0 0.0 | 0.0 6.0 -2.0 -27.0 10.0 28.0 56.3 -4.0 0.0 28.6 0.0 0.0 28.6 0.0 0.0 0.0 0.0 0.0 0.0 | 0.0 6.0 -2.0 10.0 32.3 62.0 -5.0 0.0 0.0 23.5 0.0 0.0 0.0 -2.0 | 0.0 6.0 -2.0 -27.0 10.0 31.3 59.1 -3.0 0.0 0.0 0.0 17.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 0.0 6.0 -2.0 -27.0 10.0 37.8 62.1 -3.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 0.0 5.8 -2.0 -27.0 10.0 37.1 57.2 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | -3.0 0.0 5.4 -2.0 10.0 28.8 55.1 -9.0 0.0 0.0 5.6 0.0 0.0 0.0 -2.0 | 0.9 0.0 5.2 -2.0 -27.0 10.0 25.6 59.2 -13.0 0.0 0.0 0.0 3.2 0.0 0.0 0.0 0.2,0 | -9.7 0.0 5.0 -2.0 -27.0 10.0 36.1 62.2 -10.0 0.0 0.0 10.6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | -3.6 0.0 4.8 -2.0 -27.0 10.0 32.1 63.0 -12.0 0.0 0.0 7.3 0.0 0.0 0.0 -2.0 | 9.2 0.0 4.0 -2.0 -27.0 10.0 25.7 62.5 -12.0 0.0 0.0 6.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | -6.8 0.0 3.0 -2.0 10.0 28.5 58.6 -12.5 0.0 0.0 12.8 0.0 0.0 12.8 | 3.8 0.0 2.0 -2.0 -27.0 10.0 30.7 60.8 -12.0 0.0 0.0 10.2 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | -0.7 0.0 1.0 -2.0 -27.0 10.0 27.9 56.6 -10.0 0.0 0.0 3.1 0.0 0.0 0.0 -2.0 | 0.1 0.1 0.2 -2.1 -27.1 10.1 30.2 -5.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0 |
| BUR-Amplification BVR-Floor Attenuation CTN SAF Lmax WHA - YMT Calculation FDL TIL (25kN/mm Baseplate) TOC TCF LSR BCF BVR-Amplification BVR-Floor Attenuation CTN | dB re (nm/s)/(N/m ^{1/2}) dB dB dB dB dB dB dB dB dB dB | 4.6 0.0 1.0 -27.0 32.9 29.4 60.0 2.5 0.0 0.0 29.6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.2.0 0.2.0 | -1.7 0.0 2.0 -2.0 10.0 28.6 60.8 1.5 0.0 0.0 29.5 0.0 0.0 29.5 0.0 0.0 29.5 | 9.0 0.0 3.0 -2.0 10.0 38.1 61.3 0.0 0.0 0.0 28.4 0.0 0.0 28.4 0.0 0.0 0.0 0.2 2.0 0.2 7.0 | 9.0 0.0 3.8 -2.0 -27.0 10.0 39.9 -27.0 62.1 0.0 0.0 0.0 22.1 0.0 0.0 0.0 0.0 -2.0 -27.0 | 13.0 0.0 5.0 -27.0 10.0 37.2 55.3 -1.0 0.0 31.2 0.0 0.0 31.2 0.0 0.0 -2.0 -27.0 | 0.0 6.0 -27.0 10.0 28.0 56.3 -4.0 0.0 0.0 28.6 0.0 0.0 0.0 -2.0 -27.0 | 0.0 0.0 6.0 -2.0 -27.0 10.0 32.3 62.0 -5.0 0.0 0.0 23.5 0.0 0.0 0.0 0.0 -2.0 -2.0 -5.0 0.0 -5.0 0.0 -2.0 -5.0 0.0 -5.0 -5.0 0.0 -5.0 -5.0 0.0 -5.0 -5.0 0.0 -5.0 -5.0 0.0 -5.0 -5.0 0.0 -2.5 -5.0 0.0 -2.5 -0.0 -2.5 -0.0 -2.5 -0.0 -2.5 -0.0 -2.5 -0.0 -2.5 -0.0 -2.5 -0.0 -2.5 - | 0.0 6.0 -2.0 -27.0 31.3 59.1 -3.0 0.0 0.0 17.0 0.0 0.0 0.0 0.0 0.0 -2.0 -27.0 | 0.0 6.0 -27.0 10.0 37.8 62.1 -3.0 0.0 0.0 15.9 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | 0.0 5.8 -2.0 10.0 37.1 57.2 0.0 0.0 0.0 20.0 0.0 0.0 0.0 0.0 0.0 | -3.0 0.0 5.4 -2.0 -27.0 10.0 28.8 55.1 -9.0 0.0 0.0 0.0 5.6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | 0.9 0.0 5.2 -2.0 10.0 25.6 - 59.2 -13.0 0.0 0.0 3.2 0.0 0.0 0.0 0.0 0.0 -2.0 -27.0 | -9.7 0.0 5.0 -27.0 10.0 36.1 62.2 -10.0 0.0 0.0 10.6 0.0 0.0 0.0 0.0 0.0 -2.0 -0.0 -2.0 -2.0 -2.0 -0.0 -0.0 -2.0 -2.0 -0.0 -2.0 -0.0 -2.0 -0.0 -2.0 - | -3.6 0.0 4.8 -2.0 -27.0 10.0 32.1 63.0 -12.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 9.2 0.0 4.0 -2.0 -27.0 10.0 25.7 62.5 -12.0 0.0 0.0 6.5 0.0 0.0 0.0 -2.0 -27.0 | -6.8 0.0 3.0 -2.0 0.27.0 10.0 28.5 58.6 -12.5 0.0 0.0 12.8 0.0 0.0 12.8 0.0 0.0 -2.0 -27.0 | 3.8 0.0 2.0 -2.0 -27.0 10.0 30.7 60.8 -12.0 0.0 0.0 10.2 0.0 0.0 0.0 0.0 0.0 -2.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -2.0 -0.0 -2.0 -0.0 -2.0 -0.0 -2.0 -0.0 -2.0 -0.0 -2.0 -2.0 -2.0 -0.0 -2.0 -0.0 -2.0 | -0.7 0.0 1.0 -2.0 10.0 27.9 56.6 -10.0 0.0 0.0 3.1 0.0 0.0 0.0 -2.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -2.0 -0.0 -2.0 -0.0 -0.0 -2.0 -0.0 -0.0 -2.0 -0.0 -2.0 -0.0 -2.0 -0.0 -2.0 -0.0 -2.0 -0.0 -2.0 -2.0 -0.0 -2.0 -2.0 -2.0 -2.0 -0.0 -2.0 - | 0.0.0000000000000000000000000000000000 |
| BUR-Amplification BVR-Floor Attenuation CTN SAF Lmax WHA - YMT Calculation FDL TL (25kN/mm Baseplate) TOC TCF LSR BCF BVR-Amplification BVR-Floor Attenuation CTN SAF | dB re (nm/s)/(N/m ^{1/2}) dB dB dB dB dB dB dB dB dB dB | 4.6 0.0 -2.0 -27.0 32.9 29.4 60.0 2.5 0.0 0.0 29.6 0.0 0.0 29.6 0.0 0.0 -27.0 10.0 | -1.7 0.0 2.0 -27.0 10.0 28.6 60.8 1.5 0.0 0.0 29.5 0.0 0.0 29.5 0.0 0.0 -27.0 10.0 | 9.0 0.0 3.0 -2.0 -27.0 38.1 61.3 0.0 0.0 0.0 28.4 0.0 0.0 28.4 0.0 0.0 -2.0 -2.0 10.0 | 9.0 0.0 3.8 -2.0 -27.0 10.0 39.9 -27.0 0.0 0.0 0.0 22.1 0.0 0.0 0.0 22.1 0.0 0.0 -27.0 10.0 | 13.0 0.0 5.0 -2.0 10.0 37.2 55.3 -1.0 0.0 31.2 0.0 0.0 31.2 0.0 0.0 -2.0 -2.0 -2.0 10.0 | 0.0 6.0 -27.0 10.0 28.0 56.3 -4.0 0.0 0.0 28.6 0.0 0.0 -2.0 -27.0 10.0 | 0.0 6.0 -2.0 -27.0 10.0 32.3 62.0 -5.0 0.0 0.0 23.5 0.0 0.0 0.0 -2.0 -2.0 -2.0 10.0 0.0 0.0 0.0 0.0 0.0 0.0 | 0.0 6.0 -2.0 -27.0 31.3 59.1 -3.0 0.0 0.0 17.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.27.0 10.0 | 0.0 6.0 -2.0 -27.0 10.0 37.8 62.1 -3.0 0.0 0.0 15.9 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | 0.0 5.8 -2.0 10.0 37.1 57.2 0.0 0.0 0.0 0.0 20.0 0.0 0.0 0.0 0.0 | -3.0 0.0 5.4 -2.0 -27.0 10.0 28.8 55.1 -9.0 0.0 0.0 5.6 0.0 0.0 5.6 0.0 0.0 -2.0 -2.0 10.0 0.0 -2.0 0.0 -2.0 0.0 -2.0 0.0 -2.0 0.0 -2.0 -0.0 -2.0 -2.0 -0.0 -2.0 -2.0 -2.0 -2.0 -0.0 -2.0 | 0.9 0.0 5.2 -2.0 10.0 25.6 59.2 -13.0 0.0 0.0 3.2 0.0 0.0 0.0 3.2 0.0 0.0 0.0 2.2,0 -27.0 10.0 | -9,7 0.0 5.0 -27.0 10.0 36.1 62.2 -10.0 0.0 0.0 10.6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | -9.6 0.0 4.8 -2.0 -27.0 10.0 32.1 63.0 -12.0 0.0 0.0 0.0 7.3 0.0 0.0 0.0 0.0 -2.0 -2.0 -2.0 10.0 | 9.2 0.0 4.0 -2.0 -2.0 10.0 25.7 -12.0 0.0 62.5 -12.0 0.0 0.0 6.5 0.0 0.0 0.0 -2.0 0.0 10.0 0.0 -2.0 0.0 -2.0 0.0 -2.0 0.0 -2.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -2.0 -2.0 -0.0 -0.0 -0.0 -0.0 -2.0 -2.0 -2.0 -0.0 -0.0 -2.0 -2.0 -2.0 -0.0 -2.0 -2.0 -0.0 -2.0 | -6.8 0.0 3.0 -2.0 -27.0 10.0 28.5 58.6 -12.5 0.0 0.0 12.8 0.0 0.0 12.8 0.0 0.0 -2.0 -2.0 10.0 | 3.8 0.0 2.0 -2.0 10.0 10.0 30.7 60.8 -12.0 0.0 0.0 10.2 0.0 0.0 0.0 -2.0 -2.0 -2.0 10.2 10.0 10.0 10.0 10.2 10.0 | -0.7 0.0 1.0 -2.0 10.0 27.9 56.6 -10.0 0.0 0.0 3.1 0.0 0.0 0.0 -2.0 -2.0 10.0 | 0.0 0.0 -2.0 -27.1 10.0 30. -55.3 -55.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 -2.2 -27.1 10.0 |
| BVR-Amplification BVR-Floor Attenuation TTN SAF Lmax WHA - YMT Calculation FDL TIL (25kN/mm Baseplate) TOC TCF LSR BCF BVR-Amplification BVR-Floor Attenuation CTN SAF Lmax | dB re (nm/s)/(N/m ^{1/2}) dB dB dB dB dB dB dB dB dB dB | 4.6 0.0 1.0 -27.0 10.0 32.9 29.4 60.0 2.5 0.0 0.0 0.0 29.6 0.0 0.0 0.0 -27.0 10.0 0.0 0.0 0.0 0.0 0.0 0.0 | -1.7 0.0 2.0 -2.0 -27.0 10.0 28.6 28.6 60.8 1.5 0.0 29.5 0.0 29.5 0.0 0.0 29.5 0.0 0.0 -2.0 -2.0 10.0 0.0 29.5 | 9.0 0.0 3.0 -2.0 -27.0 38.1 61.3 0.0 0.0 0.0 28.4 0.0 0.0 -2.0 -2.0 -27.0 10.0 70.7 | 9.0 0.0 3.8 -2.0 -27.0 39.9 62.1 0.0 0.0 0.0 0.0 22.1 0.0 0.0 0.0 22.1 0.0 0.0 0.0 -2.0 -27.0 10.0 65.1 | 13.0 0.0 5.0 -27.0 10.0 37.2 55.3 -1.0 0.0 31.2 0.0 31.2 0.0 0.0 -2.0 -2.0 -2.0 10.0 66.5 | 0.0 6.0 -2.0 -27.0 10.0 28.0 56.3 -4.0 0.0 0.0 28.6 0.0 0.0 28.6 0.0 0.0 -27.0 10.0 61.8 | 0.0 0.0 -2.0 -27.0 32.3 62.0 -5.0 0.0 0.0 23.5 0.0 0.0 23.5 0.0 0.0 -2.0 -2.0 -2.0 -2.0 10.0 0.0 10.0 0 0.0 0.0 0.0 0.0 0.0 0 | 0.0 6.0 -2.0 -27.0 31.3 59.1 -3.0 0.0 0.0 17.0 0.0 0.0 0.0 -2.0 -27.0 10.0 54.1 | 0.0 6.0 -2.0 -27.0 10.0 37.8 62.1 -3.0 0.0 0.0 15.9 0.0 0.0 0.0 -2.0 -27.0 -27.0 55.9 | 0.0 5.8 -2.0 -27.0 10.0 37.1 57.2 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 -2.0 -2 | -3.0 0.0 5.4 -2.0 -27.0 10.0 28.8 55.1 -9.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 0.9 0.0 5.2 -2.0 -27.0 10.0 25.6 -13.0 0.0 0.0 3.2 0.0 0.0 0.0 -2.0 -2.0 -2.0 -2.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | -9.7 0.0 5.0 -27.0 10.0 36.1 62.2 -10.0 0.0 0.0 10.6 0.0 0.0 10.6 0.0 0.0 -2.0 -2.0 -2.0 10.0 | -9.6 0.0 4.8 -2.0 -27.0 10.0 32.1 63.0 -12.0 0.0 0.0 7.3 0.0 0.0 7.3 0.0 0.0 7.3 0.0 0.0 7.3 0.0 0.0 0.0 7.3 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | 9.2 0.0 4.0 -2.0 -27.0 10.0 25.7 -12.0 62.5 -12.0 0.0 0.0 6.5 0.0 0.0 -2.0 -2.0 -2.0 -2.0 38.0 | -6.8 0.0 3.0 -2.0 27.0 10.0 28.5 58.6 -12.5 0.0 0.0 12.8 0.0 0.0 12.8 0.0 0.0 -2.0 -2.0 -27.0 0.39.9 | 3.8 0.0 2.0 -27.0 10.0 30.7 60.8 -12.0 0.0 10.2 0.0 10.2 0.0 0.0 10.2 0.0 10.2 0.0 10.2 0.0 10.2 10.0 | -0.7 0.0 1.0 -2.0 -27.0 10.0 27.9 56.6 -10.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 0.0 0.0 -2.0 -27.1 10.0 30. |
| BUR-Amplification BVR-Floor Attenuation CTN SAF Lmax WHA - YMT Calculation FDL T1L (25KN/mm Baseplate) TOC TCF LSR BCF BVR-Amplification BVR-Floor Attenuation CTN SAF SAF Lmax | dB re (nm/s)/(N/m ^{1/2}) dB dB dB dB dB dB dB dB dB dB | 4.6 0.0 1.0 -27.0 10.0 32.9 29.4 60.0 2.5 0.0 0.0 0.0 2.9 60.0 0.0 0.0 -27.0 10.0 73.1 36.6 | -1.7 0.0 2.0 -2.0 10.0 28.6 60.8 1.5 0.0 0.0 0.0 29.5 0.0 0.0 0.0 29.5 0.0 0.0 0.0 29.5 0.0 0.0 0.27.0 10.0 72.7 | 9.0 0.0 -2.0 -27.0 0.0 38.1 61.3 0.0 0.0 0.0 0.0 0.28.4 0.0 0.00 -2.0 -27.0 10.0 70.7 | 9.0 0.0 3.8 -2.0 -27.0 39.9 62.1 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 22.1 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | 13.0 0.0 5.0 -27.0 10.0 37.2 55.3 -1.0 0.0 31.2 0.0 31.2 0.0 -2.0 -27.0 10.0 66.5 | 0.0 6.0 -2.0 10.0 28.0 56.3 -4.0 0.0 0.0 28.6 0.0 0.0 0.0 0.0 0.0 -2.0 0.2 0.0 10.0 0.0 0.0 0.0 0.0 0.0 0. | 0.0 0.0 -2.0 -27.0 10.0 32.3 -5.0 -5.0 0.0 0.0 23.5 0.0 0.0 -2.0 -27.0 10.0 61.5 | 0.0 6.0 -2.0 -27.0 31.3 59.1 -3.0 0.0 0.0 17.0 0.0 0.0 -2.0 -27.0 10.0 54.1 | 0.0 6.0 -2.0 -27.0 10.0 37.8 62.1 -3.0 0.0 0.0 15.9 0.0 0.0 -2.0 -27.0 10.0 55.9 | 0.0 5.8 -2.0 -27.0 37.1 57.2 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | -3.0 0.0 5.4 -2.0 -27.0 10.0 28.8 55.1 -9.0 0.0 0.0 0.0 5.6 0.0 0.0 0.0 0.0 27.0 10.0 32.7 | 0.9 0.0 5.2 -2.0 -27.0 10.0 25.6 -13.0 0.0 0.0 0.0 3.2 0.0 0.0 0.0 -2.0 -27.0 10.0 30.4 | -9.7 0.0 5.0 -27.0 10.0 36.1 62.2 -10.0 0.0 0.0 10.6 0.0 0.0 0.0 10.6 0.0 -2.0 -27.0 10.0 | -9.6 0.0 4.8 -2.0 -27.0 10.0 32.1 63.0 -12.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | -9.2 0.0 4.0 -2.0 10.0 25.7 62.5 -12.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | -6.8 0.0 -2.0 -27.0 0.0 28.5 58.6 -12.5 0.0 0.0 0.0 0.0 0.12.8 0.0 0.0 0.0 0.22.0 -27.0 10.0 39.9 | -3.8 0.0 2.0 -2.0 0.27.0 10.0 30.7 60.8 -12.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 2.0 -2.0 - | -0.7 0.0 1.0 -27.0 10.0 27.9 56.6 -10.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 0.0 0.0 -2.2 -27.1 10.0 -27.1 30.0 53.3 -5.5 -5.5 -0.0 0.0 0.0 0.0 -2.0 -27.1 10.0 31.1 |
| BUR-Amplification BVR-Floor Attenuation CTN SAF Lmax Lmax WHA - YMT Calculation FDL TIL (25kN/mm Baseplate) TOC TCF TCF LTR BCF BVR-Amplification BVR-Floor Attenuation CTN SAF Lmax Lmax Total Prediction Noise leve | dB re (nm/s)/(N/m ^{1/2}) dB dB dB dB dB dB dB dB dB dB | 4.6 0.0 1.0 -27.0 32.9 29.4 60.0 2.5 0.0 0.0 2.9.6 0.0 0.0 2.9.6 0.0 0.0 0.0 2.2,0 -27.0 10.0 73.1 36.6 | -1.7 0.0 2.0 -2.7 0.0 2.2 0.0 2.8 6 0.8 1.5 0.0 0.0 0.0 2.9 5 0.0 0.0 0.0 0.0 2.7 0.0 0.0 0.0 0.0 2.0 0.0 0.0 0.0 0.0 0.0 | 9.0 0.0 -27.0 10.0 38.1 61.3 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | 9.0 0.0 3.8 -2.0 10.0 39.9 62.1 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | 13.0 0.0 5.0 -2.0 -27.0 10.0 37.2 55.3 -1.0 0.0 31.2 0.0 31.2 0.0 -2.0 -2.0 -27.0 10.0 66.5 | 0.0 0.0 6.0 -2.0 10.0 28.0 56.3 -4.0 0.0 0.0 28.6 0.0 0.0 28.6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | 0.0 0.0 -2.0 -27.0 10.0 32.3 62.0 -5.0 0.0 0.0 23.5 0.0 0.0 23.5 0.0 0.0 -2.0 -27.0 10.0 61.5 | 0.0 6.0 -2.0 -27.0 31.3 59.1 -3.0 0.0 0.0 0.0 17.0 0.0 0.0 0.0 0.0 -2.0 -27.0 10.0 54.1 | 0.0 6.0 -2.0 10.0 37.8 62.1 -3.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 0.0 5.8 -2.0 -27.0 37.1 57.2 0.0 0.0 0.0 0.0 20.0 0.0 0.0 0.0 0.0 | -3.0 0.0 5.4 -27.0 10.0 28.8 55.1 -9.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 0.9 0.0 5.2 -2.0 -27.0 10.0 25.6 59.2 -13.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | -9.7 0.0 5.0 -2.0 -27.0 10.0 36.1 62.2 -10.0 0.0 0.0 10.6 0.0 0.0 0.0 -2.0 -2.0 -2.0 10.0 0.0 0.0 0.0 0.0 0.0 0.0 | -9,0 0,0 4,8 -2,0 -27,0 10,0 32,1 63,0 -12,0 0,0 0,0 0,0 0,0 0,0 0,0 0,0 | -9.2 0.0 4.0 -2.0 -2.7 10.0 25.7 -12.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | -6.8 0.0 -2.0 10.0 28.5 -12.5 0.0 0.0 12.8 0.0 0.0 0.0 -2.0 -2.7.0 10.0 39.9 | -3.8 0.0 2.0 -2.0 -2.0 -2.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | -0.7 0.0 1.0 -27.0 10.0 27.9 56.6 -10.0 0.0 0.0 0.0 0.0 0.0 -2.0 -27.0 10.0 0.0 0.0 0.0 0.0 0.0 0.0 | 0.0 0.0 -2.2 -27.1 10.0 -2.7 -27.1 30.0 -53.3 -5.5 -5.5 -0.0 -0.0 -0.0 -0.0 -0.1 -2.7 -27.1 -27. |
| BUR-Amplification BVR-Floor Attenuation CTN SAF Lmax Umax WHA - YMT Calculation FDL TIL (25KN/mm Baseplate) TOC TCF L(25KN/mm Baseplate) TOC TCF BVR-Amplification BVR-Floor Attenuation CTN SAF Lmax Lmax Total Prediction Noise leve Imax | dB re (nm/s)/(N/m ^{1/2}) dB dBA | 4.66 0.00 -2.00 -2.70,0 -2.00 -2.70,0 -2.70,0 -2.5 -0.00 -2.5 -0.00 -2.5 -0.00 -2.5 -0.00 -2.5 -0.00 -2.5 -0.00 -2.5 -0.00 -2.5 -0.00 -2.5 -0.00 -2.5 -0.00 -2.5 -0.00 -2.5 -0.00 -2.70,0 -2.50,0 -2.5 | -1.7 0.0 2.0 -2.7.0 10.0 28.6 60.8 1.5 0.0 0.0 0.0 29.5 0.0 0.0 0.20 -27.0 10.0 72.7 | 9.0 0.0 3.0 -2.0 -2.7 10.0 38.1 61.3 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | 9.0 0.0 3.8 -2.0 -27.0 10.0 39.9 39.9 62.1 0.0 0.0 0.0 0.0 0.22.1 0.0 0.0 0.0 0.22.1 0.0 0.0 0.22.1 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | 13.0 0.0 5.0 -2.0 -2.0 10.0 37.2 55.3 -1.0 0.0 31.2 0.0 31.2 0.0 0.0 31.2 0.0 0.0 31.2 0.0 0.0 31.2 0.0 0.0 0.0 31.2 0.0 0.0 31.2 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | 0.0 6.0 -2.0 -2.0 10.0 28.0 -2 | 6.0 6.0 -2.0 -2.0 10.0 32.3 62.0 -5.0 0.0 0.0 0.0 -2.0 | 0.0 6.0 -27.0 10.0 31.3 59.1 -3.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 0.0 6.0 -2.0 10.0 37.8 62.1 -3.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 0.0 5.8 -2.0 -27.0 37.1 57.2 0.0 0.0 0.0 20.0 0.0 20.0 0.0 0.0 0.0 | -3.0 0.0 0.5.4 -2.0 0.0 -2.7.0 10.0 28.8 55.1 -9.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 0.9 0.0 5.2 -2.0 -27.0 10.0 25.6 - - - - - - - - - - - - - - - - - - - | -9,7 0.0 5.0 -2.0 10.0 36.1 -2.0 0.0 36.1 -2.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 9.0 0.0 4.8 2.0 -27.0 10.0 32.1 | -9.2 0.0 4.0 -2.7.0 10.0 25.7 -22.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | -6.8 0.0 3.0 (2.0 -2.7,0 10.0 28.5 58.6 -12.5 0.0 0.0 0.0 2.0 -2.0 0.0 0.0 -2.0 0.0 0.0 -2.0 0.0 0.0 -2.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | -3.8 0.0 2.0 -2.7.0 10.0 30.7 - 27.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | -0.7 0.0 1.0 -27.0 10.0 27.9 56.6 -10.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 0.0 0.0 -2.0 -27.0 30.0 -53.3 -55.0 0.0 0.0 0.0 -2.0 -27.0 10.0 -21.0 -27.0 -31.0 |
| BVR-Amplification BVR-Floor Attenuation TTN SAF Lmax Umax WHA - YMT Calculation FDL TIL (25kN/mm Baseplate) TOC TCF LSR BCF BVR-Amplification BVR-Floor Attenuation CTN SAF Lmax Lma | dB re (nm/s)/(N/m ^{1/2}) dB dBA dBA dBA dBA dBA dBA dBA dBA dBA | 4.6 0.0 1.0 2.2 0.2 2.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | -1.7 0.0 2.0 -2.0 -2.0 28.6 | 9.0 0.0 3.0 -2.0 -2.7 0.0 3.8.1 | 9.0 0.0 3.8 -2.0 -2.7.0 10.0 39.9 -2.7.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 13.0 0.0 5.0 -27.0 10.0 37.2 55.3 -1.0 0.0 31.2 0.0 0.0 0.0 0.0 0.0 0.27.0 10.0 66.5 -2.0 -0.0 -2.0 | 0.0 0.0 -2.0 -2.7.0 10.0 28.0 -27.0 28.0 -27.0 0.0 0.0 28.6 0.0 0.0 -2.0 -2.7.0 10.0 61.8 | 6.0 0.0 6.0 -27.0 10.0 32.3 62.0 -5.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 0.0 6.0 -27.0 10.0 31.3 59.1 -3.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 0.0 6.0 -2.0 -2.7 10.0 37.8 62.1 -3.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 0.0 5.8 -2.0 10.0 37.1 57.2 57.2 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | -3.3 0.0 0.0 5.4 -2.0 -27.0 10.0 28.8 55.1 -9.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 0.9 0.0 0.0 5.2 -2.0 -2.0 25.6 59.2 -13.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | -9,7 0.0 5.0 -2.0 -2.0 10.0 36.1 -27.0 10.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | 3.0 0.0 4.8 2.0 10.0 32.1 63.0 -12.0 0.0 0 -12.0 0.0 0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0. | -9.2 0.0 4.0 -2.0 -2.7.0 10.0 25.7 -12.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | -6.8 0.0 3.0 -27.0 10.0 28.5 -22.5 | -3.8 0.0 -2.0 -2.0 -2.0 -2.0 -2.0 -2.0 -2.0 | -0.7 0.0 1.0 -2.0 -2.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 0.0 0.0 0.1 0.1 0.1 0.1 0.1 0.1 |
| BUR-Amplification BVR-Floor Attenuation CTN SAF Lmax WHA - YMT Calculation FDL TIL (25KN/mm Baseplate) TOC TCF UC SAF BUR-Amplification BVR-Floor Attenuation CTN SAF Lmax Lmax Lmax Lmax Lmax Leq.30min (day) Leq.30min (dight) | dB re (nm/s)/(N/m ^{1/2}) dB dB dB dB dB dB dB dB dB dB | 4.6 0.0 1.0 2.0 2.2 2.7 0.0 2.5 4 6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | -1.7 0.0 2.0 -2.0 -2.7.0 10.0 28.6 | 9.0 0.0 -20 -27.0 10.0 38.1 | 9.0 0.0 3.8 -2.0 -2.7.0 10.0 39.9 62.1 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | 13.0 0.0 5.0 -27.0 10.0 37.2 55.3 -1.0 0.0 0.0 0.0 0.0 0.0 -2.0 -27.0 10.0 66.5 | | 0.0 0.0 -27.0 10.0 32.3 -5.0 0.0 0.0 -2.0 -2.0 -2.0 0.0 0.0 0.0 -2.0 0.0 0.0 0.0 0.0 -2.0 0.0 0.0 0.0 -2.0 0.0 0.0 0.0 -2.0 0.0 0.0 0.0 -2.0 0.0 0.0 -2.0 0.0 0.0 -2.0 0.0 0.0 -2.0 0.0 0.0 0.0 -2.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 0.0 6.0 -2.70 10.0 31.3 -59.1 -3.0 0.0 0.0 0.0 0.0 0.0 -2.70 10.0 54.1 -3.0 -2.0 | 0.0. 6.0 -27.0 10.0 37.8 62.1 -3.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 0.0 5.8 -2.0 10.0 37.1 57.2 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | -3.0 0.0 5.4 -27.0 10.0 28.8 55.1 -9.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 0.9 0.0 5.2 -2.0 10.0 25.6 25.6 25.6 25.6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | 9,7 0,0 5,0 -27,0 10,0 36,1 -10,0 62,2 -10,0 0,0 0,0 0,0 0,0 0,0 0,0 0,0 | 9.0 0.0 4.8 2.0 10.0 32.1 | -9.2 0.0 4.0 -2.0 -2.7.0 10.0 25.7 -12.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | -6.8 0.0 3.0 -27.0 10.0 28.5 -22.5 -27.0 28.5 -12.5 0.0 0.0 0.0 0.2 8 0.0 0.0 0.2 0.0 0.0 0.2 0.0 0.0 0.2 0.0 0.0 | -3.8 0.0 2.0 -2.0 -2.0 -2.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | -0.7 0.0 1.0 -27.0 0.0 27.9 -27.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 0.0 0.0 -27.0 10.0 30. 53.3.5 .5.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 |

Detailed GBN Calculation of NSR26, Wing Fu Building, Whampoa Estate



Annex B

Specification of Drill-rig Employed in WIL and KTE

| Item | Specification |
|-----------------------|------------------|
| Carrier Model | BOOMER 352 |
| Hydraulic Drill Model | COP1238ME |
| Energy per blow | 300J |
| Blow Frequency | 40 - 60Hz |
| Drill Weight | 151kg |
| Impact Power | 15kW |
| Rotation Torque | 500Nm |
| Rotation Speed | 0-300rpm (0-5Hz) |
| Rotation Power | 2.50kW |
| | |

Table B. Specification of Drill-rig Employed in WIL and KTE

Annex C

Calibration Certificates

| Item | Model | Qty. |
|-------------------------------|--------------|------|
| Vibration Analyzer | SVAN 958 | 1 |
| Accelerometer | PCB 393A03 | 4 |
| Handheld Vibration Calibrator | IMI 699A02 | 1 |
| Force Transducer (Load Cell) | Futek LCM550 | 1 |

 Table C. Equipments Employed in Vibration Measurements and Hammer Impact Test

Calibration Certificates for the Measurements at NSR12



LEVEL METER; Range: 105 dB; Filter: A; f sin= 1000 Hz

| | Input [dB] | 24.0 | 30.0 | 40.0 | 60.0 | 80.0 | 100.0 | 114.0 |
|-----------|------------|------|------|-------|-------|------|-------|-------|
| Channel 1 | Error [dB] | 0.24 | 0.12 | 0.00 | -0.01 | 0.00 | 0.01 | 0.01 |
| Channel 2 | Error [dB] | 0.29 | 0.15 | 0.02 | 0.00 | 0.01 | 0.01 | 0.02 |
| Channel 3 | Error [dB] | 0.16 | 0.03 | -0.01 | -0.01 | 0.00 | 0.01 | 0.02 |
| Channel 4 | Error [dB] | 0.20 | 0.04 | -0.01 | -0.00 | 0.01 | 0.01 | 0.02 |

LEVEL METER; Range: 130 dB; Filter: A; f sin= 1000 Hz

| | Input [dB] | 45.0 | 50.0 | 60.0 | 80.0 | 100.0 | 120.0 | 135.0 |
|-----------|------------|-------|------|------|------|-------|-------|-------|
| Channel 1 | Error [dB] | 0.18 | 0.15 | 0.05 | 0.00 | 0.00 | 0.00 | 0.01 |
| Channel 2 | Error [dB] | 0.21 | 0.15 | 0.06 | 0.01 | 0.01 | 0.01 | 0.01 |
| Channel 3 | Error [dB] | -0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Channel 4 | Error [dB] | 0.02 | 0.03 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 |

1/3 OCTAVE (1kHz); Range: 130 dB; Filter: A; f sin= 1000 Hz

| | Input [dB] | 35.0 | 40.0 | 60.0 | 80.0 | 100.0 | 120.0 | 135.0 |
|-----------|------------|------|------|------|------|-------|-------|-------|
| Channel 1 | Error [dB] | 0.52 | 0.11 | 0.03 | 0.00 | 0.01 | 0.00 | 0.01 |
| Channel 2 | Error [dB] | 0.52 | 0.13 | 0.04 | 0.00 | 0.01 | 0.00 | 0.01 |
| Channel 3 | Error [dB] | 0.48 | 0.08 | 0.02 | 0.00 | 0.01 | 0.00 | 0.01 |
| Channel 4 | Error [dB] | 0.40 | 0.07 | 0.02 | 0.00 | 0.01 | 0.00 | 0.01 |

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6. FREQUENCY RESPONSE (electrical)

LEVEL METER; Filter: Z; Range: 130 dB; Input signal =135 dB;



Measured Response with Preamplifier SV12 (f-frequency, An-attenuation in channel n)

| f[Hz] | A1[dB] | A2[dB] | A3[dB] | A4[dB] | f [Hz] | A1[dB] | A2[dB] | A3[dB] | A4[dB] |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 10 | 3.2 | 3.2 | 3.2 | 3.2 | 250 | 0.0 | 0.0 | 0.0 | 0.0 |
| 12.5 | 1.4 | 1.4 | 1.4 | 1.4 | 500 | 0.0 | 0.0 | 0.0 | 0.0 |
| 16 | 0.5 | 0.5 | 0.5 | 0.5 | 1000 | 0.0 | 0.0 | 0.0 | 0.0 |
| 20 | 0.2 | 0.1 | 0.1 | 0.1 | 2000 | 0.0 | 0.0 | 0.0 | 0.0 |
| 25 | 0.0 | 0.0 | 0.0 | 0.0 | 4000 | 0.1 | 0.0 | 0.0 | 0.0 |
| 31.5 | 0.0 | -0.1 | -0.1 | 0.0 | 8000 | 0.1 | 0.0 | 0.0 | 0,0 |
| 63 | 0.0 | -0.1 | 0.0 | 0.0 | 16000 | 0.1 | 0.0 | 0.0 | 0.0 |
| 125 | 0.0 | 0.0 | 0.0 | 0.0 | 20000 | 0.1 | 0.0 | 0,0 | 0.0 |

All frequencies are nominal center values for the 1/3 octave bands

7. INTERNAL NOISE LEVEL* (electrical)

LEVEL METER; Range: 105 dB; Back-light - off; Calibration factor: 0dB

| | Filter | Z | A | C |
|-----------|------------|------|------|------|
| Channel 1 | Level [dB] | 14.8 | 11.7 | 11.3 |
| Channel 2 | Level [dB] | 15.8 | 12.0 | 11.9 |
| Channel 3 | Level [dB] | 16.5 | 11.8 | 11.6 |
| Channel 4 | Level [dB] | 15.3 | 11.9 | 11.8 |

* measured with preamplifier SVANTEK type SV12 No. 1991.

VIBRATION LEVEL METER

1. CALIBRATION

(electrical) LEVEL METER; Filter: HP10; Input signal =140.0dB (10.0 m/s²), f_{sin}=79,6Hz

| | Range 1 | 45dB | Range 170dB | | | | |
|-----------|-----------------|------------|-----------------|------------|--|--|--|
| | Indication [dB] | Error [dB] | Indication [dB] | Error [dB] | | | |
| Channel 1 | 140.04 | 0.04 | 140.05 | 0.05 | | | |
| Channel 2 | 140.03 | 0.03 | 140.03 | 0.03 | | | |
| Channel 3 | 140.02 | 0.02 | 140.03 | 0.03 | | | |
| Channel 4 | 140.03 | 0.03 | 140.08 | 0.08 | | | |

2. CALIBRATION (vibrational)

LEVEL METER; Range: 145dB; Input signal: 120dB;

| Filter | HP1 | | HP10 |) | Wd | | Wm | | Wh | |
|-----------|--------------------|---------------|--------------------|---------------|--------------------|---------------|--------------------|---------------|--------------------|---------------|
| | Indication [dB] | Error [dB] |
| Channel 1 | 120.1 | 0.1 | 120.1 | 0.1 | 106.2 | 0.1 | 102.2 | 0.2 | 110.7 | 0.1 |
| Channel 2 | 120.1 | 0.1 | 120.0 | 0.0 | 106.2 | 0.1 | 102.2 | 0.2 | 110.7 | 0.1 |
| Channel 3 | 120.1 | 0.1 | 120.1 | 0.1 | 106.2 | 0.1 | 102.2 | 0.2 | 110.7 | 0.1 |
| Channel 4 | 120.1 | 0.1 | 120.1 | 0.1 | 106.2 | 0.1 | 102.2 | 0.2 | 110.7 | 0.1 |

Calibration measured with the accelerometer DYTRAN type 3185D No. 2327. Calibration factor: -0.2dB

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Range: 130dB; Equivalent input steady level = 74dB

| Result | Detector | Ch. | Duration [ms] | 1000 | 500 | 200 | 100 | 50 | 20 | 10 | 5 |
|--------|----------|-----|-----------------|------|------|------|------|------|------|------|------|
| | | 1 | Indication [dB] | 74.0 | 73.9 | 73.0 | 71.4 | 69.2 | 65.7 | 62.8 | 59.9 |
| | | 1 | Error [dB] | 0.0 | 0.0 | 0.0 | 0.0 | -0.0 | -0.0 | -0.1 | 0.0 |
| | | 2 | Indication [dB] | 74.0 | 73.9 | 73.0 | 71.4 | 69.1 | 65.7 | 62.8 | 59.9 |
| | Fast | 2 | Error [dB] | 0.0 | 0.0 | 73.0 | 0.0 | -0.0 | -0.0 | -0.1 | 0.0 |
| | rast | 2 | Indication [dB] | 74.0 | 73.9 | 73.0 | 71.4 | 69.1 | 65.7 | 62.8 | 59.9 |
| | | 3 | Error [dB] | 0.0 | 0.0 | 0.0 | 0.0 | -0.0 | 0.0 | -0.1 | 0.0 |
| | | 4 | Indication [dB] | 74.0 | 74.0 | 73.0 | 71.5 | 69.2 | 65.7 | 62.9 | 60.0 |
| MAY | | 4 | Error [dB] | 0.0 | 0.0 | 0.0 | 0.0 | -0.0 | -0.0 | -0.1 | 0.0 |
| MAA | | | Indication [dB] | 72.0 | 69.9 | 66.6 | 63.8 | 60.9 | 57.0 | 54.0 | 51.0 |
| | | 1 | Error [dB] | 0.0 | 0.1 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | 0.0 |
| | | 2 | Indication [dB] | 72.0 | 69.9 | 66.5 | 63.8 | 60.9 | 56.9 | 54.0 | 51.0 |
| | Class | 2 | Error [dB] | 0.0 | 0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | 0.1 |
| | SIOW | 2 | Indication [dB] | 72.0 | 69.9 | 66.5 | 63.7 | 60.8 | 56.9 | 53.9 | 51.0 |
| | | 3 | Error [dB] | 0.0 | 0.1 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | 0.0 |
| | | 4 | Indication [dB] | 72.0 | 70.0 | 66.6 | 63.8 | 60.9 | 57.0 | 54.0 | 51.0 |
| | | 4 | Error [dB] | 0.0 | 0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 |
| | | | Indication [dB] | 74.0 | 71.0 | 67.0 | 64.0 | 61.0 | 57.0 | 54.0 | 51.1 |
| | | 1 | Error [dB] | 0.0 | -0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 |
| | | 2 | Indication [dB] | 74.0 | 71.0 | 67.0 | 64.0 | 61.0 | 57.0 | 54.0 | 51.1 |
| CEI | 1 | 2 | Error [dB] | 0.0 | -0.0 | 0.0 | 0.0 | -0.0 | 0.0 | 0.1 | 0.1 |
| SEL | | 2 | Indication [dB] | 74.0 | 70.9 | 67.0 | 64.0 | 61.0 | 57.0 | 54.0 | 51.1 |
| | | 3 | Error [dB] | 0.0 | -0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 |
| | | | Indication [dB] | 74.0 | 71.0 | 67.0 | 64.0 | 61.0 | 57.1 | 54.1 | 51.1 |
| | | 4 | Error [dB] | 0.0 | -0.0 | 0.0 | 0.0 | -0.0 | 0.0 | 0.0 | 0.1 |

Range: 130dB; Equivalent input steady level = 54dB

| Result | Detector | Ch. | Duration [ms] | 1000 | 500 |
|-----------------------|-----------------------|-----|-----------------|------|------|
| | | 1 | Indication [dB] | 54.0 | 53.9 |
| | | 1 | Error [dB] | 0.0 | -0.0 |
| | and the second second | 2 | Indication [dB] | 54.0 | 53.9 |
| | Fact | 2 | Error [dB] | 0.1 | 0.1 |
| | Past | 2 | Indication [dB] | 53.9 | 53.9 |
| | | 5 | Error [dB] | 0.0 | 0.0 |
| | | 1 | Indication [dB] | 54.1 | 54.0 |
| MAY | | 4 | Error [dB] | -0.0 | -0.0 |
| MAA | | 1 | Indication [dB] | 52.0 | 50.0 |
| 19-14 | | 1 | Error [dB] | 0.0 | 0.1 |
| | | 2 | Indication [dB] | 52.0 | 49.9 |
| 12-5-5 | Slow | 4 | Error [dB] | 0.1 | 0.1 |
| | 310W | 3 | Indication [dB] | 52.0 | 49.9 |
| | | 5 | Error [dB] | 0.0 | 0.1 |
| 1247 | Sec. | 4 | Indication [dB] | 52.1 | 50.1 |
| | | - | Error [dB] | -0.0 | 0.1 |
| | | 1 | Indication [dB] | 54.0 | 51.1 |
| | | 1 | Error [dB] | 0.0 | 0.1 |
| - | - | 2 | Indication [dB] | 54.1 | 51.1 |
| CEI | | 4 | Error [dB] | 0.1 | 0.1 |
| JEL | | 2 | Indication [dB] | 54.0 | 51.0 |
| and the second second | | 3 | Error [dB] | 0.0 | 0.1 |
| - | | 1 | Indication [dB] | 54.1 | 51.2 |
| | | + | Error [dB] | -0.0 | 0.1 |

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Range: 105dB; Equivalent input steady level = 34dB

| Result | Detector | Ch. | Duration [ms] | 1000 | 500 |
|--------|----------|--------|-----------------|------|------|
| | | 1 | Indication [dB] | 34.0 | 34.0 |
| | | 1 | Error [dB] | -0.0 | 0.0 |
| | | 2 | Indication [dB] | 34.0 | 34.0 |
| | East | 2 | Error [dB] | 0.0 | 0.1 |
| | rast | 2 | Indication [dB] | 34.0 | 33.9 |
| | | 3 | Error [dB] | -0.0 | -0.0 |
| | | 4 | Indication [dB] | 34.0 | 33.9 |
| MAY | | 4 | Error [dB] | 0.0 | -0.0 |
| MAA | | | Indication [dB] | 32.0 | 30.1 |
| | | 1 | Error [dB] | 0.0 | 0.1 |
| | Slow | 2 3 | Indication [dB] | 32.0 | 30.0 |
| | | | Error [dB] | 0.0 | 0.1 |
| | | | Indication [dB] | 31.9 | 30.0 |
| | | | Error [dB] | -0.0 | 0.1 |
| | | 4 | Indication [dB] | 32.0 | 30.0 |
| | | 4 | Error [dB] | -0.0 | 0.1 |
| | | 1 | Indication [dB] | 34.1 | 31.2 |
| | | 1 | Error [dB] | 0.0 | 0.1 |
| SEL | | 2 | Indication [dB] | 34.1 | 31.2 |
| | - | 2 | Error [dB] | 0.1 | 0.2 |
| | | 2 | Indication [dB] | 34.0 | 31.1 |
| | | 5 | Error [dB] | -0.0 | 0.1 |
| | | 4 | Indication [dB] | 34.1 | 31.1 |
| | | 4 | Error [dB] | 0.0 | 0.1 |

Range: 130dB; Equivalent input steady level = 134dB

| Result | Detector | Ch. | Duration [ms] | 1000 | 500 | 200 | 100 | 50 | 20 | 10 | 5 | 2 | 1 | 0.5 | 0.25 |
|--------|----------|-----|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | | 1 | Indication [dB] | 134.0 | 133.9 | 133.0 | 131.4 | 129.2 | 125.7 | 122.8 | 119.9 | 116.0 | 112.9 | 109.9 | 106.9 |
| | | 1 | Error [dB] | -0.0 | 0.0 | 0.0 | 0.0 | -0.0 | -0.0 | -0.1 | 0.0 | -0.0 | -0.1 | -0.1 | -0.1 |
| | | 2 | Indication [dB] | 134.0 | 133.9 | 133.0 | 131.4 | 129.1 | 125.7 | 122.8 | 119.9 | 115.9 | 112.9 | 109.9 | 106.9 |
| | Fact | - | Error [dB] | 0.0 | 0.0 | 0.0 | 0.0 | -0.0 | -0.0 | -0.0 | 0.0 | -0.0 | -0.0 | -0.1 | -0.1 |
| | rast | 2 | Indication [dB] | 134.0 | 133.9 | 133.0 | 131.4 | 129.1 | 125.7 | 122.8 | 119.9 | 115.9 | 112.9 | 109.9 | 106.8 |
| | | 5 | Error [dB] | 0.0 | 0.0 | 0.0 | 0.0 | -0.0 | -0.0 | -0.1 | 0.0 | -0.0 | -0.1 | -0.1 | -0.1 |
| | | 4 | Indication [dB] | 134.1 | 134.0 | 133.1 | 131.4 | 129.2 | 125.7 | 122.9 | 120.0 | 116.0 | 113.0 | 110.0 | 106.9 |
| MAX | | 4 | Error [dB] | 0.0 | 0.0 | 0.0 | -0.0 | 129.2 | -0.0 | -0.1 | 0.0 | -0.0 | -0.1 | -0.1 | -0.1 |
| IVIAA | | 1 | Indication [dB] | 132.0 | 129.9 | 126.6 | 123.8 | 120.9 | 117.0 | 114.0 | 111.0 | 107.0 | - | - | - |
| | | 1 | Error [dB] | 0.0 | 0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | - | - | - |
| 1925 | | 2 | Indication [dB] | 132.0 | 129.9 | 126.6 | 123.8 | 120.9 | 116.9 | 114.0 | 110.9 | 107.0 | - | - | - |
| 1.00 | Clow | 2 | Error [dB] | 0.0 | 0.1 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | - | - | - |
| | SIOW | 2 | Indication [dB] | 132.0 | 129.9 | 126.5 | 123.8 | 120.9 | 116.9 | 113.9 | 110.9 | 107.0 | - | - | - |
| | | 3 | Error [dB] | 0.0 | 0.1 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | - | - | - |
| | | 4 | Indication [dB] | 132.1 | 130.0 | 126.6 | 123.8 | 120.9 | 117.0 | 114.0 | 111.0 | 107.0 | - | - | - |
| | | 4 | Error [dB] | 0.0 | 0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | - | - | - |
| | | 1 | Indication [dB] | 134.0 | 131.0 | 127.0 | 124.0 | 121.0 | 117.0 | 114.0 | 111.0 | 107.0 | 103.9 | 100.9 | 97.9 |
| | | 1 | Error [dB] | -0.0 | -0.0 | 0.0 | -0.0 | -0.0 | 0.0 | -0.0 | -0.0 | -0.0 | -0.1 | -0.1 | -0.1 |
| | | 2 | Indication [dB] | 134.0 | 131.0 | 127.0 | 124.0 | 121.0 | 117.0 | 114.0 | 111.0 | 107.0 | 103.9 | 100.9 | 97.8 |
| SEI | | 2 | Error [dB] | 0.0 | -0.0 | 0.0 | 0.0 | -0.0 | 0.0 | 0.0 | -0.0 | -0.0 | -0.0 | -0.1 | -0.1 |
| SEL | - | 2 | Indication [dB] | 134.0 | 131.0 | 127.0 | 124.0 | 121.0 | 117.0 | 114.0 | 111.0 | 107.0 | 103.9 | 100.9 | 97.8 |
| | | 3 | Error [dB] | 0.0 | -0.0 | 0.0 | 0.0 | -0.0 | 0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.1 | -0.1 |
| | | 4 | Indication [dB] | 134.1 | 131.0 | 127.1 | 124.0 | 121.0 | 117.1 | 114.0 | 111.0 | 107.0 | 104.0 | 101.0 | 97.9 |
| | | 4 | Error [dB] | 0.0 | -0.0 | 0.0 | -0.0 | -0.0 | 0.0 | -0.0 | -0.0 | -0.0 | -0.1 | -0.1 | -0.1 |

4. TONEBURST RESPONSE* (electrical)

LEVEL METER; Characteristic: A; f_{sin} = 4000 Hz; Burst duration: 2s;

Range: 105dB; Equivalent input steady level = 112dB

| Result | Detector | Ch. | Duration [ms] | 1000 | 500 | 200 | 100 | 50 | 20 | 10 | 5 | 2 | 1 | 0.5 | 0.25 |
|--------|-----------------------|-----|-----------------|-------|-------|-------|-------|-------|-------|-------|------|------|------|------|------|
| | | 1 | Indication [dB] | 112.0 | 111.9 | 111.0 | 109.4 | 107.2 | 103.7 | 100.8 | 97.9 | 94.0 | 91.0 | 87.9 | 84.9 |
| | | 1 | Error [dB] | 0.0 | 0.0 | 0.0 | 0.0 | -0.0 | -0.0 | -0.1 | 0.0 | -0.0 | -0.0 | -0.1 | -0.1 |
| | | 2 | Indication [dB] | 112.0 | 111.9 | 111.0 | 109.4 | 107.2 | 103.7 | 100.8 | 97.9 | 94.0 | 90.9 | 87.9 | 84.9 |
| | Fact | 2 | Error [dB] | -0.0 | 0.0 | 0.0 | -0.0 | -0.0 | -0.0 | -0.1 | 0.0 | -0.0 | -0.1 | -0.1 | -0,1 |
| | 1 dot | 3 | Indication [dB] | 112.0 | 111.9 | 111.0 | 109.4 | 107.1 | 103.7 | 100.8 | 97.9 | 93.9 | 90.9 | 87.9 | 84.9 |
| | | - | Error [dB] | 0.0 | 0.0 | 0.0 | 0.0 | -0.0 | -0.0 | -0.1 | 0.0 | -0.0 | -0.0 | -0.1 | -0.1 |
| | 1. 1. 1. | 4 | Indication [dB] | 112.0 | 111.9 | 111.0 | 109.4 | 107.2 | 103.7 | 100.9 | 97.9 | 94.0 | 91.0 | 87.9 | 84.9 |
| MAX | and the second second | T | Error [dB] | 0.0 | 0.0 | 0.0 | 0.0 | -0.0 | -0.0 | -0.1 | 0.0 | -0.0 | -0.0 | -0.1 | -0.1 |
| MILLY | | 1 | Indication [dB] | 110.0 | 108.0 | 104.6 | 101.8 | 98.9 | 95.0 | 92.0 | 89.0 | 85.0 | - | - | - |
| | | | Error [dB] | 0.0 | 0.1 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | - | - | - |
| | | 2 | Indication [dB] | 110.0 | 107.9 | 104.6 | 101.8 | 98.9 | 95.0 | 92.0 | 89.0 | 85.0 | - | - | - |
| | Slow | 2 | Error [dB] | 0.0 | 0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | - | - | - |
| | SIGN | 3 | Indication [dB] | 110.0 | 107.9 | 104.5 | 101.8 | 98.9 | 94.9 | 91.9 | 88.9 | 85.0 | - | - | - |
| | | 5 | Error [dB] | 0.0 | 0.1 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | - | - | - |
| | | 4 | Indication [dB] | 110.0 | 108.0 | 104.6 | 101.8 | 98.9 | 95.0 | 92.0 | 89.0 | 85.0 | - | - | - |
| | _ | - | Error [dB] | 0.0 | 0.1 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | | - | - |
| | | 1 | Indication [dB] | 112.0 | 109.0 | 105.0 | 102.0 | 99.0 | 95.0 | 92.0 | 89.0 | 85.0 | 82.0 | 78.9 | 75.9 |
| | | 1 | Error [dB] | 0.0 | -0.0 | 0.0 | 0.0 | -0.0 | 0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.1 | -0.1 |
| | | 2 | Indication [dB] | 112.0 | 109.0 | 105.0 | 102.0 | 99.0 | 95.0 | 92.0 | 89.0 | 85.0 | 81.9 | 78.9 | 75.9 |
| SEL | | 2 | Error [dB] | -0.0 | -0.0 | 0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.1 | -0.1 | -0.1 |
| JEL | | 3 | Indication [dB] | 112.0 | 109.0 | 105.0 | 102.0 | 99.0 | 95.0 | 92.0 | 89.0 | 85.0 | 81.9 | 78.9 | 75.8 |
| | | 5 | Error [dB] | 0.0 | -0.0 | 0.0 | 0.0 | -0.0 | 0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.1 | -0.1 |
| | | 4 | Indication [dB] | 112.0 | 109.0 | 105.0 | 102.0 | 99.0 | 95.0 | 92.0 | 89.0 | 85.0 | 82.0 | 78.9 | 75.9 |
| | | 7 | Error [dB] | 0.0 | -0.0 | 0.0 | 0.0 | -0.0 | 0.0 | 0.0 | -0.0 | -0.0 | -0.0 | -0,1 | -0.1 |

Range: 105dB; Equivalent input steady level = 52dB

| Result | Detector | Ch. | Duration [ms] | 1000 | 500 | 200 | 100 | 50 | 20 | 10 | 5 |
|--------|----------|-----|-----------------|------|------|------|------|------|------|------|------|
| | | 1 | Indication [dB] | 52.0 | 51.9 | 51.0 | 49.4 | 47.1 | 43.7 | 40.8 | 37.9 |
| | 13 | 1 | Error [dB] | 0.0 | 0.0 | 0.0 | 0.0 | -0.0 | 0.0 | -0.0 | 0.0 |
| | | 2 | Indication [dB] | 52.0 | 51.9 | 51.0 | 49.4 | 47.1 | 43.7 | 40.8 | 37.9 |
| | Fact | 2 | Error [dB] | 0.0 | 0.0 | 0.0 | 0.0 | -0.0 | 0.0 | -0.1 | 0.0 |
| | Tast | 2 | Indication [dB] | 51.9 | 51.9 | 51.0 | 49.3 | 47.1 | 43.6 | 40.8 | 37.8 |
| | | 5 | Error [dB] | -0.0 | 0.0 | 0.0 | 0.0 | -0.0 | -0.0 | -0.1 | 0.0 |
| | | 4 | Indication [dB] | 52.0 | 51.9 | 51.0 | 49.4 | 47.1 | 43.6 | 40.8 | 37.9 |
| MAX | | 4 | Error [dB] | 0.0 | 0.0 | 0.0 | 0.0 | -0.0 | -0.0 | -0.1 | -0.0 |
| IVIAA | | 1 | Indication [dB] | 50.0 | 47.9 | 44.6 | 41.8 | 38.9 | 35.0 | 32.0 | 29.0 |
| | | 1 | Error [dB] | 0.0 | 0.1 | 0.0 | -0.0 | -0.0 | 0.0 | 0.0 | 0.0 |
| | | 2 | Indication [dB] | 50.0 | 47.9 | 44.5 | 41.7 | 38.8 | 35.0 | 31.9 | 29.1 |
| | Slow | 2 | Error [dB] | 0.0 | 0.1 | -0.0 | -0.0 | -0.0 | 0.0 | -0.0 | 0.1 |
| | SIOW | 3 | Indication [dB] | 49.9 | 47.9 | 44.5 | 41.7 | 38.8 | 34.9 | 31.9 | 29.0 |
| | | 3 | Error [dB] | 0.0 | 0.1 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | 0.0 |
| | | 4 | Indication [dB] | 50.0 | 47.9 | 44.6 | 41.8 | 38.9 | 35.0 | 32.0 | 29.0 |
| | | - | Error [dB] | 0.0 | 0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 |
| | | 1 | Indication [dB] | 52.0 | 49.0 | 45.0 | 42.0 | 39.0 | 35.1 | 32.1 | 29.2 |
| | | 1 | Error [dB] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.2 |
| | | 2 | Indication [dB] | 52.0 | 49.0 | 45.0 | 42.0 | 39.0 | 35.0 | 32.1 | 29.2 |
| SEL. | | 2 | Error [dB] | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.3 |
| 500 | | 3 | Indication [dB] | 51.9 | 48.9 | 45.0 | 41.9 | 39.0 | 35.0 | 32.0 | 29.1 |
| | | 5 | Error [dB] | 0.0 | -0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.2 |
| | | 4 | Indication [dB] | 52.0 | 49.0 | 45.0 | 42.0 | 39.0 | 35.0 | 32.1 | 29.2 |
| | | - | Error [dB] | 0.0 | -0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 |

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3. FREQUENCY RESPONSE (electrical)

1/3 OCTAVE; Filter: HP; Range: 170 dB; input=175 dB;



Measured Response (f-frequency, An-attenuation in channel n)

| f [Hz] | A1[dB] | A2[dB] | A3[dB] | A4[dB] | f[Hz] | A1[dB] | A2 [dB] | A3[dB] | LANDI A | fillel | AILIDI | 100100 | 10/101 | |
|--------|--------|--------|--------|--------|-------|--------|---------|--------|---------|--------|--------|--------|--------|--------|
| 0.8 | 0.18 | 0.18 | 0.18 | 0.19 | 5 | 0.01 | 0.01 | AJUD | Aqubj | TINZ | AI[dB] | AZ[dB] | A3[dB] | A4[dB] |
| 1 | 0.10 | 0.10 | 0.18 | 0.10 | 5 | 0.01 | 0.01 | 0.01 | 0.01 | 500 | 0.01 | 0.00 | 0.00 | 0.01 |
| 1 | 0.11 | 0.11 | 0.11 | 0.11 | 6.3 | 0.01 | 0.01 | 0.01 | 0.01 | 1000 | 0.01 | 0.01 | 0.01 | 0.01 |
| 1.25 | 0.08 | 0.08 | 0.08 | 0.08 | 8 | 0.00 | 0.00 | 0.00 | 0.00 | 2000 | 0.01 | 0.01 | 0.01 | 0.01 |
| 1.6 | 0.06 | 0.06 | 0.06 | 0.06 | 16 | 0.00 | 0.00 | 0.00 | 0.00 | 4000 | 0.02 | 0.02 | 0.02 | 0.01 |
| 2 | 0.03 | 0.03 | 0.03 | 0.03 | 31.5 | 0.00 | 0.00 | 0.00 | 0.00 | 8000 | 0.02 | 0.02 | 0.02 | 0.02 |
| 2.5 | 0.02 | 0.01 | 0.01 | 0.01 | 63 | 0.00 | 0.00 | 0.00 | 0.00 | 16000 | 0.00 | 0.05 | 0.03 | 0.05 |
| 315 | 0.02 | 0.02 | 0.02 | 0.02 | 125 | 0.00 | 0.00 | 0.00 | 0.00 | 10000 | 0.06 | 0.03 | 0.03 | 0.03 |
| 5.15 | 0.02 | 0.02 | 0.02 | 0.02 | 125 | 0.00 | 0.00 | 0.00 | 0.00 | 20000 | 0.04 | 0.01 | 0.01 | 0.02 |
| 4 | 0.00 | -0.01 | -0.01 | 0.00 | 250 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | |

All frequencies are nominal center values for the 1/3 octave bands

4. INTERNAL NOISE LEVEL (electrical)

LEVEL METER func.; Range: 145 dB; Back-light - off

| | Filter | HP1 | HP10 | Wd | Wm | Wh |
|-----------|-----------------|------|------|------|------|------|
| Channel 1 | Indication [dB] | 54.7 | 52.3 | 42.2 | 38.5 | 363 |
| Channel 2 | Indication [dB] | 54.9 | 52.6 | 43.1 | 39.7 | 37.2 |
| Channel 3 | Indication [dB] | 55.0 | 52.3 | 44.6 | 39.0 | 36.4 |
| Channel 4 | Indication [dB] | 54.7 | 52.5 | 42.8 | 39.1 | 36.5 |

ENVIRONMENTAL CONDITIONS Temperature Relative humidity Ambient pressure 23 °C 41 % 998 hPa

| | | | TEST EQUIPME | NT |
|------|--------------|-----------|--------------|--|
| Item | Manufacturer | Model | Serial no. | Description |
| 1. | SVANTEK | SVAN 401 | 65 | Signal generator |
| 2. | SVANTEK | SVAN 912A | 4369 | Sound & Vibration Analyser |
| 3. | KEITHLEY | 2000 | 0910165 | Digital multimeter |
| 4. | SVANTEK | SV30A | 7449 | Acoustic collibrator |
| 5. | SVANTEK | ST02 | - | Microphone aquivalent electrical in a (10 P) |
| 6. | DYTRAN | 3233A | 450 | Reference accelerometer |

CONFORMITY & TEST DECLARATION

1. Herewith Svantek company declares that this instrument has been calibrated and tested in compliance with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass them.

2. Tracebility of the calibration is guarantied by the above mentioned ISO9001 procedures.

3. The information appearing on this sheet has been compiled specifically for this instrument. This form is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.

4. This calibration sheet shall not be reproduced except in full, without written permission of the SVANTEK Ltd.

Calibration specialist: Ryszard Leoniak

De

Test date: 2012-09-14

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| Serial Number: 16/98 Accelerometor Method: Back-to-Back Comparison (AT401-3) Manufacturer: PCB Calibration Data Sensitivity @ 100.0 Hz 1008 mV/g Output Bias 11.0 VDC Calibration Data Sensitivity @ 100.0 Hz 1008 mV/g Output Bias 11.0 VDC Calibration Data Sensitivity Plot Sensitivity Plot Discharge Time Constant 1.0 seconds Resonant Frequency 14.3 kHz Discharge Time Constant 1.0 seconds Resonant Frequency 14.3 kHz Discharge Time Constant 1.0 seconds Resonant Frequency 14.3 kHz Hz Data Points Frequency (Hz) Dev. (%) Trequency (Hz) Dev. (%) 100.0 -1.2 30.0 1.1 1000.0 -1.5 50.0 0.0 Notes Calibration for Mark School Sch | Serial Number: 36982 Description: ICP® Accelerometer Method: Back-to-Back Comparison (AT401-3) Manufacturer: PCB Calibration Data Sensitivity @ 100.0 Hz 1008 mV/g Output Bias 11.0 VDC (102.7 mV/m/s ³) Transverse Sensitivity 2.7 % Discharge Time Constant 1.0 seconds Resonant Frequency 14.3 kHz Data Points Frequency (Hz) Dev. (%) Frequency (Hz) Dev. (%) Job 0.0 Collibration Data Sensitivity Plot Temperature: 73 °F (23 °C) Relative Humidity: 45 % Job 0.0 Data Points Frequency (Hz) Dev. (%) Temperature: 73 °F (23 °C) Data Points Job 0.0 Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2" Job 0.0 <th c<="" th=""><th>Model Number:</th><th>3934</th><th>403</th><th>- Per 150 16</th><th>063-21</th></th> | <th>Model Number:</th> <th>3934</th> <th>403</th> <th>- Per 150 16</th> <th>063-21</th> | Model Number: | 3934 | 403 | - Per 150 16 | 063-21 |
|--|--|---|--|---|---|---|--------------------------|
| Description: ICP@ Accelerometer Method: Back-to-Back Comparison (AT401-3) Manufacturer: PCB Calibration Data Sensitivity @ 100.0 Hz 1008 mV/g Output Bias 11.0 VDC (102.7 mV/m/s ²) Transverse Sensitivity 2.7 % Discharge Time Constant 1.0 seconds Resonant Frequency 14.3 kHz Sensitivity Plot Temperature: 73 °F (23 °C) Relative Humidity: 45 % Temperature: 73 °F (23 °C) Relative Humidity: 45 % Relative Hum | Description: ICP@ Accelerometer Method: Back-to-Back Comparison (AT401-3) Manufacturer: PCB Calibration Data Sensitivity @ 100.0 Hz 1008 m V/g Output Bias 11.0 VDC (102.7 mV/m/s ³) Transverse Sensitivity 2.7 % Discharge Time Constant 1.0 seconds Resonant Frequency 14.3 kHz Sensitivity Plot Temperature: 73 % (23 %C) Relative Humidity: 45 % 3.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1 | Serial Number: | 369 | 82 | | | |
| Manufacturer: PCB Calibration Data Sensitivity @ 100.0 Hz 1008 mV/g Output Bias 11.0 VDC (102.7 mV/m/s ³) Transverse Sensitivity 2.7 % Discharge Time Constant 1.0 seconds Resonant Frequency 14.3 kHz Sensitivity Plot Temperature: 73 °F (23 °C) Relative Humidity: 45 % 20 B Calibration Data Plots Frequency (Hz) Dev. (%) Frequency (Hz) Dev. (%) 10.0 2.0 300.0 -0.8 15.0 1.5 500.0 -1.2 30.0 1.1 1000.0 -1.5 50.0 0.7 2000.0 -0.4 REF. FREQ. 0.0 Manufactures The Sense Statement Interface Interface Statement Interface Interface Statement Interface Interface Interface Statement Interface Interface Statement Interface Interface Interface Statement Interface Interface Inter | Manufacturer: PCB Calibration Data Sensitivity @ 100.0 Hz 1008 mV/g Output Bias 11.0 VDC (102.7 mV/g Output Bias 11.0 VDC (103.0 Resonant Frequency 14.3 kHz Hz Data Points Dev. (%) 100.0 200.0 2000.0 Hz Data Points Frequency (Hz) Dev. (%) Frequency (Hz) Dev. (%) 10.0 2.0 300.0 -1.2 30.0 1.1 1000.0 -1.5 50.0 0.7 2000.0 -0.4 REF. FREQ. 0.0 Condition of Unit Condition of Unit Condition of Unit Astern Name States Machine States Machine States Machi | Description: | ICP® Acceleror | neter | Method: Pools to De | ool: Comparison (AT401.2) | |
| Calibration Data Sensitivity @ 100.0 Hz 1008 mV/g Output Bias 11.0 VDC (102.7 mV/m/s ³) Transverse Sensitivity 2.7 % Discharge Time Constant 1.0 seconds Resonant Frequency 14.3 kHz Discharge Time Constant 1.0 seconds Resonant Frequency 14.3 kHz Sensitivity Plot Temperature: 73 °F (23 °C) Relative Humidity: 45% Output Discond Colspan="2">Constant Discharge Time Constant Discharge Time Constant Discharge Time Constant Temperature: 73 °F (23 °C) Relative Humidity: 45% Temperature: 73 °F (23 °C) Relative Humidity: 45% Discharge Time Constant Discharge Time Constant Discharge Time Constant Discharge Time Constant <th colspa<="" th=""><th>Calibration Data Sensitivity @ 100.0 Hz 1008 mV/g Output Bias 11.0 VDC (102.7 $mV/m/s^3$) Transverse Sensitivity 2.7 % Discharge Time Constant 1.0 seconds Resonant Frequency 14.3 kHz Sensitivity Plot Temperature: 73 °F (23 °C) Relative Hundiny: 45 % June 2000 June 2000 Sensitivity Plot Temperature: 73 °F (23 °C) Relative Hundiny: 45 % June 2000 June 2000 June 2000 June 2000 June 2000 June 2000 Note: Summary Summary</th><th>Manufacturer:</th><th>РСВ</th><th></th><th>Memou. Back-10-Ba</th><th>ick Comparison (A1401-5)</th></th> | <th>Calibration Data Sensitivity @ 100.0 Hz 1008 mV/g Output Bias 11.0 VDC (102.7 $mV/m/s^3$) Transverse Sensitivity 2.7 % Discharge Time Constant 1.0 seconds Resonant Frequency 14.3 kHz Sensitivity Plot Temperature: 73 °F (23 °C) Relative Hundiny: 45 % June 2000 June 2000 Sensitivity Plot Temperature: 73 °F (23 °C) Relative Hundiny: 45 % June 2000 June 2000 June 2000 June 2000 June 2000 June 2000 Note: Summary Summary</th> <th>Manufacturer:</th> <th>РСВ</th> <th></th> <th>Memou. Back-10-Ba</th> <th>ick Comparison (A1401-5)</th> | Calibration Data Sensitivity @ 100.0 Hz 1008 mV/g Output Bias 11.0 VDC (102.7 $mV/m/s^3$) Transverse Sensitivity 2.7 % Discharge Time Constant 1.0 seconds Resonant Frequency 14.3 kHz Sensitivity Plot Temperature: 73 °F (23 °C) Relative Hundiny: 45 % June 2000 June 2000 Sensitivity Plot Temperature: 73 °F (23 °C) Relative Hundiny: 45 % June 2000 June 2000 June 2000 June 2000 June 2000 June 2000 Note: Summary | Manufacturer: | РСВ | | Memou. Back-10-Ba | ick Comparison (A1401-5) |
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| $B = \begin{array}{c} 1.0 \\ 0$ | HB 100 10000 2000.0 Hz Data Points Frequency (Hz) Dev. (%) Frequency (Hz) Dev. (%) 15.0 1.5 500.0 -1.2 30.0 1.1 1000.0 -1.5 50.0 0.7 2000.0 -0.4 Ref. FREQ. 0.0 Months Surface: Solidows Grade County Frances: Still Monet According Frances: Still Monet According Frances: Still Monet According Surface: Solidows Grade County Frances: Still Solidows Grade County Frances: Solidows Grade County France Condition of Unit As Left: New Unit, In Tolerance Notes A Solidor Solidows Grade County Frances Solidows Grade County Frances Solidows Grade County Frances Solidows Grade County Franceounty Franceouble thru Projeet 10065. | 2.0- | | | | | |
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| $H_Z = \frac{10^{-4}}{100.0} + \frac{100.0}{100.0} + \frac{1000.0}{1000.0} + \frac{1000.0}{2000.0}$ $H_Z = \frac{Data Points}{Data Points}$ $Frequency (Hz) Dev. (%) Frequency (Hz) Dev. (%) + \frac{1000.0}{100.0} + \frac{1000.0}{2000.0} + \frac{1000.0}{100.0} + \frac{1000.0}{2000.0} + \frac{1000.0}{100.0} + \frac{1000.0}{$ | 10 100 100.0 2000.0 Hz Data Points Frequency (Hz) Dev. (%) Frequency (Hz) Dev. (%) 10.0 2.0 300.0 -0.8 15.0 1.5 500.0 -1.2 30.0 1.1 1000.0 -1.5 50.0 0.7 2000.0 -0.4 REF. FREQ. 0.0 0.0 -0.4 Machine Suffex Statistics Statistics acting Fatters: Stad Most Fature Orientation: Verical Accelement of Wittigs 0.0 (20 at 00) -0.4 REF. FREQ. 0.0 -0.0 Machine Suffex Statistics Statistics acting Fatters: Stad Most Fature Orientation: Verical "The acceleration level" 100.0 (20 at 00) -0.4 REF. FREQ. 0.0 -0.0 -0.0 Machine Interview 100.0 (20 at 00) -0.4 As Found: n/a | dB 0.0- | | | | | |
| $H_Z = \frac{20^{-1}_{30^{-1}_{10.0}} - 100.0}{1000.0} 2000.0$ $H_Z = \frac{Data Points}{Prequency (Hz) Dev. (\%) Prequency (Hz) Dev. (\%)}{10.0 2.0 300.0 - 0.8}$ $15.0 1.5 500.0 - 1.2$ $30.0 1.1 1 1000.0 - 1.5$ $50.0 0.7 2000.0 - 0.4$ $REF. FREQ. 0.0$ $Meuting Surfac: Statistics Steel will know? To go (Statistics State Moset Acceleration Level (met)? 100 g (Statistics State displacement at low frequencies. If the listed level cannot be obtained, the calibration system is: 1 g = 9.80665 m/2.$ $As Found: n/a As Left: New Unit, In Tolerance Notes 1. Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065.$ $Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065.$ $Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065.$ $Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065.$ $Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065.$ $Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065.$ $Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065.$ $Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065.$ $Calibration is Performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025.$ $See Manufacturer's Specification Sheet for a detailed listing of performance specifications.$ $Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 5-9 Hz; +/- 2.0\%, 10-99 Hz; +/- 1.5\%, 100-1999 Hz; +/- 1.0\%, 2-10 kHz; +/- 2.5\%.$ | Hz Data Points Frequency (Hz) Dev. (%) Frequency (Hz) Dev. (%) 10.0 2.0 300.0 -0.8 15.0 1.5 500.0 -1.2 30.0 1.1 1000.0 -0.4 REF. FREQ. 0.0 Meeting Suffice: States chains Crains Fastes: State Orientator: Versical Acceleration Level (m) 1.0 (g 081 mO)? -0.4 REF. FREQ. 0.0 Meeting Suffice: States Chains Crains: Fastes: Stad Mount Fastes Chains by the calibration system uses the following formula to a the vibrions amplinds; Acceleration Level (gree OB) v(trop: The acceleration level and by takker displacement at low frequencies: if the list level cause to evaluation of the calibration system use the following formula to a the vibrions amplinds; Acceleration Level (gree OB) v(trop: The acceleration level and by takker displacement at low frequencies: if the list level cause to evaluation of the calibration system use the following formula to a the vibrions amplinds; Acceleration Level (gree OB) v(trop: Condition of Unit As Left: New Unit, In Tolerance Notes Log (c log (star m)? Log (c log (star m)? Log (c log (star m)? | -1.0- | | | | | |
| $H_Z $ $Dev. (%) Frequency (Hz) Dev. (%) Frequency (Hz) Dev. (%) 10.0 2000.0 Data Points Frequency (Hz) Dev. (%) Frequency (Hz) Dev. (%) 10.0 2.0 300.0 -0.8 15.0 1.5 500.0 -1.2 30.0 1.1 1000.0 -1.5 50.0 0.7 2000.0 -0.4 REF. FREQ. 0.0 Mounting Surface: Statistics Steel will black displays the displays $ | $\begin{array}{c c c c c c c c c c c c c c c c c c c $ | -2.0- | | | | | |
| Data Points Data Points Frequency (Hz) Dev. (%) Frequency (Hz) Dev. (%) 10.0 2.0 300.0 -0.8 15.0 1.5 500.0 -1.2 30.0 1.1 1000.0 -1.5 50.0 0.7 2000.0 -0.4 REF. FREQ. 0.0 Mutual Suffex: States Sted willicore Grass Coating Fasteer: Sind Mont Exture Orientation: Vertical Acceleration Level (mei): The initial by shaker displacement at low frequencies. If the listed herel cannot be obtained, the calibration system ats: 1 g = 9.30065 m/s^2. Total Condition of Unit As Found: Notes I. Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. 3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSUNCSL Z540-1-1994 and ISO 17025. 4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. 5. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during | Intervention of the set of the se | -3.0- | | 100. | .0 | 1000 0 2000 0 | |
| Frequency (Hz) Dev. (%) Frequency (Hz) Dev. (%) 10.0 2.0 300.0 -0.8 15.0 1.5 500.0 -1.2 30.0 1.1 1000.0 -1.5 50.0 0.7 2000.0 -0.4 REF. FREQ. 0.0 $Fixture Orientation: Vertical Meuting Surfac: Stainless Sted wiSilicone Grass Coating Fastener: Stud Mount Acceleration Level (mol): Tota coefferation level may be limited by slake of planewist: The acceleration level may be limited by slake of planewist: The acceleration level may be limited by slake of planewist: The acceleration level may be limited by slake of planewist: The acceleration level may be limited by slake of planewist: The acceleration level may be limited by slake of planewist: Tota coefficiation structure of the state of the plane of may be slake of planewist: The acceleration level may be slake of planewist: Reservertion of Unit As Left: Notes 1. Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065.$ | Frequency (Hz) Dev. (%) Frequency (Hz) Dev. (%) 10.0 2.0 300.0 -0.8 15.0 1.5 500.0 -1.2 30.0 1.1 1000.0 -1.5 50.0 0.7 2000.0 -0.4 REF. FREQ. 0.0 0.7 2000.0 -0.4 Mounting Surface: Statistics Steel williones Grass Coating Festence: Statistics Water displacement at low frequencies. If the listed level cannot be obtained, the calibration system use the following formula to set the vibration amplitude. Acceleration Level (reg): The acceleration level may be limited by shaked singlacement at low frequencies. If the listed level cannot be obtained, the calibration system use the following formula to set the vibration amplitude. Acceleration Level "*the gravitational constant used for calculations by the calibration system is; $1 g = 9.80665$ m/d? The acceleration level may be inmited by shaked singlacement at low frequencies. If the listed level cannot be obtained, the calibration system is; $1 g = 9.80665$ m/d? Acceleration Level "*the gravitational constant used for calculations by the calibration system is; $1 g = 9.80665$ m/d? Acceleration Level "*the gravitational constant used for calculations by the calibration system is; $1 g = 9.80665$ m/d? Acceleration IS NOT Tracceable thru Project 681/280472 and PTB T | Hz | | Data | Points | 1000.0 2000.0 | |
| 10.0 2.0 300.0 -0.8 15.0 1.5 500.0 -1.2 30.0 1.1 1000.0 -1.5 50.0 0.7 2000.0 -0.4 REF. FREQ. 0.0 Numing Surface: Stainless Steed wishicone Grease Coating Fastener: Stud Moutt Acceleration Level (may): The acceleration beef may be limited by shaker displacement at low frequencies. If the limited level cannot be obtained, the calibration system uses the following formula to set the vibration amplitude: Acceleration Level (b) = 0.010 x (freq): The gravitational content used for calculations by the calibration system use is the following formula to set the vibration amplitude: Acceleration Level (b) = 0.010 x (freq): New Unit, In Tolerance Notes 1. Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065. 2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. 3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025. 4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. 5. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%. Technician: Scott Skibiniewski <td>$\begin{array}{c ccccccccccccccccccccccccccccccccccc$</td> <td>Frequency (Hz)</td> <td>Dev. (%)</td> <td>Frequency (Hz)</td> <td>Dev. (%)</td> <td></td> | $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | Frequency (Hz) | Dev. (%) | Frequency (Hz) | Dev. (%) | | |
| 15.0 1.5 500.0 -1.2 30.0 1.1 1000.0 -1.5 50.0 0.7 2000.0 -0.4 REF. FREQ. 0.0 Mounting Surface: Staintess Steel wSilicone Grease Coating Fasteer: Stud Mount Acceleration level may be limited by shaker displacement at low frequencies. If the listed level cannot be obtained, the calibration system uses the following formula to set the vibration amplitude. Acceleration Level (g) = 0010 x (freq). The acceleration level may be limited by shaker displacement at low frequencies. If the listed level cannot be obtained, the calibration system uses the following formula to set the vibration amplitude. Acceleration Level (g) = 0010 x (freq). As Found: n/a As Left: New Unit, In Tolerance Notes 1. Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065. 2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. 3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025. 4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. 5. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 H | 15.0 1.5 50.0 -1.2 30.0 1.1 1000.0 -1.5 50.0 0.7 2000.0 -0.4 REF. FREQ. 0.0 Menting Surface: States Steel wSilicone Grease Coating Fastener: Stud Mount Fixture Orientation: Vertical Academation Level (ms): $100 (281 ms)^{27}$ The gravitational constant used for calculations by the calibration system uses the following formula to set the vibration amplitude; Acceleration Level $g^{0} = 0003 (freq)^{2}$ The gravitational constant used for calculations by the calibration system is; $1 g = 9.80665 mt^{32}$. As Found: n/a As Left: New Unit, In Tolerance Notes In Calibration is NIST Traceable thru Project $681/280472$ and PTB Traceable thru Project 10065 . 2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. 3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025. 4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. 5. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: $5.9 Hz$; $+/- 2.0\%$, $1099 Hz$; $+/- 1.5\%$, $100-1999 Hz$; $+/- 1.0\%$, $210 kHz$; $+/- 2.5\%$. Technician: <t< td=""><td>10.0</td><td>2.0</td><td>300.0</td><td>-0.8</td><td></td></t<> | 10.0 | 2.0 | 300.0 | -0.8 | | |
| 30.0 1.1 1000.0 -1.5 50.0 0.7 2000.0 -0.4 REF. FREQ. 0.0 Mounting Surface: Statiletes Steel w/Silicone Grease Coating Fastener: Stud Mount Acceleration Level (ms)? Fixture Orientation: Vertical reader the provide the statistical provide the stat | 30.0 1.1 1000.0 -1.5 50.0 0.7 2000.0 -0.4 REF. FREQ. 0.0 Mounting Surface: Stainless Steel willicone Grease Coating Fastener: Stud Mount Acceleration Level (mg): 100 g (981 ms?) The acceleration level (mg): 100 g (981 ms?) The acceleration level (mg) timted by staket displacement at low frequencies. If the listed level cannot be obtained, the calibration system uses the following formula to set the vibration amplitude, Acceleration Level (mg): (Dond) K (freq): The acceleration level mg be limited by staket displacement at low frequencies. If the listed level cannot be obtained, the calibration system uses the following formula to set the vibration amplitude, Acceleration Level (mg): (Dond) K (freq): Condition of Unit As Found: n/a | 15.0 | 1.5 | 500.0 | -1.2 | | |
| 50.0 0.7 2000.0 -0.4 REF. FREQ. 0.0 Mounting Surface: Statuless Stele willicone Grease Coating Fastener: Stud Mount Acceleration Level (mg): 100 g (93 mcV)? Fixture Orientation: Vertical Acceleration Level (mg): 100 g (93 mcV)? "The acceleration level may be limited by shaker displacement at low frequencies. If the listed level cannot be obtained, the calibration system uses the following formula to set the vibration amplitude; Acceleration Level (g)=0010 x (freq)? As Found: n/a As Left: New Unit, In Tolerance Notes 1. Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065. 2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. 3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025. 4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. 5. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%. Technician: Scott Skibniewski Date: 01/23/13 | 50.0 0.7 2000.0 -0.4 REF. FREQ. 0.0 Moming Surfac: Suides Steel wildicone Greate Coating Fastener: Stud Mourt Exture Orientation: Vertical Acceleration level (mg): 1.00 g (981 m/s)? The acceleration level may be limited by shaker displacement at low frequencies. If the listed level cannot be obtained, the calibration system uses the following formula to set the vibration amplitude; Acceleration Level (g) = 0.010 x (freq)? Condition of Unit As Found: n/a As Left: New Unit, In Tolerance Notes 1. Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065. 2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. 3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025. 4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. 5. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%. Technician: Scott Skibniewski | 30.0 | 1.1 | 1000.0 | -1.5 | | |
| REF. FREQ. 0.0 Mounting Surface: Stainless Steel w/Silicone Grease Coating Fastener: Stud Mount Acceleration Level (ms): 1.00 g (981 ms?) ² The acceleration Level (ms): 1.00 g (981 ms?) ² The acceleration Level may be limited by shaker displacement at low frequencies. If the listed level cannot be obtained, the calibration system uses the following formula to set the vibration amplitude: Acceleration Level (g)=0.00 x (freq). As colored may be limited by shaker displacement at low frequencies. If the listed level cannot be obtained, the calibration system uses the following formula to set the vibration amplitude: Acceleration Level (g)=0.00 x (freq). As Found: n/a As Left: New Unit, In Tolerance Notes Notes 1. Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065. 2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. 3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025. 4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. 5. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%. Technician: Scott Skibniewski <t< td=""><td>REF. FREQ. 0.0 Moming Suffex: Suites Steel wSilicone Grease Ceating Fastener: Stud Mount Long (981 m/s)¹ Exture Orientation: Vertical The acceleration Level (mms)¹: Stude displacement at low frequencies. If the listed level cannot be obtained, the calibration system is; 1 g = 9.80665 m/s². Condition of Unit As Found: n/a Image: Condition of Unit States As Left: New Unit, In Tolerance Notes 1. Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065. Image: Condition of Unit 3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. 5. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%. Technician: Scott Skibniewski Date: 01/23/13</td><td>50.0</td><td>0.7</td><td>2000.0</td><td>-0.4</td><td></td></t<> | REF. FREQ. 0.0 Moming Suffex: Suites Steel wSilicone Grease Ceating Fastener: Stud Mount Long (981 m/s) ¹ Exture Orientation: Vertical The acceleration Level (mms) ¹ : Stude displacement at low frequencies. If the listed level cannot be obtained, the calibration system is; 1 g = 9.80665 m/s ² . Condition of Unit As Found: n/a Image: Condition of Unit States As Left: New Unit, In Tolerance Notes 1. Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065. Image: Condition of Unit 3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. 5. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%. Technician: Scott Skibniewski Date: 01/23/13 | 50.0 | 0.7 | 2000.0 | -0.4 | | |
| Mounting Surface: Stature Orientation: Vertical Acceleration Level (ms): 1.00 g (981 ms?): 1.00 g (981 ms?): 1.00 g (981 ms?): The acceleration level may be limited by shaker displacement at low frequencies: If the listed level cannot be obtained, the calibration system uses the following formula to set the vibration amplitude: Acceleration Level (g)=0010 x (freq): If (ms): If (ms): If (ms): If (ms): As Found: Im/a Im/a Im/a Im/a Im/a As Left: New Unit, In Tolerance Notes 1. Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065. Im/a 2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. 3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025. 4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. 5. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%. Technician: Scott Skibniewski Date: 01/23/13 | Mounting Surface: Stature Orientation: Vertical Acceleration Level (mg): 100 g (981 m/s)? The acceleration level mg): 100 g (981 m/s)? The acceleration level (mg): 100 g (981 m/s)? The acceleration level mg): 100 g (981 m/s)? The acceleration level (mg): 100 g (981 m/s)? The acceleration level mg): 100 g (981 m/s)? The acceleration level (mg): 100 g (981 m/s)? The acceleration level mg): 1 g = 9,30665 m/s? As Left: New Unit, In Tolerance Notes Notes 1. Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065. Notes 2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. 3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025. 4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. 5. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%. Technician: Scott Skibniewski Date: 01/23/13 | REF. FREQ. | 0.0 | | | | |
| The acceleration level may be limited by staker displacement at low frequencies. If the listed level cannot be obtained, the calibration system uses the following formula to set the vibration amplitude, Acceleration Level "The gravitational constant used for calculations by the calibration system is: 1 g = 9.80665 m/s". Condition of Unit As Found: <u>n/a</u> As Left: New Unit, In Tolerance Notes 1. Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065. 2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. 3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025. 4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. 5. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%. Technician: Scott Skibniewski Date: 01/23/13 | The acceleration level may be limited by shaker displacement at low frequencies. If the listed level cannot be obtained, the calibration system uses the following formula to set the vibration amplitude, Acceleration Level "The gravitational constant used for calculations by the calibration system use, 1 g = 9.8065 m/s ² . Condition of Unit As Found: n/a Notes 1. Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065. 2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. 3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025. 4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. 5. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%. Technician: Scott Skibniewski | Mounting Surface: Stainless Steel w/Silico Acceleration Level (rms)1: 100 | ne Grease Coating Fastener: 9 (9.81 m/s ²) ² | Stud Mount | Fixture Orientation: Vertical | | |
| Condition of Unit As Found: n/a As Left: New Unit, In Tolerance Notes 1. Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065. 2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. 3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025. 4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. 5. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%. Technician: Scott Skibniewski | Condition of Unit As Found: n/a As Left: New Unit, In Tolerance Notes 1. 1. Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065. 2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. 3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025. 4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. 5. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%. Technician: Scott Skibniewski Date: 01/23/13 | The acceleration level may be limited by sha (g) = $0.010 \text{ x} (\text{freq})^2$. | iker displacement at low frequen | cies. If the listed level cannot be ² The gravitational | obtained, the calibration system uses the following formula to se constant used for calculations by the calibration system is; | t the vibration amplitude; Acceleration Level 1 g = 9.80665 m/s ² . | |
| As Found: <u>I/a</u> As Left: New Unit, In Tolerance Notes 1. Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065. 2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. 3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025. 4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. 5. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%. Technician: Scott Skibniewski Date: 01/23/13 | As Found: <u>n/a</u> As Left: <u>New Unit, In Tolerance</u> Notes 1. Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065. 2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. 3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025. 4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. 5. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibratic are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%. Technician: <u>Scott Skibniewski</u> Date: <u>01/23/13</u> | | | Conditio | on of Unit | | |
| Notes 1. Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065. 2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. 3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025. 4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. 5. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%. Technician: Scott Skibniewski Date: 01/23/13 | Notes 1. Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065. 2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. 3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025. 4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. 5. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibratic are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%. Technician: Scott Skibniewski Date: 01/23/13 | As Found: <u>n/a</u> As Left: New Unit | In Tolerance | | | | |
| Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%. Technician: Scott Skibniewski Date: 01/23/13 | Calibration is NIST Traceable thru Project 681/280472 and PTB Traceable thru Project 10065. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibratic are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%. Technician: Scott Skibniewski Date: 01/23/13 | <u></u> | in rotoranee | N | otes | | |
| This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%. Technician: Scott Skibniewski Date: 01/23/13 | This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibratic are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%. Technician: Scott Skibniewski Date: 01/23/13 | 1. Calibration is NIS | T Traceable thru | Project 681/2804 | 72 and PTB Traceable thru Project | et 10065. | |
| 4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. 5. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%. 7. Technician: Scott Skibniewski Date: 01/23/13 | Calibration is performed in computate with ISO 9001, ISO 1012-1, ANSI/NCSL 2540-1-1994 and ISO 17025. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibratic are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%. Technician: Scott Skibniewski Date: 01/23/13 | 2. This certificate sha | Il not be reproduc | ed, except in full, | without written approval from PC | B Piezotronics, Inc. | |
| 5. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%. Technician: Scott Skibniewski Date: 01/23/13 | 5. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibratic are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%. Technician: Scott Skibniewski Date: 01/23/13 | 4. See Manufacturer's | Specification Sh | eet for a detailed 1 | listing of performance specification | -1-1994 and ISO 17025. | |
| are as follows. 5-9 fiz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%. Technician: | are as follows. 5-9 HZ; +/- 2.0%, 10-99 HZ; +/- 1.5%, 100-1999 HZ; +/- 1.0%, 2-10 kHZ; +/- 2.5%. Technician: | 5. Measurement uncer | rtainty (95% conf | idence level with | coverage factor of 2) for frequency | ranges tested during calibration | |
| Technician: Scott Skibniewski // Date: 01/23/13 | Technician: Scott Skibniewski & Date: 01/23/13 | are as follows: 3-9 HZ; | T/- 2.0%, 10-99 | nz; +/- 1.5%, 100 | 0-1999 Hz; +/- 1.0%, 2-10 kHz; + | /- 2.5%. | |
| | | Technician: | Scott | Skibniewski <u> </u> | Date: | 01/23/13 | |
| VIBRATION DIVISION | | | | v | IDRATION DIVISION | | |

| Model Number: | 202 | 102 | Per ISO 1 | 6063-21 |
|---|-----------------------------------|---|--|---|
| Serial Number: | 393 | A03 | | |
| Description: | 369 | 081 | | |
| Monufacture | ICP® Accelero | meter | Method: Back-to-B | ack Comparison (AT401- |
| | PCB | | | |
| | | Calibra | ution Data | |
| Sensitivity @ 100.0 Hz | 1004 | mV/g | Output Bias | |
| | (102.4 | $mV/m/c^2$ | Transaction Constants | 10.8 VDC |
| Discharge Time Constant | 1.2 | III V/III/S ⁻) | Transverse Sensitivity | 1.5 % |
| e constant | 1.2 | seconds | Resonant Frequency | 13.1 kHz |
| | | | | |
| Te | mperature: 73 °F (23 | °C) | tivity Plot | |
| 3.0- | Territor 10 1 (25 | () | Relative Humidity: | 45 % |
| 2.0- | | | | |
| 1.0- | | | | |
| dB 0.0- | | * | | |
| -1.0- | | And the second se | Conserve and a second | |
| -2.0- | | | | |
| -3.0-1- | kunner tanan | 100 | 0 | |
| Hz | | 100. | | 1000.0 2000 |
| Frequency (Hz) | Day (%) | Data | Points | |
| 10.0 | 2.0 | Frequency (Hz) | Dev. (%) | |
| 15.0 | 2.0 | 300.0 | -0.7 | |
| 30.0 | 1.5 | 500.0 | -1.1 | |
| 50.0 | 1.1 | 1000.0 | -1.2 | |
| BEE EREO | 0.8 | 2000.0 | 0.5 | |
| REF. FREQ. | 0.0 | | | |
| Mounting Surface: Stainless Steel w/Silicone Acceleration Level (rms) ² | Grease Coating Fastener: St | ud Mount | Fixture Orientation Vertical | |
| The acceleration level may be limited by shake (g) = 0.010 x (freq) ² . | er displacement at low frequencie | es. If the listed level cannot be c | btained, the calibration system uses the following formula to set t | the vibration amplitude; Acceleration Level |
| | | Conditio | n of Unit | $g = 9.80665 \text{ m/s}^2$. |
| As Found: <u>n/a</u> | | | , sy enn | |
| As Left: <u>New Unit</u> , 1 | In Tolerance | | | |
| 1 Collibration in Array | | No | tes | |
| 2. This certificate shall | I raceable thru P | roject 681/28047 | 2 and PTB Traceable thru Project | 10065. |
| Calibration is perfor. | med in compliance | e with ISO 9001 | Without written approval from PCB | Piezotronics, Inc. |
| 4. See Manufacturer's S | Specification Shee | et for a detailed li | sting of performance specifications | 1-1994 and ISO 17025. |
| 5. Measurement uncerta | ainty (95% confid | lence level with c | overage factor of 2) for frequency r | ranges tested during calibr |
| are as 10110WS: 3-9 Hz; + | 7-2.0%, 10-99 H | lz; +/- 1.5%, 100 | -1999 Hz; +/- 1.0%, 2-10 kHz; +/- | · 2.5%. |
| Technician: | Scott SI | kibniewski 🏿 | Date: | 01/23/13 |
| | | PCR PIF | | |
| | | | | |

| | ~ Cal | libratio | n Certificate | ~ 6063-21 | |
|---|--|--|--|--|------------------------|
| Model Number: | 393A | 03 | | | |
| Serial Number: | 3713 | 79 | | | |
| Description: | ICP® Acceleron | patar | | | 2401 2) |
| | | | Method: Back-to-B | ack Comparison (A1 | 401-3) |
| | РСВ | | | | |
| | | Calibra | tion Data | | |
| Sensitivity @ 100.0 Hz | 1009 | mV/g | Output Bias | 10.8 VDC | |
| | (102.9 | mV/m/s²) | Transverse Sensitivity | 2.0 % | |
| Discharge Time Constar | nt 1.1 | seconds | Resonant Frequency | 12.4 kHz | |
| | | | | | |
| | | Sensi | tivity Plot | | |
| 3.0- | Temperature: 72 °F (22 | °C) | Relative Humidity | : 42 % | |
| 2.0- | | | | | |
| 1.0- | | | | | |
| lB 0.0- | | * | (| | |
| -1.0- | | | | | |
| -2.0- | | | | | |
| -3.0-1 | · · · · | 100 |).0 | 1000.0 | 2000.0 |
| HZ | | Data | a Points | | |
| Frequency (Hz) | Dev. (%) | Frequency (Hz |) Dev. (%) | | |
| 10.0 | 1.7 | 300.0 | -0.9 | | |
| 15.0 | 1.4 | 500.0 | -1.3 | | |
| 30.0 | 0.9 | 1000.0 | -1.3 | | |
| 50.0 | 0.6 | 2000.0 | 0.5 | | |
| REF. FREQ. | 0.0 | | | | |
| Mounting Surface: Stainless Steel w/S | ilicone Grease Coating Fastener; | Stud Mount | Fixture Orientation: Vertical | с | |
| Acceleration Level (rms)': 'The acceleration level may be limited b | 1.00 g (9.81 m/s ²) ² y shaker displacement at low freque | ncies. If the listed level cannot b | be obtained, the calibration system uses the following formula to | set the vibration amplitude; Acceleration | ion Level |
| (g) = 0.010 x (freq). | | Conditi | on of Unit | s, 1 g = 9.00003 m/s ⁻ . | |
| As Found: <u>n/a</u> | | | | | |
| As Left: <u>New Ur</u> | nit, In Tolerance | | | | |
| Calibration is N This certificate s Calibration is pe See Manufacture Measurement ur are as follows: 5-9 F | IIST Traceable thru shall not be reprodu rformed in complia er's Specification SI ccertainty (95% con Iz; +/- 2.0%, 10-99 | A Project 681/280 ced, except in ful nce with ISO 900 neet for a detailed fidence level with PHz; +/- 1.5%, 10 | Notes 472 and PTB Traceable thru Proj I, without written approval from P 11, ISO 10012-1, ANSI/NCSL Z54 listing of performance specificati 1 coverage factor of 2) for frequen 00-1999 Hz; +/- 1.0%, 2-10 kHz; | ect 10065. PCB Piezotronics, Inc 40-1-1994 and ISO 17 ons. cy ranges tested durin +/- 2.5%. | 7025. ng calibratio |
| Technician: | Scott | Skibniewski | Date: | 01/22/13 | |
| | | PCB P | IEZOTRONICS | | |
| | Не | adquarters: 3425 Wa | Iden Avenue, Depew, NY 14043 | | |
| LIBRATION CERT #1862.02 | Calibra | tion Performed at: 108 | 869 Highway 903, Halifax, NC 27839 | | |

| Malax | Cu | ioru | ion Ceruj | Per ISO 160 | 63-21 | |
|---|---|--|---|--|--|--------------------|
| Model Number: | 393/ | 403 | | | | |
| Serial Number: | 371 | 89 | | | | |
| Description: | ICP® Acceleror | neter | Method: | Back-to-Bac | k Comparie | n (AT401.2) |
| Manufacturer: | PCB | | | Buck-to-Dac | k compariso | 511 (A1401-5) |
| | | | | | | |
| S. 111 11 C 100 0 | | Ca | libration Data | | | |
| Sensitivity @ 100.0 Hz | 1010 | mV/g | Output Bias | | 11.0 | VDC |
| | (103.0 | $mV/m/s^2$) | Transverse Sen | sitivity | 5.0 | % |
| Discharge Time Constant | 1.1 | seconds | Resonant Frequ | uency | 10.4 | kHz |
| | | | | | | |
| 75 | | S | ensitivity Plot | | | |
| 3.0- | iperature: 73 °F (23 | °C) | Re | elative Humidity: 4 | 15 % | |
| 2.0- | | | | | | |
| 1.0- | e. | | | | | |
| dB 0.0- | | | | | | |
| -2.0- | | | | | | |
| -3.0- | | | | | | |
| 10.0 Hz | | 1 1 1 | 100.0 | | 1000.0 | 2000.0 |
| | | 1 | Data Points | | | |
| Frequency (Hz) | Dev. (%) | Frequency | (Hz) Dev. (%) | | | |
| 10.0 | 1.4 | 300.0 | -1.0 | | | |
| 15.0 | 1.0 | 500.0 | -1.2 | | | |
| 30.0 | 0.6 | 1000.0 | -1.1 | | | |
| 50.0 | 0.3 | 2000.0 | 1.8 | | | |
| REF. FREQ. | 0.0 | | | | | |
| Mounting Surface: Stainless Steel w/Silicone Acceleration Level (rms)': 1.00 g (| Grease Coating Fastener: St 9.81 m/s ²) ² | tud Mount | Fixture | Orientation: Vertical | | |
| ¹ The acceleration level may be limited by shaker (g) = 0.010 x (freq) ² . | displacement at low frequencie | es. If the listed level c. The grav | innot be obtained, the calibration system uses th tational constant used for calculations by the | e following formula to set the calibration system is; 1 g | vibration amplitude; = 9,80665 m/s ² | Acceleration Level |
| As Ferry 1 | | Con | lition of Unit | | | |
| As Left: New Unit I | n Tolaranaa | | | | | |
| | in Tolerance | | Notas | | | |
| 1. Calibration is NIST | Traceable thru F | roject 681/ | 280472 and PTB Traceah | la then Designat | 10075 | |
| 2. This certificate shall | not be reproduce | d, except in | full, without written appr | oval from PCB | Piezotronics | . Inc. |
| Calibration is perform See Manufacturer's S | ned in compliand | e with ISO | 2001, ISO 10012-1, ANSI | I/NCSL Z540-1- | 1994 and IS | 0 17025. |
| 5. Measurement uncerta | inty (95% confic | lence level v | with coverage factor of 2) | specifications. | anges tested | during calibratic |
| 0.11 | /- 2.0%, 10-99 H | Iz; +/- 1.5% | , 100-1999 Hz; +/- 1.0%, | , 2-10 kHz; +/- : | 2.5%. | during canoratio |
| are as follows: 5-9 Hz; + | Scott S | kibniewski | | Date: | 01/23/13 | |
| are as follows: 5-9 Hz; + Technician: | | n/ | | | 01120/10 | |
| are as follows: 5-9 Hz; + | 4 | ™PCB | PIEZUI RUINIL S | | | |
| are as follows: 5-9 Hz; + Technician: | Headd | Uarters: 3425 | VIBRATION DIVISION | 1043 | | |

| | ~ | Calibration C | ertificate ~ | | |
|---|---|---|---|--|---|
| Model Number: | 5 | 699A02 | Custo | omer: | |
| Serial Number: | | 989 | | - | |
| Description: | Porta | ble Handheld Shaker | P.O. | | |
| Manufacturer: ICS-12 | - | IMI | Meth | od : Back-to-Ba | ck Comparison (AT70 |
| | | Calibration | Data | | |
| Operating Frequency: | 160.6 | Hz. | Test Point Ve | oltage: 100.4 | mVAC |
| Acceleration Level: | 1.00 | g's rms | | | |
| | 9.826 | m/s ² | | | |
| Temperature: | 69 | °F (21 °C) | Relative Hur | nidity: 49 | % |
| As Left: In Tolerance | ceable thru Proje e reproduced, ex | e Malfunctioning ir Notes ect 822/267400 and PTB Tr cept in full, without written th ISO 9001_ISO 10012-1 | aceable thru Project 10 approval from PCB Pi ANSINCSI 7540-11 | 955. ezotronics, Inc. 994 and ISO 17025 | |
| As Left: In Tolerance Calibration is N.I.S.T. Trac Calibration is performed in See Manufacturer's Specif Measurement uncertainty (| ceable thru Proje e reproduced, ex n compliance wi fication Sheet for (95% confidence | e Malfunctioning ir Notes ect 822/267400 and PTB Tr iccept in full, without written th ISO 9001, ISO 10012-1, , r a detailed listing of perform e level with coverage factor of | aceable thru Project 10 approval from PCB Pi ANSI/NCSL Z540-1-1 nance specifications. of 2) for reference freq | 955. ezotronics, Inc. 994 and ISO 17025 uency is +/-1.6%. | |
| As Left: In Tolerance Calibration is N.I.S.T. Trad Calibration is performed in See Manufacturer's Specif Measurement uncertainty (| ceable thru Proja ceable thru Proja e reproduced, ex n compliance wi fication Sheet for (95% confidence | re Malfunctioning ir Notes ect 822/267400 and PTB Tr tecept in full, without written th ISO 9001, ISO 10012-1, J r a detailed listing of perform e level with coverage factor of Equipment Used Fo | aceable thru Project 10 approval from PCB Pi ANSI/NCSL Z540-1-1 nance specifications. of 2) for reference freq r Calibration | 955. ezotronics, Inc. 994 and ISO 17025 uency is +/-1.6%. | |
| As Left: In Tolerance Calibration is N.I.S.T. Trad Calibration is performed in See Manufacturer's Specif Measurement uncertainty (Manufacturer National Instruments | ceable thru Proje ceable thru Proje e reproduced, ex n compliance wi fication Sheet for (95% confidence Descriptio Acquistion | re Malfunctioning ir Notes ect 822/267400 and PTB Tr acept in full, without written th ISO 9001, ISO 10012-1, <i>J</i> r a detailed listing of perform e level with coverage factor of Equipment Used Fo on Model# Brd PCI-6052 | aceable thru Project 10 approval from PCB Pi ANSI/NCSL Z540-1-1 nance specifications. of 2) for reference freq r Calibration Serial No. E 1125572 | 055. ezotronics, Inc. 994 and ISO 17025 uency is +/-1.6%. Cal Date 2/5/2012 | |
| As Left: In Tolerance As Left: In Tolerance Calibration is N.I.S.T. Transition Calibration is performed in See Manufacturer's Specific Measurement uncertainty (Manufacturer National Instruments PCB Piezotronics PCB Piezotronics | ceable thru Proje ceable thru Proje e reproduced, ex n compliance wi fication Sheet for (95% confidence Descriptio Acquistion Accelerome Power Sup | re Malfunctioning ir Notes ect 822/267400 and PTB Tr iccept in full, without written th ISO 9001, ISO 10012-1, , r a detailed listing of perform e level with coverage factor of Equipment Used Fo on Model# Brd PCI-6052 eter Y353B34 iply 480C02 | aceable thru Project 10 approval from PCB Pi ANSI/NCSL Z540-1-1 nance specifications. of 2) for reference freq r Calibration Serial No. E 1125572 93740 CA360 | 055. ezotronics, Inc. 994 and ISO 17025 uency is +/-1.6%. Cal Date 2/5/2012 4/16/2012 2/2/2012 | Due Date 2/5/2013 4/16/2013 2/2/2013 |
| As Left: In Tolerance As Left: In Tolerance Calibration is N.I.S.T. Trade Calibration is performed in See Manufacturer's Specif Manufacturer Manufacturer National Instruments PCB Piezotronics PCB Piezotronics Technician: | ceable thru Proje e reproduced, ex n compliance wi fication Sheet for (95% confidence Descriptio Acquistion Accelerome Power Sup | re Malfunctioning re Malfunctioning r Notes ect 822/267400 and PTB Tr tcept in full, without written th ISO 9001, ISO 10012-1, , r a detailed listing of perform e level with coverage factor of Equipment Used Fo on Model# Brd PCI-6052 eter Y353B34 480C02 s L. L. | aceable thru Project 10 approval from PCB Pi ANSI/NCSL Z540-1-1 nance specifications. of 2) for reference freq r Calibration Serial No. E 1125572 93740 CA360 | D55. 220tronics, Inc. 994 and ISO 17025 uency is +/-1.6%. Cal Date 2/5/2012 4/16/2012 2/2/2012 Date: <u>11/22/12</u> | Due Date 2/5/2013 4/16/2013 2/2/2013 |
| As Left: In Tolerance As Left: In Tolerance Calibration is N.I.S.T. Trade Calibration is performed in See Manufacturer's Specif Manufacturer (Manufacturer National Instruments PCB Piezotronics PCB Piezotronics Technician: | ceable thru Proje e reproduced, ex n compliance wi fication Sheet for (95% confidence Descriptio Acquistion Accelerome Power Sup | re Malfunctioning re Malfunctioning r Notes ect 822/267400 and PTB Tr tccept in full, without written th ISO 9001, ISO 10012-1, . r a detailed listing of perform e level with coverage factor of Equipment Used Fo on Model# Brd PCI-6052 eter Y353B34 480C02 s <u>L. L.</u> | aceable thru Project 10 approval from PCB Pi ANSI/NCSL Z540-1-1 nance specifications. of 2) for reference freq r Calibration Serial No. E 1125572 93740 CA360 Due | 255. 220tronics, Inc. 994 and ISO 17025 uency is +/-1.6%. Cal Date 2/5/2012 4/16/2012 2/2/2012 Date: Date: | Due Date 2/5/2013 2/2/2013 2/2/2013 |
| As Left: In Tolerance As Left: In Tolerance Calibration is N.I.S.T. Transition of the set of the | ceable thru Proje e reproduced, ex n compliance wi fication Sheet for (95% confidence Descriptio Acquistion Accelerome Power Sup | re Malfunctioning re Malfunctioning r Notes ect 822/267400 and PTB Tr tcept in full, without written th ISO 9001, ISO 10012-1, , r a detailed listing of perform e level with coverage factor of Equipment Used Fo on Model# Brd PCI-6052 eter Y353B34 480C02 s S ABCB PIEZOTROM 3425 Walden A | aceable thru Project 10 approval from PCB Pi ANSI/NCSL Z540-1-1 nance specifications. of 2) for reference freq r Calibration Serial No. E 1125572 93740 CA360 CA360 | 255. ezotronics, Inc. 994 and ISO 17025 uency is +/-1.6%. Cal Date 2/5/2012 4/16/2012 2/2/2012 Date: Date: | Due Date 2/5/2013 4/16/2013 2/2/2013 |

Calibration Certificates for the Measurement and Test at NSR14 and NSR26



CALIBRATION CERTIFICATE

| cernificate injorma | non | | 방송 정말 이 일당 중 집 같이 가지 않는 | |
|------------------------------|--------------------------|------------------------------|---|--------------------------|
| Date of Issue | 30-Aug-2013 | | Certificate Number | MLCN131110S |
| Customer Informati | ion | | | |
| Company Name | Wilson Accoust | tics Limited | | |
| Address | Unit 601, Block | k A, Shatin Industrial | Centre, | |
| | Shatin N T | cuit, | | |
| | Hong Kong | | | |
| Eauipment-under-T | est (EUT) | | | |
| Description | Sound & Vibra | tion Analyser | | |
| Manufacturer | Svantek | lion r mary our | | |
| Model Number | SVAN 958 | | | |
| Serial Number | 14210 | | | |
| Equipment Number | | | | |
| Calibration Particu | lar | | | |
| Date of Calibration | 30-Aug-2013 | | | |
| Calibration Equipment | 4231(MLTE008 | 8) / DC120076 / 29-M | ar-2014 | |
| | | | | |
| Calibration Procedure | MLCG00, MLC | CG15 | | |
| Calibration Conditions | Laboratory | Temperature | 23 °C + 5 °C | |
| unoration conditions | Eucoratory | Relative Humidity | $55\% \pm 25\%$ | |
| | EUT | Stabilizing Time | Over 3 hours | |
| | | Warm-up Time | 10 minutes | |
| | | Power Supply | Internal battery | |
| Calibration Results | Calibration data | a were detailed in the | continuation pages. | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| Approved By & Date | | | | |
| | | 1 | C KOIA | 20 4110 2012 |
| Statamonto | A DECISION OF THE OWNER. | CONTRACTOR OF THE OWNER | , KOLO | 50-Aug-2013 |
| Calibration equipment use | d for this calibration : | are traceable to national / | nternational standards | |
| The results on this Calibrat | tion Certificate only r | relate to the values measur | ed at the time of the calibration and the u | uncertainties quoted wil |
| not include allowance for t | he EUT long term dri | ift, variation with environ | nental changes, vibration and shock duri | ng transportation, |
| MaxLab Calibration Centr | e Limited shall not be | e liable for any loss or dam | age resulting from the use of the FUT | |
| enter enterenter enterenter | | any root of duit | Be the second and the second and DOT. | |
| The copy of this Certificate | e is owned by MaxLa | b Calibration Centre Limi | ted. No part of this Certificate may be re | eproduced without the |

Page 1 of 2

<mark>萬儀校正中心有限公司</mark> MaxLab Calibration Centre Limited ^{香港新界葵涌華星街 16-18 號保盈工業大廈 9 樓 B2 室}

Unit B2, 9/F., Boldwin Industrial Bldg., 16-18 Wah Sing Street, Kwai Chung, N.T., Hong Kong. Tel: (852) 2116 1380 Fax: (852) 2264 6480 Email: info@maxlab.com.hk



Certificate NoMLCN131110S

| Calibration | Data | | | | | | | | | | |
|-------------------|-------------------|-----|----|-------------|----------|---------------|--------------|---------|----|----------------------|------------|
| Channel / Mode | Filter / Detector | Ran | ge | EU Readi | Г ing | Stand Read | dard ling | EUT Eri | or | Calibrat Uncertai | ion nty |
| CH4 / Sound | A / FAST | 105 | dB | 93.7 | dB | 94.0 | dB | -0.3 | dB | 0.2 | dB |
| | (1 kHz Input) | 130 | dB | 93.7 | dB | 94.0 | dB | -0.3 | dB | 0.2 | dB |
| | | | | 113.8 | dB | 114.0 | dB | -0.2 | dB | 0.2 | dB |
| | C / FAST | 105 | dB | 93.7 | dB | 94.0 | dB | -0.3 | dB | 0.2 | dB |
| | (1 kHz Input) | 130 | dB | 93.7 | dB | 94.0 | dB | -0.3 | dB | 0.2 | dB |
| | | | | 113.8 | dB | 114.0 | dB | -0.2 | dB | 0.2 | dB |
| | LIN / FAST | 105 | dB | 93.7 | dB | 94.0 | dB | -0.3 | dB | 0.2 | dB |
| | (1 kHz Input) | 130 | dB | 93.7 | dB | 94.0 | dB | -0.3 | dB | 0.2 | dB |
| | | | | 113.8 | dB | 114.0 | dB | -0.2 | dB | 0.2 | dB |
| | A / SLOW | 105 | dB | 93.7 | dB | 94.0 | dB | -0.3 | dB | 0.2 | dB |
| | (1 kHz Input) | 130 | dB | 113.8 | dB | 114.0 | dB | -0.2 | dB | 0.2 | dB |
| | C / SLOW | 105 | dB | 93.7 | dB | 94.0 | dB | -0.3 | dB | 0.2 | dB |
| | (1 kHz Input) | 130 | dB | 113.8 | dB | 114.0 | dB | -0.2 | dB | 0.2 | dB |
| | LIN / SLOW | 105 | dB | 93.7 | dB | 94.0 | dB | -0.3 | dB | 0.2 | dB |
| | (1 kHz Input) | 130 | dB | 113.8 | dB | 114.0 | dB | -0.2 | dB | 0.2 | dB |
| | A / IMPULSE | 105 | dB | 93.7 | dB | 94.0 | dB | -0.3 | dB | 0.2 | dB |
| | (1 kHz Input) | 130 | dB | 113.8 | dB | 114.0 | dB | -0.2 | dB | 0.2 | dB |
| | C / IMPULSE | 105 | dB | 93.7 | dB | 94.0 | dB | -0.3 | dB | 0.2 | dB |
| | (1 kHz Input) | 130 | dB | 113.8 | dB | 114.0 | dB | -0.2 | dB | 0.2 | dB |
| | LIN / IMPULSE | 105 | dB | 93.7 | dB | 94.0 | dB | -0.3 | dB | 0.2 | dB |
| | (1 kHz Input) | 130 | dB | 113.8 | dB | 114.0 | dB | -0.2 | dB | 0.2 | dB |

- END -

Calibrated By : Date :

Dan 30-Aug-2013

K.O. Lo 30-Aug-2013 Checked By : Date :

Page 2 of 2



Unit B2, 9/F., Boldwin Industrial Bldg., 16-18 Wah Sing Street, Kwai Chung, N.T., Hong Kong. Tel: (852) 2116 1380 Fax: (852) 2264 6480 Email: info@maxlab.com.hk

| | ~ (| Calibration | Certificate ~ | |
|--|--|---|---|---------------------------------------|
| Model Number: | | 393A03 | Per ISO 16063-21 | |
| Serial Number: | | 41076 | | |
| Description: | ICP® Acc | celerometer | | |
| Manufacturer: | , | РСВ | Method: Back-to-Back Comp | arison AT401-3 |
| | | | Memou | |
| | | Calibration | Data | |
| Sensitiv | vity @ 100 Hz | 1011 mV/g | Output Bias | 11.4 VDC |
| | | (103.1 mV/m/s ²) | Transverse Sensitivity | 2.7 % |
| Discharge 7 | Fime Constant | 1.4 seconds | Resonant Frequency | 12.6 kHz |
| | | | | |
| | | Generaldinite | Dist | |
| | Temperature: 73 °F (| 23 °C) | Relative Humidity: 51 % | |
| 3.0- | | | | |
| 2.0- | | | | |
| dB 1.0- | | | | |
| dB 0.0- | | ~ | | |
| -1.0- | | | | |
| -2.0- | | | | |
| -3.0-1 | Y I | 100.0 | | 1000.0 2000.0 |
| HZ | | Data Poi | nts | |
| Frequency (Hz) | Dev. (%) | Frequency (Hz) | Dev. (%) | |
| 10 | 2.0 | 300 | -0.6 | |
| 15 | 1.6 | 500 | -1.0 | |
| 30 | 1.3 | 1000 | -1.1 | |
| 50 | 0.8 | 2000 | 0.6 | |
| REF. FREQ. | 0.0 | | | |
| Mounting Surface: Stainless: Acceleration Level (pk)': 1.0 'The acceleration level may (g) = $0.008 \text{ x} (\text{freq})^2$. ² The g | iteel w/Silicone Grease Fastener: 1 0 g (9.81 m/s ²) be limited by shaker displacement ravitational constant used for calcula | 4-28 Female Fixture Orientation: Vertical at low frequencies. If the listed level cannot be obtaine ions by the calibration system is: $1 g = 9.80665$ m/s ² . Condition o | d, the calibration system uses the following formula to set the vibration $fUnit$ | amplitude; Acceleration Level |
| As Found: <u>n</u> | a Jew Unit In Toler | ance | | |
| As Lett. I | iew onn, in 10101 | Notes | | |
| Calibration This certifica Calibration i See Manufac Measuremen are as follows: | is NIST Traceable ate shall not be rep s performed in con turer's Specification t uncertainty (95% 5-9 Hz; +/- 2.0%, | thru Project 683/283498 and roduced, except in full, withou ppliance with ISO 9001, ISO on Sheet for a detailed listing of confidence level with coverage 10-99 Hz; +/- 1.5%, 100-199 | PTB Traceable thru Project 10065. ut written approval from PCB Piezotro 10012-1, ANSI Z540.3 and ISO 17025 of performance specifications. ge factor of 2) for frequency ranges te 99 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%. | nics, Inc. sted during calibration |
| Technician: | | Robert Zsebehazy RT | Date: | 5/28/2014 |
| | | SPCB PIEZO | TRONICS | |
| | | Headquarters: 3425 Walden Av | enue Denew NY 14043 | |
| ACCREDITED | 12 (| VIBRA Headquarters: 3425 Walden Av Calibration Performed at: 10869 Higl | enue, Depew, NY 14043 hway 903, Halifax, NC 27839 | |

| Model Number: | ~ Calibration Certificate ~ | |
|---|--|------|
| Serial Number: | Model Number: 393A03 | |
| $\frac{ }{ $ | Serial Number: 41076 | |
| letering the second s | Description: ICP® Accelerometer | |
| $ \begin{array}{c c c c c c c c c c c c c c c c c c c $ | Manifesturary DCD | |
| <section-header><section-header><section-header><form> Calibration Data Sensitivity @ 101 RW (13.11 RV)R (13.11 RV)R (13.11 RV)R Calibrative Particular Security Particular Particular</form></section-header></section-header></section-header> | Manufacturer: PCB Method: Back-to-Back Comparison A1401-12 | |
| <form> Bensitivity @ 100 Hz 101 m V(n) (103.1 mV/m/s)</form> | Calibration Data | |
| <text><form></form></text> | Sensitivity @ 100 Hz 1011 mV/g | |
| <text><form></form></text> | (103.1 mV/m/s^2) | |
| <section-header><form></form></section-header> | | |
| <section-header> Sensitivity Participation Relative Humidity: 4.9.4 abs abs abs abs abs abs abs abs abs abs abs bbs bbs bbs bbs bbs <td< td=""><td></td></td<></section-header> | | |
| Substituting Plot Temperature: 72 °F (22 °C) Relative Humidity: 49 % A Provide Plot B Operation of the plot of the p | | |
| All productions 1/2 F (1/2 G) Relative Humidaly: 4979 All productions 1/2 F (1/2 G) Relative Humidaly: 4979 All productions Dev. (%) Dev. (%) All productions Dev. (%) Frequency (Hz) Dev. (%) 0.5 0.7 7 2.0 0.7 2.0 10 1.8 1 2.6 3 2.5 5 2.2 2.5 5 5 2.2 Dev. (%) Requires instance | Sensitivity Plot | |
| ab ab <td< td=""><td>3.0</td></td<> | 3.0 | |
| dB 0 0 0 0 Hz Data Points Frequency (Hz) Dev. (%) Frequency (Hz) Dev. (%) 0.7 2.0 10 1.8 1 2.6 3 2.5 5 2.2 0 10 1.8 1 2.6 3 2.5 5 2.2 Solution to the state of the fill of 100 Million 0 1.8 1.8 1.8 1 2.6 3 2.5 5 2.2 The 2.0 Million of the maximum of the state of the s | 2.0- | |
| CD 0.0 4.2 Data Points Frequency (Hz) Dev. (%) 0.5 0.7 0.7 2.0 0.7 2.0 1 2.6 3 2.5 5 2.2 Montring function shared with the operations. Function 1.8 1 2.6 3 2.5 5 2.2 Montring function. Standard label with the operation of the finance function of the operation operation of the operation operation operation op | 1.0- dB | |
| Hz Data Points Frequency (Hz) Dev. (%) Frequency (Hz) Dev. (%) 0.5 0.7 7 2.0 0.7 2.0 10 1.8 1 2.6 3 2.5 5 2.2 2.5 5 2.2 Maxing bulker, bladets biod wildbace Onese Fasteer 14-38 freesh Fister Orientace. Vincel Notesh States St | dB 0.0- | |
| Hz Data Points Frequency (Hz) Dev. (%) Frequency (Hz) Dev. (%) 0.5 0.7 7 2.0 0.7 2.0 10 1.8 1 2.6 3 2.5 5 2.2 2.2 Mounds Suffice States biel visitizes Grass Finance File File File File File File File Fil | -1.0- | |
| Hz Data Points Frequency (Hz) Dev. (%) 0.5 0.7 7 2.0 0.7 2.0 10 1.8 1 2.6 3 2.5 5 2.2 2.2 Moming function for the binary binary distance of the state of the sta | -2.0 | |
| Data Points Frequency (Hz) Dev. (%) Frequency (Hz) Dev. (%) 0.5 0.7 7 2.0 0.7 2.0 10 1.8 1 2.6 3 2.5 5 2.2 2.2 Monthing Suffers States States Tables These Partner 10-38 Female Feature Obstations: Vental Accelerations from the binned by shater displacement at law frequencies. If the indel eter cambe to etail the additionable by etailer displacement at law frequencies. If the indel eter cambe to etail the additionable of the additionable by etailer displacement at law frequencies. If the indel eter cambe to etail the additionable of the additin (1 to Opence) | 0.5 1.0 10.0 | |
| Frequency (Hz) Dev. (%) Frequency (Hz) Dev. (%) 0.5 0.7 7 2.0 0.7 2.0 10 1.8 1 2.6 3 2.5 5 2.2 5 2.2 Monthly State: State Stat | Data Points | |
| 0.5 0.7 2.0 10 1.8 1 2.6 3 2.5 5 2.2 Meaning Suffice: Statules: State Vi-Vi-28 Female: Foture Orientation: Vertical Acceleration Level (g): 1.05 (g): 81 m/9) The acceleration level of g): Marker displacement at low frequencies. If the Intel Vertication extension is used to acceleration to set the vibration amplitude: Acceleration Level (g): 0.07 (g): 0. | Frequency (Hz) Dev. (%) Frequency (Hz) Dev. (%) | |
| 0.7 2.0 10 1.3 1 2.6 3 2.5 5 2.2 Meaning function Sized to Globare function: 1/4-38 Female Fixture Orientation: Vertical Academistica Level (gr. 1.09 (gr. 81) mov) "The academistication of the displacement at two frequencies. If the listed tool cannot be obtained, the calibration system uses the following formula to set the vibration amplitude: Acceleration Level (gr. 0.307 v(freq). The gravitational constant used for calculations by the calibration system is: 1gr = 9.80648 moV. Condition of Unit As Left: New Unit, In Tolerance Notes 1. Calibration is traceable to one or more of the following: PTB 100665, PTB 100666 and NIST 683/283498. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI Z540.3 and ISO 17025. S. Due to state of art limitations, the test uncertainty ratio is 3:1. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 0.5-0.09 Hz; +/- 1.8%, 1-30 Hz; +/- 1.0%, 30.01-199 Hz; +/- 1.5%, 200-1 kHz; +/- 3.0%. Technician: Robert Zsebehazy Reference INSERTION CERT with the adquarters 3425 Walden Avenue, Depew, NY 14043. Constructions Construction of Profese 108 Pielos Pie | 0.5 		 0.7 		 7 		 2.0 		 10 		 18 | |
| 1 2.0 3 2.5 5 2.2 Meeting Surface States Seed w5/discon Greame Fasteer: 1/2-39 Female Festuer Overstate Colspan="2">Colspan="2" Colspan="2" Colspan="2" Colspan="2" Colspan="2" Colspan="2" <td co<="" td=""><td>1 26</td></td> | <td>1 26</td> | 1 26 |
| 5 2.2 Moning Surface Statesting Scales and Scales and Scales and Scales Scales and Scales S | 3 2.5 | |
| Meaning Surface Statese Statese Visitione Grease Fattere: 14-28 Female Future Orientation : Ventual Codemain Level (gh): 100 (g 081 m3) The acceleration level may be initialed by shader displacement at low frequencies. If the listed level cannot be obtained, the calibration system uses the following formula to set the vibration amplitude; Acceleration Level (g 0.207 x (freq)) Image: State of a calculations by the calibration system is: $ _g = 0.8066 ms^2$. Image: State of a calculations by the calibration system is: $ _g = 0.8066 ms^2$. Image: State of a calculation is traceable to one or more of the following; PTB 10065, PTB 100666 and NIST 683/283498. Image: State of a calculation is traceable to one or more of the following; PTB 10065, PTB 100666 and NIST 683/283498. Image: State of a calculation is traceable to one or more of the following of performance specifications. Image: State of a calculation is performed in compliance with ISO 9001, ISO 10012-1, ANSI 2540.3 and ISO 17025. Image: State of a calculation state calibration system set of calibration are as follows: 0.5-0.99 Hz; +/- 1.8%, 1-30 Hz; +/- 1.0%, 3.0.1-199 Hz; +/- 1.5%, 200-1 kHz; +/- 3.0%. Technician: Robert Zsebehazy Image: Rest of calibration Performed are 10809 Highway 903, Halfar, NC27835 Image: Rest of calibration Performed are 10809 Highway 903, Halfar, NC27835 Image: Rest of calibration set calibration set set of calibration performed are 10809 Highway 903, Halfar, NC27835 | 5 2.2 | |
| Mouring Surface: Standard: Standard Under Contraction: Vertical Acceleration Level (g/k): 1.00 g (VR1 m/M) "The acceleration Level (g/k): 1.00 g (VR1 m/M) "The acceleration Level (g/k): 1.00 g (VR1 m/M) (g = 2.37 x (freq): "The gravitational constant used for calculations by the calibration system is: 1g = 9.8866 m/M. Condition of Units As Level: Note: As Level: Note: 1. Calibration is traceable to one or more of the following; PTB 10065, PTB 10066 and NIST 683/283498. 2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. 3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI Z540.3 and ISO 17025. 4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. 5. Due to state of art limitations, the test uncertainty ratio is 3:1. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 0.5-0.99 Hz; +/- 1.8%, 1-30 Hz; +/- 1.0%, 30.01-199 Hz; +/- 1.5%, 200-1 kHz; +/- 3.0%. Technician: Robert Zsebehazy MEACOMENTION DEVISION Calibration CERF refere. Signaturers: 3425 Walden Avenue, Depew, NY 14043 Calibration Performater at 10869 Highway 903, Halifax, NC 27835 Reta dor Rets 64-001 Rets 73-68-3-388 | | |
| The acceleration level may be binning by shaked displacement at low frequencies. If the listed level cannot be obtained most main is the set when the vibration amplitude; Acceleration Level (g) = 0.207 x (freq) ² . The gavitational costant used for calculations by the calibration system is, the g = 0.8006 m/s ² . Condition of Unit As Left: New Unit, In Tolerance Notes 1. Calibration is traceable to one or more of the following; PTB 10065, PTB 10066 and NIST 683/283498. . 2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. . 3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI Z540.3 and ISO 17025. . 4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. . 5. Due to state of art limitations, the test uncertainty ratio is 3:1. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 0.5-0.99 Hz; +/- 1.8%, 1-30 Hz; +/- 1.0%, 30.01-199 Hz; +/- 1.5%, 200-1 kHz; +/- 3.0%. Technician: Robert Zsebehazy Date: 5/28/2014 Distribution Distribution State Acceleration CENT endition of the State | Mounting Surface: Stainless Steel w/Silicone Grease Fastener: 1/4-28 Female Fixture Orientation: Vertical Acceleration Level (pk): 1.00 g (0.81 m/s) | |
| Condition of Unit As Found: n/a As Left: New Unit, In Tolerance Notes 1. Calibration is traceable to one or more of the following; PTB 10065, PTB 10066 and NIST 683/283498. 2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. 3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI Z540.3 and ISO 17025. 4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. 5. Due to state of art limitations, the test uncertainty ratio is 3:1. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 0.5-0.99 Hz; +/- 1.8%, 1-30 Hz; +/- 1.0%, 30.01-199 Hz; +/- 1.5%, 200-1 kHz; +/- 3.0%. Technician: Robert Zsebehazy Robert Zsebehazy Nie Matquarter: 3425 Walden Avenue, Depew, NY 14043 Calibration Performed at 10869 Highway 903, Halfax, NC 27839 TEL: 888-684-0013 FAX: 716-685-3886 www.epcb.com CAL57-3484176158.372+0 | ¹ The acceleration level may be limited by shaker displacement at low frequencies. If the listed level cannot be obtained, the calibration system uses the following formula to set the vibration amplitude; Acceleration Level (g) = 0.207 x (freq) ² The gravitational constant used for calculations by the calibration system is, 1 g = 9.80665 m/s ² . | |
| As Left: New Unit, In Tolerance Notes As Left: New Unit, In Tolerance Notes Calibration is traceable to one or more of the following; PTB 10065, PTB 10066 and NIST 683/283498. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI Z540.3 and ISO 17025. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. Due to state of art limitations, the test uncertainty ratio is 3:1. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 0.5-0.99 Hz; +/- 1.8%, 1-30 Hz; +/- 1.0%, 30.01-199 Hz; +/- 1.5%, 200-1 kHz; +/- 3.0%. Technician: Robert Zsebehazy R.Z. Date: 5/28/2014 | As Found: n/a | |
| Notes 1. Calibration is traceable to one or more of the following; PTB 10065, PTB 10066 and NIST 683/283498. 2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. 3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI Z540.3 and ISO 17025. 4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. 5. Due to state of art limitations, the test uncertainty ratio is 3:1. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 0.5-0.99 Hz; +/- 1.8%, 1-30 Hz; +/- 1.0%, 30.01-199 Hz; +/- 1.5%, 200-1 kHz; +/- 3.0%. Technician: Robert Zsebehazy MERATION CERT #1862.02 Nebert Zsebehazy PAGE 2 of 3 TEL: 888-684-0013 VEX. FAX: 716-685-3886 VEX. Calibration Performed at 10809 Highway 903, Halifax, NC 27839 TEL: 888-684-0013 FAX: 716-685-3886 VEX.4 Calibration Performed at 10809 Highway 903, Halifax, NC 27839 TEL: 888-684-0013 FAX: 716-685-3886 VEX.4 Calibration Performed at 10809 Highway 903, Halifax, NC 27839 TEL: 888-684-0013 FAX: 716-685-3886 | As Left: New Unit, In Tolerance | |
| Calibration is traceable to one or more of the following; PTB 10065, PTB 10066 and NIST 683/283498. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI Z540.3 and ISO 17025. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. Due to state of art limitations, the test uncertainty ratio is 3:1. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 0.5-0.99 Hz; +/- 1.8%, 1-30 Hz; +/- 1.0%, 30.01-199 Hz; +/- 1.5%, 200-1 kHz; +/- 3.0%. Technician: Robert Zsebehazy R.Z. Date: 5/28/2014 | Notes | |
| 3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI Z540.3 and ISO 17025. 4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. 5. Due to state of art limitations, the test uncertainty ratio is 3:1. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 0.5-0.99 Hz; +/- 1.8%, 1-30 Hz; +/- 1.0%, 30.01-199 Hz; +/- 1.5%, 200-1 kHz; +/- 3.0%. Technician: Robert Zsebehazy R.Z. Date: 5/28/2014 WERATION DIVISION Headquarters: 3425 Walden Avenue, Depew, NY 14043 Calibration Performed at: 10869 Highway 903, Halifax, NC 27839 TEL: 888-684-0013 FAX: 716-685-3886 www.pcb.com CAL57-3484176158.372+0 | 1. Calibration is traceable to one or more of the following; PTB 10065, PTB 10066 and NIST 683/283498. | |
| 4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. 5. Due to state of art limitations, the test uncertainty ratio is 3:1. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 0.5-0.99 Hz; +/- 1.8%, 1-30 Hz; +/- 1.0%, 30.01-199 Hz; +/- 1.5%, 200-1 kHz; +/- 3.0%. Technician: Robert Zsebehazy R.Z. Date: 5/28/2014 MERATION DVISION Headquarters: 3425 Walden Avenue, Depew, NY 14043 Calibration Performed at 10869 Highway 903, Halifax, NC 27839 TEL: 888-684-0013 FAX: 716-685-3886 www.pcb.com CALS7-3484176158.372+0 | 3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI Z540.3 and ISO 17025. | |
| S. Due to state of an initiations, the test uncertainty ratio is 5.1. Measurement uncertainty (55% communicate fever with coverage factor of 2) for frequency ranges tested during calibration are as follows: 0.5-0.99 Hz; +/- 1.8%, 1-30 Hz; +/- 1.0%, 30.01-199 Hz; +/- 1.5%, 200-1 kHz; +/- 3.0%. Technician: Robert Zsebehazy R.Z. Date: 5/28/2014 Image: Calibration CERT #1862.02 Robert Zsebehazy Date: 5/28/2014 PAGE 2 of 3 TEL: 888-684-0013 FAX: 716-685-3886 www.pcb.com Calibration Unit unit unit unit unit unit unit unit u | 4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications. | |
| 30.01-199 Hz; +/- 1.5%, 200-1 kHz; +/- 3.0%. Technician: Robert Zsebehazy Robert Zsebehazy R.Z. Date: 5/28/2014 Discretering Signation Division Headquarters: 3425 Walden Avenue, Depew, NY 14043 Calibration Performed at: 10869 Highway 903, Halifax, NC 27839 TEL: 888-684-0013 FAX: 716-685-3886 WWW.pcb.com Calibration Division Performed at: | coverage factor of 2) for frequency ranges tested during calibration are as follows: 0.5-0.99 Hz; +/- 1.8%, 1-30 Hz; +/- 1.0%, | |
| Technician: Robert Zsebehazy K. Date: 5/28/2014 Disparion Division CALIBRATION CERT #1862.02 Disparion Division Headquarters: 3425 Walden Avenue, Depew, NY 14043 Calibration Performed at: 10869 Highway 903, Halifax, NC 27839 TEL: 888-684-0013 FAX: 716-685-3886 www.pcb.com CAL57-3484176158.372+0 | 30.01-199 Hz; +/- 1.5%, 200-1 kHz; +/- 3.0%. | |
| Image: Constraint of the second se | Technician: Robert Zsebehazy K. Date: 5/28/2014 | |
| VIBRATION DIVISION ACCREDITED Headquarters: 3425 Walden Avenue, Depew, NY 14043 CALIBRATION CERT #1862.02 Calibration Performed at: 10869 Highway 903, Halifax, NC 27839 PAGE 2 of 3 TEL: 888-684-0013 · FAX: 716-685-3886 · www.pcb.com CAL57-3484176158.372+0 | PCB PIEZOTRONICS | |
| CALIBRATION CERT #1862.02 Calibration Performed at: 10869 Highway 903, Halifax, NC 27839 PAGE 2 of 3 TEL: 888-684-0013 FAX: 716-685-3886 www.pcb.com CAL57-3484176158.372+0 ACS-4 IM INF UND | VIBRATION DIVISION Headquarters: 3425 Walden Avenue, Depew, NY 14043 | |
| PAGE 2 01 3 CCAL/754641/01/8.3/2/0 | CALIBRATION CERT #1862.02 CALIBRATION CERT #1862.02 TEL: 888-684-0013 FAX: 716-685-3886 www.pcb.com | |
| | PAUE 2 01 3 CAE/7/94941/01363 | |

| | ~ (| Calibration | Certifica | ite ~ | |
|--|---|--|--|---------------------------------------|-------------------------------|
| Model Number | n | 393A03 | - | Per ISO 16063-21 | |
| Serial Number: | : | 41076 | | | |
| Description: | ICP® Acc | elerometer | | | |
| Manufacturer: | I | PCB | Method: Ba | ck-to-Back Compa | rison AT401-3 |
| Manufacturer. | 1 | | | ek to Buck compu | |
| | | Calibration | Data | | |
| Sensi | tivity @ 100 Hz | 1011 mV/g | | Output Bias | 11.4 VDC |
| | | (103.1 mV/m/s ²) | Transver | se Sensitivity | 2.7 % |
| Discharg | e Time Constant | 1.4 seconds | Resona | nt Frequency | 12.6 kHz |
| | | | | | |
| | | | | | |
| | | Sensitivity | Plot | | |
| 3.0- | Temperature: 73 °F (| 23 °C) | Relativ | e Humidity: 51 % | |
| 2.0- | | | | | |
| 1.0- | | | | | |
| dB 0.0- | and the street of the point of the second | | | | |
| -1.0- | | | | | |
| -2.0- | | | | | |
| -3.0-\ 10.0 | · · · · · | 100.0 | | | 1000.0 2000.0 |
| Hz | | Data Po | ints | | |
| Frequency (H | (%) Dev. (%) | Frequency (Hz) | Dev. (%) | | |
| 10 | 2.0 | 300 | -0.6 | | |
| 15 | 1.6 | 500 | -1.0 | | |
| 50 | 0.8 | 2000 | 0.6 | | |
| REF FREC | 0.0 | 2000 | 0.0 | | |
| KEI. I KEQ | | | | | |
| Mounting Surface: Stainl | ess Steel w/Silicone Grease Fastener: 1 | 4-28 Female Fixture Orientation: Vertical | | | |
| The acceleration level $(gg) = 0.008 \text{ x} (\text{freq})^2$. ² T | may be limited by shaker displacement The gravitational constant used for calculat | at low frequencies. If the listed level cannot be obtain ions by the calibration system is: $1 \text{ g} = 9.80665 \text{ m/s}^2$. | ed, the calibration system uses the foll | owing formula to set the vibration | amplitude; Acceleration Level |
| | 1 | Condition of | of Unit | | |
| As Found: As Left: | <u>n/a</u> New Unit, In Tolera | ance | | | |
| | | Note | 5 | | |
| 1. Calibratio | n is NIST Traceable | thru Project 683/283498 and | d PTB Traceable thr | u Project 10065. from PCB Piezotro | nics, Inc. |
| 3. Calibration | n is performed in com | pliance with ISO 9001, ISO | 10012-1, ANSI Z54 | 0.3 and ISO 17025 | • |
| 4. See Manuf | facturer's Specificatio | n Sheet for a detailed listing | of performance spec | ifications. | sted during calibration |
| Measurem are as follow | ent uncertainty (95%) s: 5-9 Hz; +/- 2.0%, | 10-99 Hz; +/- 1.5%, 100-19 | 1999 Hz; +/- 1.0%, 2- | 10 kHz; +/- 2.5%. | and auting validiation |
| Technician | | Robert Zsebebazy B.7 | 5 | Date: | 5/28/2014 |
| rechnician: | | Robert Zscoenazy | ATDANICE " | | 5/20/2017 |
| 2 D | | PCB PIEZO | JIRUNICS | | |
| ACCREDITED | | Headquarters: 3425 Walden Av | venue, Depew, NY 1404 | 3 | |
| CALIBRATION CERT #180 | 52.02 TE | L: 888-684-0013 · FAX: 716- | 685-3886 · www.j | ocb.com | CAL57-3484165316.396+0 |

| | ~ (| Calibration | Certificate ~ | |
|---|---|---|---|--|
| Model Numbe | r: | 393A03 | Per ISO 16063-21 | |
| Serial Number | | 41074 | | |
| Description: | ICP® Ac | celerometer | | |
| Manufacturer: | | РСВ | Method: Back-to-Back Co | mparison AT401-3 |
| | | | | |
| | | Calibration | Data | |
| Sensi | tivity @ 100 Hz | 997 mV/g | Output Bias | 11.4 VDC |
| | | (101.7 mV/m/s^2) | Transverse Sensitivity | 0.6 % |
| Discharg | e Time Constant | 1.4 seconds | Resonant Frequency | 14.0 kHz |
| | | | | |
| | | Sensitivity | Plot | |
| 3.0- | Temperature: 73 °F | 23 °C) | Relative Humidity: 51 % | |
| 2.0- | | | | |
| 1.0- | | | | |
| dB 0.0- | | × | | |
| -1.0- | | | | |
| -2.0- | | | | |
| -3.0- | 1 1 | 100.0 | · · · · · · · · · | 1000.0 2000.0 |
| Hz | | Data Poi | nts | |
| Frequency (F | (z) Dev. (%) | Frequency (Hz) | Dev. (%) | |
| 10 | 1.7 | 300 | -0.7 | |
| 15 | 1.4 | 500 | -1.1 | |
| 30 | 1.1 | 1000 | -1.2 | |
| 50 | 0.8 | 2000 | 0.0 | |
| REF. FREC | 0.0 | | | |
| Mounting Surface: Stain Acceleration Level (pk) "The acceleration level (g) = 0.008 x (freq) ² . ² | less Steel w/Silicone Grease Fastener: 1.00 g (9.81 m/s ⁹) may be limited by shaker displacemen The gravitational constant used for calcul | 1/4-28 Female Fixture Orientation: Vertical at low frequencies. If the listed level cannot be obtaine usors by the calibration system is; $1 g = 9.80665 \text{ m/s}^3$. Condition o | d, the calibration system uses the following formula to set the vib $fUnit$ | vration amplitude; Acceleration Level |
| As Found: | n/a | | | |
| As Left: | New Unit, In Toler | ance | | |
| Calibratic This certif Calibratio See Manu Measurem are as follow | n is NIST Traceable icate shall not be rep n is performed in cor facturer's Specification ent uncertainty (95% vs: 5-9 Hz; +/- 2.0% | thru Project 683/283498 and roduced, except in full, withou ppliance with ISO 9001, ISO on Sheet for a detailed listing confidence level with covera , 10-99 Hz; +/- 1.5%, 100-19 | PTB Traceable thru Project 1006 at written approval from PCB Pieze 10012-1, ANSI Z540.3 and ISO 17/ of performance specifications. ge factor of 2) for frequency ranges 99 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5 | 5. otronics, Inc. 025. s tested during calibration 5%. |
| Technician: | | Robert Zsebehazy | Date: | 5/28/2014 |
| ACCREDITED CALIBRATION CERT #18 | \$2.02 | Headquarters: 3425 Walden Av Calibration Performed at: 10869 High LL: 888-684-0013 FAX: 716-6 | TION DIVISION enue, Depew, NY 14043 nway 903, Halifax, NC 27839 585-3886 www.pcb.com | CAL57-3484165058.001+ |
| PAUE 1 01 3 | | | | |

| | ~ Calibi | ration | Certificate - | ~ |
|--|---|--|--|--|
| Model Number: | 393A03 | C | Per ISO 160 | 03-21 |
| Serial Number: | 41074 | | | |
| Description: | LCD® Accelerometer | | | |
| Description: | ICP® Accelerometer | | | |
| Manufacturer: | РСВ | | Method: Back-to-Bac | k Comparison AT401-12 |
| | | Calibration | Data | |
| Sensitivit | y @ 100 Hz 997 m | V/g | | |
| | (101.7 m ⁻ | V/m/s ²) | | |
| | | | | |
| | | | | |
| | | | | |
| | | Sensitivity | Plot | |
| 3.0- | emperature: 72 °F (22 °C) | | Relative Humidity: | 50 % |
| 2.0- | | | | |
| 1.0- | | | | |
| dB 0.0- | | | | |
| -1.0- | | | | |
| -2.0- | | | | |
| -3.0- | 1.0 | 1 | 1 1 | 10.0 |
| Hz U.S | 1.0 | | | |
| Frequency (Hz) | Dev (%) = F | Data Pol | nts Dev (%) | |
| 0.5 | 0.7 | 7 | 2.0 | |
| 0.7 | 2.0 | 10 | 1.8 | |
| 1 | 2.6 | | | |
| 3 | 2.6 | | | |
| 5 | 2.3 | | | |
| 5 | 2.5 | | | |
| Mounting Surface: Stainless Steel | w/Silicone Grease Fastener: 1/4-28 Female Fixture Or | ientation: Vertical | | |
| Acceleration Level (pk) ¹ : 1.00 g ('The acceleration level may be li | 9.81 m/s ²) imited by shaker displacement at low frequencies. If the | e listed level cannot be obtaine | ed, the calibration system uses the following formula to s | et the vibration amplitude; Acceleration Level |
| (g) = 0.207 x (freq) ² . ² The gravit | ational constant used for calculations by the calibration syst | Condition 0 | of Unit | |
| As Found: <u>n/a</u> | | | | |
| As Left: <u>Nev</u> | w Unit, In Tolerance | ¥7. | | |
| 1 Colling in the | reasonable to one or many of the | following: DTP | 10065 PTR 10066 and NIST | 683/283498 |
| 2. This certificate | shall not be reproduced. exce | pt in full, witho | ut written approval from PCB | Piezotronics, Inc. |
| 3. Calibration is p | performed in compliance with | ISO 9001, ISO | 10012-1, ANSI Z540.3 and IS | O 17025. |
| 4. See Manufactu | rer's Specification Sheet for a | detailed listing | of performance specifications. | 5% confidence level with |
| 5. Due to state of | art limitations, the test uncert | ainty ratio is 3:1 d during calibra | tion are as follows: 0.5-0.99 F | [z; +/- 1.8%, 1-30 Hz; +/- 1.0%. |
| 30.01-199 Hz; +/ | - 1.5%, 200-1 kHz; +/- 3.0% | | | |
| Technician: | Robert Zse | behazy Riz | - Date: | 5/28/2014 |
| | ∜₽ | CB PIEZO | OTRONICS ** | |
| | Headquarter | VIBRA s: 3425 Walden Av | enue, Depew, NY 14043 | |
| CALIBRATION CERT #1862.02 | Calibration Perfo | rmed at: 10869 High | hway 903, Halifax, NC 27839 | |
| PAGE 2 of 3 | TEL: 888-684-0013 | • FAX: 716-0 | 685-3886 · www.pcb.com | CAL57-3484175623.349+0 |
| ACS-4 | | | | |

| | ~ Calibration Certificate ~ |
|---|--|
| Model Number | r: 393A03 |
| Serial Number | : 41074 |
| Description: | ICP® Accelerometer |
| Manufacturer: | PCB Method: Back-to-Back Comparison AT401-12 |
| 0 | Calibration Data |
| Sensi | itivity @ 100 Hz 997 mV/g (101.7 mV/m/s ²) |
| | |
| | Phase Plot |
| 30.0- | |
| 15.0- | |
| Degrees 0.0- | |
| -15.0- | |
| -30.0- | |
| Hz 0.5 | 1.0 10.0 |
| | Data Points |
| Frequency (F | Hz) Phase (°) 12.5 |
| 0.7 | 9.0 |
| 0.7 | 62 |
| 1 | 0.2 |
| 3 | 1.6 |
| 5 | 0.7 |
| 7 | 0.3 |
| 10 | -0.0 |
| | |
| 1. Calibratio 2. This certif 3. Calibratio 4. See Manu | Notes on is traceable to one or more of the following; PTB 10065, PTB 10066 and NIST 683/283498. ficate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc. on is performed in compliance with ISO 9001, ISO 10012-1, ANSI Z540.3 and ISO 17025. facturer's Specification Sheet for a detailed listing of performance specifications. |
| Technician | Robert Zsebehazy RZ. Date: 5/28/2014 |
| | VIERATION DIVISION Headquarters: 3425 Walden Avenue, Depew, NY 14043 Calibration Performed at: 10869 Highway 903, Halifax, NC 27839 TEL: 888-684-0013 FAX: 716-685-3886 |
| PAGE 3 of 3 | |

| Model Number: | 393A | 03 | Per ISO 16 | 063-21 |
|--|---|---|--|---|
| Serial Number: | 3605 | 22 | | |
| Description: | ICP® Acceleron | notor | Mathada Daala ta Da | al Comparison (AT401.2) |
| Marchattan | ICI & Acceleton | lieter | Method: Back-to-Ba | ick Comparison (A1401-3) |
| | РСВ | | | |
| | | Calibra | ation Data | |
| Sensitivity @ 100.0 Hz | 1008 | mV/g | Output Bias | 11.0 VDC |
| | (102.7 | mV/m/s²) | Transverse Sensitivity | 2.7 % |
| Discharge Time Constant | 1.0 | seconds | Resonant Frequency | 14.3 kHz |
| | | | | |
| | | Sansi | itivity Plat | |
| Ter | nperature: 73 °F (23 | °C) | Relative Humidity: | 45 % |
| 3.0- | | | | |
| 1.0- | | | | |
| dB 0.0- | | | · | |
| -1.0- | | | | |
| -2.0- | | | | |
| -3.0- 10.0 | , | 100 | 0.0 | 1000.0 2000.0 |
| 112 | | Date | a Points | |
| Frequency (Hz) | Dev. (%) | Frequency (Hz | z) Dev. (%) | |
| 10.0 | 2.0 | 300.0 | -0.8 | |
| 15.0 | 1.5 | 500.0 | -1.2 | |
| 50.0 | 1.1 | 2000.0 | -1.5 | |
| REF. FREQ. | 0.0 | 2000.0 | -0.4 | |
| | | - 114 · | | |
| Acceleration Level (rms) ¹ : 1.00 The acceleration level may be limited by sha | g (9.81 m/s ²) ² ker displacement at low freque | Stud Mount ncies. If the listed level cannot | Fixture Orientation: Vertical be obtained, the calibration system uses the following formula to | set the vibration amplitude; Acceleration Level |
| $(g) = 0.010 \text{ x} (\text{freq})^2.$ | | The gravitation | nal constant used for calculations by the calibration system is | , 1 g = 9.80005 m/s*. |
| As Found: <u>n/a</u> | 1 | | | |
| As Left: <u>New Unit</u> , | In Tolerance | 7 | Notas | |
| 1. Calibration is NIS | T Traceable thru | 1 Project 681/280 | 0472 and PTB Traceable thru Proje | ect 10065. |
| 2. This certificate sha | ll not be reprodu | ced, except in ful | II, without written approval from P | CB Piezotronics, Inc. |
| 4. See Manufacturer's | Specification Sh | neet for a detailed | l listing of performance specification | ons. |
| 5. Measurement unce | rtainty (95% con $+/-2.0\%$ 10-90 | fidence level with | h coverage factor of 2) for frequence | y ranges tested during calibrati |
| are as follows. 5-7 112, | 17- 2.070, 10-99 | 112, 11- 1.576, 1 | 00-1555 112, 17- 1.070, 2-10 KH2, | 11/22/12 |
| Technician: | Scott | t Skibniewski | Z Date: | 11/23/13 |
| | | PCB P | VIBRATION DIVISION | |
| | Не | adquarters: 3/25 Wa | Iden Avenue, Denew NY 14043 | |

| | 393A03 | 3 |
|---|---|--|
| Serial Number: | 36082 | |
| Description: | ICP® Acceleromet | |
| Manufacturer: | PCB | Back-to-Back Comparison (A1401-12) |
| | reb | California Data |
| Sensitivity @ 100.0 Hz | z 1008 | mV/g (102.7 mV/m/s ²) Magnitude Plot |
| 3.0- | | 0 |
| 2.0- | | |
| 1.0- | and a second second second second | |
| dB 0.0- | | |
| -1.0- | | |
| -2.0- | | |
| Hz 0.5 | 1.0 | 1/ |
| | | Phase Plot |
| 30.0- | | |
| 20.0- | | |
| 0.0- | | |
| -10.0- | | |
| -20.0- | | |
| -30.0- | | |
| Hz 0.5 | 1.0 | 1 |
| Frequency (Hz) | Deviation (%) | Phase (°) |
| 0.5 | -0.4 | 16.8 |
| 1.0 | 2.6 | 8.4 |
| 2.0 | 3.1 | 3.9 |
| 5.0 | 2.5 | 1.2 |
| 7.0 | 2.3 | 0.8 |
| 10.0 | 2.0 | 0.4 |
| | | |
| | eable to one or more of all not be reproduced, ¢ formed in compliance v | <i>Notes</i> of the following; PTB 10065, PTB 10066 and NIST 681/280472. except in full, without written approval from PCB Piezotronics, Inc. with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025. for a detailed listing of performance specifications. |
| Calibration is trac This certificate sh Calibration is perf See Manufacturer' Measurement unco are as follows: 0.5-0.9 | s Specification Sheet for ertainty (95% confidence 9 Hz; +/- 1.8%, 1-30 I | nce level with coverage factor of 2) for frequency ranges tested during calibra 'Hz; +/- 1.0%, 30.01-199 Hz; +/- 1.5%, 200-1 kHz; +/- 3.0%. |
| Calibration is trac This certificate sh Calibration is perf See Manufacturer' Measurement unco are as follows: 0.5-0.5 Technician: | s Specification Sheet fu ertainty (95% confidence 99 Hz; +/- 1.8%, 1-30 H Scott Sk | nce level with coverage factor of 2) for frequency ranges tested during calibra Hz; +/- 1.0%, 30.01-199 Hz; +/- 1.5%, 200-1 kHz; +/- 3.0%. Skibniewski Date: 11/23/13 |

| Model Number: | | 699A02 | Customer: | |
|---|---|--|--|---|
| Serial Number: | Alter and | 989 | | 114540 |
| Description: | Portab | le Handheld Shaker | | 114542 |
| Manufacturer: ICS-12 | | IMI | Method : | Back-to-Back Comparison (AT701 |
| | | Calibration | n Data | |
| On anoting Englished | 160.6 | u- | Test Point Voltage | 100.4 mVAC |
| Operating Frequency: | 160.6 | ΠΖ. | Test Point voltage | . 100.4 mvAC |
| Acceleration Level: | 1.00 | g's rms | | |
| Temperature | 5.020 | °F (21 °C) | Relative Humidity | · 49 % |
| remperature. | 09 | . (21 0) | Actually and a | |
| Calibration is N.I.S.T. Tra | aceable thru Projecter Projecter Projecter Projecter Produced, exc | Notes ct 822/267400 and PTB 7 ept in full, without writter | Traceable thru Project 1055. n approval from PCB Piezotroi | nics, Inc. |
| Calibration is N.I.S.T. Tra This certificate shall not b Calibration is performed i See Manufacturer's Speci Measurement uncertainty | aceable thru Proje e reproduced, exc n compliance with fication Sheet for (95% confidence | Notes ct 822/267400 and PTB 7 ept in full, without written h ISO 9001, ISO 10012-1 a detailed listing of perfor level with coverage factor | Fraceable thru Project 1055. n approval from PCB Piezotron , ANSI/NCSL Z540-1-1994 ar mance specifications. r of 2) for reference frequency | nics, Inc. nd ISO 17025. is +/-1.6%. |
| Calibration is N.I.S.T. Tra This certificate shall not b Calibration is performed i See Manufacturer's Speci Measurement uncertainty | aceable thru Proje e reproduced, exc n compliance with fication Sheet for (95% confidence | Notes ct 822/267400 and PTB T ept in full, without written h ISO 9001, ISO 10012-1 a detailed listing of perfor level with coverage factor Equipment Used F | Traceable thru Project 1055. n approval from PCB Piezotron , ANSI/NCSL Z540-1-1994 ar mance specifications. r of 2) for reference frequency For Calibration | nics, Inc. nd ISO 17025. is +/-1.6%. |
| Calibration is N.I.S.T. Tra This certificate shall not b Calibration is performed i See Manufacturer's Speci Measurement uncertainty | aceable thru Project e reproduced, exc n compliance with fication Sheet for (95% confidence Description Acquistion E | Notes tt 822/267400 and PTB T rept in full, without written h ISO 9001, ISO 10012-1 a detailed listing of perfor level with coverage factor Equipment Used F h Model# and PCI-605 | Fraceable thru Project 1055. n approval from PCB Piezotron , ANSI/NCSL Z540-1-1994 ar mance specifications. r of 2) for reference frequency For Calibration Serial No. 2E 1125572 | nics, Inc. nd ISO 17025. is +/-1.6%. Cal Date Due Date 2/5/2013 2/5/2014 |
| Calibration is N.I.S.T. Tra This certificate shall not b Calibration is performed i See Manufacturer's Speci Measurement uncertainty Manufacturer National Instruments PCB Piezotronics PCB Piezotronics | aceable thru Project e reproduced, exc n compliance with fication Sheet for (95% confidence Description Acquistion E Accelerome Power Supp | Notes ct 822/267400 and PTB 7 rept in full, without written h ISO 9001, ISO 10012-1 a detailed listing of perfor level with coverage factor Equipment Used F h Model# 3rd PCI-605 ter Y353B3- bly 480C02 | Fraceable thru Project 1055. n approval from PCB Piezotron , ANSI/NCSL Z540-1-1994 ar mance specifications. r of 2) for reference frequency For Calibration Serial No. 2E 1125572 4 93740 CA360 | nics, Inc. nd ISO 17025. is +/-1.6%. <u>Cal Date Due Date</u> <u>2/5/2013 2/5/2014</u> 4/16/2013 4/16/2014 2/2/2013 2/2/2014 |
| Calibration is N.I.S.T. Tra This certificate shall not b Calibration is performed i See Manufacturer's Speci Measurement uncertainty Manufacturer National Instruments PCB Piezotronics PCB Piezotronics Technician: | aceable thru Project e reproduced, exc n compliance with fication Sheet for (95% confidence Description Acquistion E Accelerome Power Supp Luke Rogers | Notes tet 822/267400 and PTB T rept in full, without written h ISO 9001, ISO 10012-1 a detailed listing of perfor level with coverage factor Equipment Used F h Model# 3rd PCI-605 ter Y353B3. hy 480C02 | Fraceable thru Project 1055. n approval from PCB Piezotron , ANSI/NCSL Z540-1-1994 ar mance specifications. r of 2) for reference frequency For Calibration Serial No. 2E 1125572 4 93740 CA360 Date | nics, Inc. nd ISO 17025. is +/-1.6%. <u>Cal Date Due Date</u> <u>2/5/2013 2/5/2014</u> 4/16/2013 4/16/2014 2/2/2013 2/2/2014 : <u>12/21/13</u> |
| Calibration is N.I.S.T. Tra This certificate shall not b Calibration is performed i See Manufacturer's Speci Measurement uncertainty Manufacturer National Instruments PCB Piezotronics PCB Piezotronics Technician: | aceable thru Projec e reproduced, exc n compliance with fication Sheet for (95% confidence Description Acquistion E Accelerome Power Supp Luke Rogers | Notes tt 822/267400 and PTB T rept in full, without written h ISO 9001, ISO 10012-1 a detailed listing of perfor level with coverage factor Equipment Used F <u>Model#</u> Brd PCI-605 ter Y353B3- bly 480C02 L. L. | Fraceable thru Project 1055. n approval from PCB Piezotron , ANSI/NCSL Z540-1-1994 ar mance specifications. r of 2) for reference frequency For Calibration Serial No. 2E 1125572 4 93740 CA360 Date Due Date | nics, Inc. nd ISO 17025. is +/-1.6%. <u>Cal Date Due Date</u> <u>2/5/2013 2/5/2014</u> 4/16/2013 4/16/2014 2/2/2013 2/2/2014 : <u>12/21/13</u> |

| CERTIFICATION CERTIFICATION Title Page of Calibon CUSTOMER: Wilson Acoustics LTD Room 601, Block A, Shatin Industrial Centre Yuen Shun Circuit Shatin NT HONG KONG | DIEZOTRONICS ^{INC.} ON OF CONFORMANCE Diration Certificate Documentation PURCHASE ORDER #: 1 PCB ORDER #: 114542 | | | | |
|---|---|--|--|--|--|
| QTY !TEM | DESCRIPTION | | | | |
| 1 699A02 | S/N 989 | | | | |
| | | | | | |
| NOTES: 1. This document certifies that the subject item(s) has been manufactured, repaired (if applicable), tested, or inspected in accordance with referenced purchase order and conform(s) to applicable specifications per PCB Quality Policy Manual Rev. E 10/21/2008. 2. Equipment used in validation is traceable to NIST and appropriate records are on file. 3. Calibrations comply with ISO 17025 and ANSI/NCSL Z540-1-1994 except as noted on associated calibration certificate(s). 4. Calibrations are performed using processes having a test uncertainty ratio (TUR) of four or more times greater than the unit calibrated, unless otherwise noted on the calibration certificate. Calibration at 4:1 TUR provides reasonable confidence that the instrument is within product specifications. | | | | | |
| Approved by | Date: 12/21/13 | | | | |
| - ISO 9001 Certif PCB | ied / ISO 17025 Accredited - Piezotronics, Inc. | | | | |
| 3425 Walden Avenue Depew, New York 14043-2495 Phone: 716-684-0001 Fax: 716-684-0987 | | | | | |
| | | | | | |

Page 1 of 1

CERTIFICATE OF CALIBRATION FORCE VERIFICATION OF LOAD CELL



CM21578 Date of Issue : 27 Aug 2014 Certificate No. :

INFORMATION PROVIDED BY CUSTOMER

Customer : Wilson Acoustics Limited Customer Address : Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin. NT.

Customer Ref. No. : N.A.

Load Cell & Display Details

| • • | | Load Cell | Display* | | |
|---------------|---|-----------|-------------------------------------|--|--|
| Max. Capacity | : | 220kN | N.A. | | |
| | | | 0.01kN (upto 99.99kN) & 0.1kN (upto | | |
| Resolution | : | N.A. | 220kN) | | |
| Manufacturer | : | Futek | Pico Technology | | |
| Model No. | : | LCM550 | PicoScope 2203 | | |
| Serial No. | : | 520583 | VDR63/364 | | |
| Equipment No. | : | N.A. | N.A. | | |

INFORMATION PROVIDED BY THE LABORATORY

Date of Calibration : Mode of Calibration : Location of Calibration : Calibrated By :

26 Aug 2014 Compression Calibration Lab. Of Stanger Asia Limited M.K. Leung & Y.W. Ho

RESULTS

In accordance with in house procedure CAL1006

| | Mean Indicated | | | | |
|-----------------------|----------------|------------------|----------------------|----------------------|-----------------|
| Applied Force (kN) | Force (kN) | Error (%) | Repeatability (%) | Uncertainty (± %) | Coverage Factor |
| 20 | 20.72 | 3.60 | 0.60 | 1.00 | 1.96 |
| 40 | 40.10 | 0.24 | 0.55 | 0.40 | 1.96 |
| 60 | 59.52 | -0.80 | 0.03 | 0.40 | 1.96 |
| 80 | 82.83 | 3.54 | 0.05 | 0.40 | 1.96 |
| 100 | 102.20 | 2.20 | 0.00 | 0.40 | 1.96 |
| 120 | 121.60 | 1.33 | 0.00 | 0.40 | 1.96 |
| 140 | 141.03 | 0.74 | 0.07 | 0.64 | 1.96 |
| 160 | 160.40 | 0.25 | 0.00 | 0.64 | 1.96 |
| 180 | 179.80 | -0.11 | 0.11 | 0.64 | 1.96 |
| 200 | 199.23 | -0.38 | 0.05 | 0.63 | 1.96 |
| 220 | 222.50 | 1.14 | 0.00 | 0.64 | 1.96 |
| T I I I | d | a lovel of confi | dance of 05% | | |

The quoted expanded uncertainties are for a level of confidence of 95%.

Remarks

1) Reference load device used for range 20kN to 220kN:- 700kN load cell, serial no.33862 & 1000029732

2) Temperature range during the verification : 20.6 to 20.8 °C

3) Maximum zero force error : 0.0%.

4) Results are traceable to the International System of Units (S.I.) or recognised measurement standards.

5) *Loadcell was connected to a Futek amplifer module; model no. CSG 110; serial no. 267397 and the signal was outputted through the PicoScope and displayed on the provided laptop computer.

Certified by, Pang Ying Yan Approved Signatory

On Behalf of Stanger Asia Limited

---- End of Report ----

CAL1006 : Issue 2008 No.1 17 April 2008 Stanger Asia Limited registered in Hong Kong No. 146287

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written approval of the issuing laboratory. Isoboratory Advectors : Room 705-706, 7/F, Fik Shing Commercial Building, 28 On Lok Mun Street, On Lok Tsuen, Fanling, New Terntories, HONG KONG. / DD83 Lot 549, 553, 556 Sha Tau Kok Road, Ko Po Village Fanling, New Terntories, Correspondence Address : Room 705-706, 7/F, Fik Shing Commercial Building, 28 On Lok Mun Street, On Lok Tsuen, Fanling, New Terntories, HONG KONG. I 2033 Fax: 852-2682 1023 Fax: 852-2682 1024 Fax: 852-2682 1024