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**Report on Environmental Noise Survey undertaken at
undertaken at World Rubber, Chelveston
on 22nd December 2017**

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A handwritten signature in black ink that reads "Chris Smith".

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Executive Summary

World Rubber operates a rubber recycling facility at its site in Chelveston, Northamptonshire. Exova (UK) Ltd was commissioned by Mr Victor Buchanan of Dallol Energy Ltd to carry out an environmental noise survey at the World Rubber site in Chelveston.

The purpose of the noise survey was to establish the prevailing noise climate at the site boundary during both day and night-time periods. This report details the noise survey methodology and results.

Site work was undertaken by Mr Chris Smith on 22nd December 2017.

Measurements were carried out in accordance with parameters specified in BS 4142:2014 and BS 7445-2:1991. For this exercise, the nearest Noise Sensitive Receptor (NSR) was considered to be the Chelston Rise houses to the north-east of the site.

Measurement Results

Environmental noise measurements were carried out at the World Rubber site during what was considered to be typical operating conditions during the daytime. However, there was no activity at night, therefore measurements represent the background noise level.

| Period | BS 4142 Assessment | | BS 8233 Assessment | |
|---|--|--|--|--|
| | Difference between Rating and Background noise levels dB | Indication of an Adverse Impact according to BS4142? | Difference between BS8233 recommended levels | Internal noise levels meet BS8233:2014 |
| Daytime; Location 3 – To south of Chelston Rise houses (nearest NSR to site) | +12.6 | Yes – complaints are likely | -5.9 | Yes |

Conclusion

The BS 4142 assessment indicates that the noise produced by World Rubber at the façade of the NSR may have a negative impact (however; difference between Rating and Background noise levels to be considered as a 'worst scenario' on this occasion).

The BS8233 assessment indicates that the attenuated internal values do not exceed the noise levels during the daytime hours at the NSR.



1. Introduction

World Rubber operates a rubber recycling facility at its site in Chelveston, Northamptonshire. Exova (UK) Ltd was commissioned by Mr Victor Buchanan of Dallol Energy Ltd to carry out an environmental noise survey at the World Rubber site in Chelveston.

The purpose of the noise survey was to establish the prevailing noise climate at the site boundary during both day and night-time periods. This report details the noise survey methodology and results.

Site work was undertaken by Mr Chris Smith on 22nd December 2017.

2. Measurement Methodology

To assess the noise environment at the site, an environmental noise survey was carried out on 22nd December at the World Rubber site in Chelveston, Northamptonshire.

Measurements were carried out in accordance with parameters specified in BS 4142:2014 and BS 7445-2:1991. For this exercise, the nearest Noise Sensitive Receptor (NSR) was considered to be the Chelston Rise houses to the north-east of the site.

The noise monitoring equipment used during the survey comprised of a Casella CEL-63X Type 1 sound level meter, serial number 2451098.

On site calibration checks were performed on the meter before and after the measurements and were found to be within the permitted tolerance of BS EN 61672-1:2013. All equipment had a valid calibration certificate at the time of the survey.

For all static measurements, the microphone was located approximately 1.5m above ground level and 3.5m away from any other reflective surface, i.e. in free field conditions. Boundary measurement locations were selected to represent the surveyor's subjective assessment of maximum noise emissions from plant and activity along the boundary under question. The Noise Sensitive Receptor location was chosen for the proximity to the site, the residential nature of the properties, and the direction of the prevailing wind at the time of the assessment.

3. Site Observations

The World Rubber site is located within a semi-rural setting with the villages of Caldecott to the north, Yelden to the east, and Newton Bromswold to the south (at distances of approximately one kilometre from the site). The town of Rushden is located approximately two kilometres to the west of the site.

The World Rubber site was situated on Upper Higham Lane. For this exercise, the nearest Noise Sensitive Receptor (NSR) was considered to be the Chelston Rise houses to the north-east of the site, at a distance of 380 metres from the site boundary.

Environmental noise measurements were carried out at the World Rubber site during what was considered to be typical operating conditions during the daytime. However, there was no activity at night at the time of the assessment, therefore measurements represent the background noise level. It was reported that the plant could be operated 24 hours a day.

Noise measurements were obtained at three locations; opposite the entrance to the site on Upper Higham Lane, at the T-junction of Upper Higham Lane and Rushden Road (230 metres to the south east of the site), and to the south of the Chelston Rise houses.

The measurement locations are shown in Figure 1 in Appendix 1.



3.1 Noise Sources

During the night there was no activity on the site. Off-site the main noise source was distant road noise and wildlife noises.

3.1.1 Location 1: Opposite the entrance to the site on Upper Higham Lane

The measurement location was on the opposite side of the road to the site entrance on Upper Higham Lane.

The main noise sources during the daytime measurements were site machinery, cranes and forklift truck activity; this was the dominant type of noise at the measurement location during the daytime measurement.

N.B. Noise measurements were paused when road vehicles drove past the measurement location.

3.1.2 Location 2: At the T-junction of Upper Higham Lane and Rushden Road

The measurement location was at the T-junction of Upper Higham Lane and Rushden Road Lane, at a distance of 230 metres from the south east of the site boundary.

Noise from process machinery (low rumble) was audible at this location during the daytime measurements; this was the dominant type of noise at the measurement location during the daytime measurement.

N.B. Noise measurements were paused when road vehicles drove past the measurement location.

3.1.3 Location 3: To the south of the Chelston Rise Houses

The measurement location was to the south of the Chelston Rise houses, at a distance of 380 metres from the site boundary.

Site traffic and a low rumbling noise from process machinery on site was just audible at the measurement location. Distant road noise from the local main roads (A45 / A6) was just audible.

N.B. Noise measurements were paused when road vehicles drove past the measurement location.

3.2 Climatic Conditions

3.2.1 Climatic conditions during Day Time measurements 22nd December 2017

| Time | 09:58 – 10:28 | 10:31 – 11:01 | 11:08 – 11:38 |
|------------------------|---------------|---------------|---------------|
| Temp °C | 9 | 9 | 10 |
| Relative Humidity % | 96 | 96 | 93 |
| Average wind speed m/s | 2.0 | 2.0 | 2.0 |
| Wind direction | W | W | W |
| Conditions | Dry, Cloudy | Dry, Cloudy | Dry, Cloudy |

3.2.2 Climatic conditions during Night Time measurements 22nd December 2017

| Time | 01:00 – 01:10 | 01:17 – 01:27 | 01:31 – 01:41 |
|------------------------|---------------|---------------|---------------|
| Temp °C | 11 | 11 | 11 |
| Relative Humidity % | 94 | 94 | 94 |
| Average wind speed m/s | 2.2 | 2.2 | 2.2 |
| Wind direction | SW | SW | SW |
| Conditions | Dry, Cloudy | Dry, Cloudy | Dry, Cloudy |

4. Measurement Results

Full A-weighted measurement results from the survey are presented in the tables below.

4.1 Summary of Daytime Measurements 22nd December 2017

| Location | Time | Duration (mins) | L _{Aeq} | L _{AF10} | L _{A90} | L _{AFmin} | L _{AFmax} |
|--|---|-----------------|------------------|-------------------|------------------|--------------------|--------------------|
| 1 – Opposite Site Entrance | 09:58 – 10:28 | 30 | 55.6 | 57.5 | 52.0 | 46.4 | 65.5 |
| Notes: | Noise from process machinery, cranes and forklift truck activity was audible and was the dominant noise. Off-site noise included bird song; there was occasional traffic on the local road (measurement was paused at these times). | | | | | | |
| 2 – T-Junction of Upper Higham Lane and Newton Bromswold Road | 10:31 – 11:01 | 30 | 46.3 | 48.5 | 43.0 | 39.1 | 56.0 |
| Notes: | Noise from process machinery (low rumble) was audible and was the dominant noise. Off-site noise included bird song; there was occasional traffic on the local road (measurement was paused at these times). Main road (A45 / A6) traffic was just audible. | | | | | | |
| 3 – To south of Chelston Rise houses (nearest NSR to site) | 11:08 – 11:38 | 30 | 40.5 | 42.0 | 35.0 | 32.9 | 59.2 |
| Notes: | Noise from process machinery (low rumble) and site traffic was just audible. Off-site noise included bird song; there was occasional traffic on the local road (measurement was paused at these times). Main road (A45 / A6) traffic was just audible. | | | | | | |

4.2 Summary of Night Time Measurements 22nd December 2017

| Location | Time | Duration (mins) | L _{Aeq} | L _{AF10} | L _{A90} | L _{AFmin} | L _{AFmax} |
|--|---|-----------------|------------------|-------------------|------------------|--------------------|--------------------|
| 1 – Opposite Site Entrance | 01:00 – 01:10 | 10 | 37.3 | 40.2 | 32.5 | 29.8 | 49.1 |
| Notes: | There were no on-site activities during the measurement period; the measurement reflects the background noise level. There was some distant road noise from the main roads in the area (A45 / A6), as well as less frequent local road traffic nearby. | | | | | | |
| 2 – T-Junction of Upper Higham Lane and Newton Bromswold Road | 01:17 – 01:27 | 10 | 39.0 | 43.0 | 31.5 | 28.9 | 54.4 |
| Notes: | There were no on-site activities during the measurement period; the measurement reflects the background noise level. There was some distant road noise from the main roads in the area (A45 / A6). There was some animal noise (possibly foxes) during the measurement. | | | | | | |
| 3 – To south of Chelston Rise houses (nearest NSR to site) | 01:31 – 01:41 | 10 | 34.6 | 36.6 | 30.5 | 28.3 | 46.9 |
| Notes: | There were no on-site activities during the measurement period; the measurement reflects the background noise level. There was some distant road noise from the main roads in the area (A45 / A6). | | | | | | |

5. Assessment Criteria

5.1 BS4142 Assessment

The British Standard BS4142:2014 *Methods for rating and assessing industrial and commercial sound*, describes methods for determining, at the outside of a building:

- a) sound from industrial and manufacturing processes;
- b) sound from fixed installations which comprise mechanical and electrical plant and equipment;
- c) sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- d) sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

The methods described in this British Standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

The procedure compares measured or predicted specific noise levels with the background noise level at the residential dwelling in question.

- Typically, the greater this difference, the greater the magnitude of the impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

The specific noise level also acknowledges the following reference time intervals depending upon whether the noise source operates during daytime or night-time periods:

- Daytime (07:00 – 23:00): 1 hr; and,
- Night-time (23:00 – 07:00): 15 minutes.



Rating Level

The Standard also applies penalties when the noise source under investigation can be considered to have particular *noise characteristics*. The penalties vary depending on the level of severity of the noise characteristic.

Tonality

- +2dB: where the tonality is just perceptible;
- +4dB: where the tonality is clearly perceptible; and,
- +6dB: where the tonality is highly perceptible.

Impulsivity

- +3dB: where the impulsivity is just perceptible;
- +6dB: where the impulsivity is clearly perceptible; and,
- +9dB: where the impulsivity is highly perceptible.

Intermittency

- +3dB: where the intermittency is readily distinctive against the acoustic environment.

Other Sound Characteristics

In addition to the above acoustic features, there is a penalty for 'other sound characteristics' of +3dB where a sound exhibits characteristics that are neither tonal nor impulsive, though are readily distinctive against the acoustic environment.

BS4142 goes on to state that the rating level is equal to the specific sound level if there are no such features present or expected to be present.

5.2 BS8233 Assessment

BS8233 suggests appropriate criteria and limits for different room types within a property. It should be noted that although the predicted noise levels at the façade of the NSR exceed the background noise level by up to 16.5 dB, BS8233:2014 provides recommended internal noise levels which are detailed below.

Indoor ambient noise levels for dwellings

| Activity | Location | 07:00 to 23:00 | 23:00 to 07:00 |
|----------------------------|-------------|-------------------------|------------------------|
| Resting | Living Room | 35 dB $L_{Aeq, 16hour}$ | - |
| Sleeping (daytime resting) | Bedroom | 35 dB $L_{Aeq, 16hour}$ | 30 dB $L_{Aeq, 8hour}$ |

6. Impact Assessment

6.1 BS4142 Assessment at Chelston Rise Houses

The noise levels obtained were used to calculate the noise level at the respective receiver locations. Measurements were obtained at the site boundary; as a result, the noise level must be corrected for distance.

The correction for distance is obtained from the formula;

$$L_2 = L_1 - 20 \times \log(d_2/d_1)$$

L_1 = measured level

d_1 = distance at which noise was measured

d_2 = distance at which noise is to be predicted

6.1.1 Calculation of Specific Noise Levels

| Location | L_{Aeq} dB | Correction for distance dB(A) |
|---|-----------------|----------------------------------|
| Daytime | | |
| Location 3 – To south of Chelston Rise houses (nearest NSR to site) | 40.5 | 40.1 |

The relevant penalties for the noise characteristics is assessed and applied as appropriate.

6.1.2 Assessment of Applicable Penalties

| Characteristic | Applicable | Penalty | Comment |
|-------------------------------------|------------|-------------|--|
| Tonality | No | 0 dB | Objective assessment indicates there was no tonality |
| Impulsivity | No | 0 dB | Objective assessment indicates there is no impulsivity |
| Intermittent | Yes | 3 dB | Site traffic and fork lift alarms are intermittent |
| Other characteristic | No | 0 dB | Not applicable |
| Total penalties attributable | | 3 dB | |

The rating level is then calculated and used to assess the impact at the receptor.



6.1.3 Calculation of Rating Level

| Location | Noise at Receiver dB(A) | Penalty | Calculated Rating Level dB | Measured Background Noise Level L _{A90} | Difference dB |
|---|-------------------------|---------|----------------------------|--|---------------|
| Daytime | | | | | |
| Receiver – Chelston Rise houses (nearest NSR) | 40.1 | 3 | 43.1 | 30.5* | +12.6 |

*Alternative equivalent level (night time measurement) used, as site noise sources could not be shut down during the daytime measurement.

6.1.4 BS4142 Assessment

The noise rating level shows that there is a +12.6 dB difference to the background noise level. If the "rating" level exceeds the "background" by around 10 dB(A) or more this "indicates that complaints are likely". A difference of around 5 dB(A) is of marginal significance; at a difference below 5 dB(A), the lower the value, the less likely that complaints will occur". It should be noted that because a background measurement could only be obtained during a night time period, the difference between the rating level and background level is likely to be an over-estimate, so should be considered as a 'worst scenario'. Day-time background noise levels are likely to be closer to the specific noise measured with the site in operation, therefore reducing the likelihood of an adverse impact arising,

6.2 BS8233 Assessment

BS8233 suggests appropriate criteria and limits for different room types within a property. It should be noted that although the predicted noise levels at the façade of the NSR exceed the background noise level by up to 16.5 dB, BS8233:2014 provides recommended internal noise levels which are detailed below.

6.2.1 Indoor ambient noise levels for dwellings

| Activity | Location | 07:00 to 23:00 | 23:00 to 07:00 |
|----------------------------|-------------|--------------------------------|-------------------------------|
| Resting | Living Room | 35 dB $L_{Aeq, 16\text{hour}}$ | - |
| Sleeping (daytime resting) | Bedroom | 35 dB $L_{Aeq, 16\text{hour}}$ | 30 dB $L_{Aeq, 8\text{hour}}$ |

An open/closed window research project carried out by Napier University indicates that the range of measured insulation ratings for windows with a free open area of 0.05 m², is D_w 14 – 20 dB.

6.2.2 Attenuated indoor noise levels at the NSR

| Location | Calculated Rating Level dB | Attenuation from open window ¹ dB | Internal noise level | BS8233 Recommended Level dB L_{Aeq} | Difference dB |
|---|----------------------------|--|----------------------|---------------------------------------|---------------|
| Daytime | | | | | |
| Receiver – Chelston Rise houses (nearest NSR) | 43.1 | 14 | 29.1 | 35 | -5.9 |

The attenuated internal values detailed above indicate that during the daytime noise levels do meet the requirements of BS8233.

¹ [NANR116 Open/Closed Window Research](#)

7. Conclusions

Environmental noise measurements were carried out at the World Rubber site during what was considered to be typical operating conditions during the daytime. However, there was no activity at night, therefore measurements were taken during this period to represent the background noise level.

| Period | BS 4142 Assessment | | BS 8233 Assessment | |
|---|--|--|--|--|
| | Difference between Rating and Background noise levels dB | Indication of an Adverse Impact according to BS4142? | Difference between BS8233 recommended levels | Internal noise levels meet BS8233:2014 |
| Daytime; Location 3 – To south of Chelston Rise houses (nearest NSR to site) | +12.6 | Yes – complaints are likely | -5.9 | Yes |

Conclusion

The BS 4142 assessment indicates that the noise produced by World Rubber at the façade of the NSR may have a negative impact (however; difference between Rating and Background noise levels to be considered as a 'worst scenario' on this occasion).

The BS8233 assessment indicates that the attenuated internal values do not exceed the noise levels during the daytime hours at the NSR.

Appendix 1 – Site Plan of Measurement Locations



Appendix 2 – Third Octave Band Measurements

| Location | | 1 | | 2 | | 3 | |
|-----------|----|------|-------|------|-------|------|-------|
| Time | | Day | Night | Day | Night | Day | Night |
| Hz | - | dB | dB | dB | dB | dB | dB |
| Band | Fw | Leq | Leq | Leq | Leq | Leq | Leq |
| Broadband | A | 55.6 | 37.3 | 46.3 | 39.0 | 40.5 | 34.6 |
| Broadband | C | 68.3 | 67.3 | 63.8 | 64.9 | 55.6 | 60.2 |
| Broadband | Z | 72.7 | 78.8 | 67.5 | 76.7 | 64.5 | 72.6 |
| 20 | Z | 55.4 | 65.7 | 52.6 | 62.7 | 50.5 | 58.0 |
| 25 | Z | 56.1 | 64.1 | 52.2 | 61.5 | 49.4 | 56.3 |
| 32 | Z | 60.7 | 61.9 | 52.8 | 59.6 | 49.2 | 53.9 |
| 40 | Z | 61.8 | 59.4 | 56.5 | 57.4 | 48 | 50.6 |
| 50 | Z | 61.7 | 56.8 | 58.7 | 55.4 | 48.9 | 49.5 |
| 63 | Z | 58.4 | 53.4 | 56.7 | 52.3 | 46.8 | 46.6 |
| 80 | Z | 60.6 | 50.1 | 56.5 | 47.9 | 45.5 | 42.5 |
| 100 | Z | 57.9 | 44.4 | 54.5 | 44.9 | 40.6 | 41.8 |
| 125 | Z | 53.9 | 40.7 | 49.9 | 40.5 | 38.3 | 38.7 |
| 160 | Z | 54.3 | 36.2 | 44.8 | 37.3 | 36 | 35.6 |
| 200 | Z | 53.9 | 31.7 | 39.6 | 33.0 | 32.1 | 32.0 |
| 250 | Z | 51.5 | 27.8 | 35.8 | 30.0 | 28.2 | 29.5 |
| 315 | Z | 50.9 | 26.2 | 36.1 | 26.3 | 26.2 | 28.2 |
| 400 | Z | 49.2 | 25.0 | 37 | 23.0 | 26.7 | 26.5 |
| 500 | Z | 47 | 26.3 | 39.1 | 23.2 | 28.2 | 25.8 |
| 630 | Z | 44.3 | 26.5 | 36.1 | 26.6 | 29.7 | 25.7 |
| 800 | Z | 44.5 | 25.0 | 37.2 | 29.7 | 32.1 | 23.7 |
| 1k | Z | 45.1 | 25.3 | 36.5 | 31.0 | 33.1 | 22.9 |
| 1k25 | Z | 44.7 | 22.6 | 34.8 | 28.2 | 32.3 | 19.5 |
| 1k6 | Z | 44.2 | 19.7 | 33.4 | 26.0 | 31 | 16.6 |
| 2k | Z | 43 | 18.2 | 32.2 | 21.8 | 28.2 | 14.4 |
| 2k5 | Z | 40.5 | 17.7 | 31.6 | 20.0 | 24.4 | 13.0 |
| 3k15 | Z | 39.8 | 17.8 | 28.4 | 19.4 | 23.3 | 12.7 |
| 4k | Z | 37.2 | 18.3 | 24 | 19.4 | 21.5 | 12.2 |
| 5k | Z | 34.9 | 19.1 | 21 | 18.5 | 18.7 | 12.1 |
| 6k3 | Z | 30.5 | 19.6 | 18.5 | 17.3 | 23.6 | 11.8 |
| 8k | Z | 25.4 | 20.7 | 13 | 17.6 | 19 | 12.4 |
| 10k | Z | 17.6 | 21.5 | 11.4 | 18.1 | 10.9 | 12.9 |
| 12k5 | Z | 13.5 | 23.0 | 10.6 | 19.2 | 10.2 | 13.9 |
| 16k | Z | 10.7 | 23.5 | 10.2 | 19.7 | 10.5 | 14.5 |
| 20k | Z | 10 | 24.0 | 8.8 | 20.0 | 8.8 | 14.6 |



Appendix 3 – Glossary of Acoustic Terminology

| | |
|------------------------|---|
| Decibel, dB | A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. For sound pressure level (L_p) the reference quantity is $2 \times 10^{-5} \text{ N/m}^2$. The sound pressure level existing when microphone measured pressure is $2 \times 10^{-5} \text{ N/m}^2$ is 0 dB, the threshold of hearing. |
| L | Instantaneous value of Sound Pressure Level (L_p) or Sound Power Level (L_w). |
| Frequency | Number of cycles per second, measured in hertz (Hz), related to sound pitch. |
| A weighting | Arithmetic corrections applied to values of L_p according to frequency. When logarithmically summed for all frequencies, the resulting single "A weighted value" becomes comparable with other such values from which a comparative loudness judgement can be made, then, without knowledge of frequency content of the source. |
| $L_{eq,T}$ | Equivalent continuous level of sound pressure which, if it actually existed for the integration time period T of the measurement, would possess the same energy as the constantly varying values of L_p actually measured. |
| $L_{Aeq,T}$ | Equivalent continuous level of A weighted sound pressure which, if it actually existed for the integration time period, T, of the measurement would possess the same energy as the constantly varying values of L_p actually measured. |
| $L_{n,T}$ | L_p which was exceeded for n% of time, T. |
| $L_{An,T}$ | Level in dBA which was exceeded for n% of time, T. |
| $L_{max,T}$ | The instantaneous maximum sound pressure level which occurred during time, T. |
| $L_{Amax,T}$ | The instantaneous maximum A weighted sound pressure level which occurred during time, T. |
| Background Noise Level | The value of $L_{A90,T}$, ref. BS4142:2014. |
| Assessment Position | Unless otherwise noted, is a point at 1m from the façade of the nearest affected sensitive property. |

Appendix 4 – Calibration Certificate

Certificate of Conformity and Calibration

| | | | |
|--------------------------------|----------|----------------------------|---------|
| Instrument Model:- | CEL-633C | | |
| Serial Number | 2451098 | | |
| Firmware revision | V129-09 | | |
| Microphone Type:- | CEL-251 | Preamplifier Type:- | CEL-495 |
| Serial Number | 1159 | Serial Number | 002864 |
| Instrument Class/Type:- | 1 | | |

Applicable standards:-

IEC 61672: 2002 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1963 (Specifications For Sound Level Meters)

Note:- The test sequences performed in this report are in accordance with the current Sound level meter Standard - IEC61672. The combination of tests performed are considered to confirm the product's electro-acoustic performance to all applicable standards including superseded Sound Level Meter Standards - IEC60651 and IEC60604.

| | | | |
|--------------------------|------------------------------------|------------------------|-----------------|
| Test Conditions:- | 21.4 °C 25.3 %RH 1031.1 mBar | Test Engineer:- | Mike Hill |
| | | Date of issue:- | January 6, 2017 |

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2008 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

Test Summary:-

| | |
|--|-----------------------|
| Self Generated Noise Test | All Tests Pass |
| Electrical Signal Test Of Frequency Weightings | All Tests Pass |
| Frequency & Time Weightings At 1 kHz | All Tests Pass |
| Level Linearity On The Reference Level Range | All Tests Pass |
| Toneburst Response Test | All Tests Pass |
| C-peak Sound Levels | All Tests Pass |
| Overload Indication | All Tests Pass |
| Acoustic Tests | All Tests Pass |

Combined Electro-Acoustic Frequency Response - A Weighted

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instrument's overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.

| | |
|--|---|
| <p>Casella CEL Rygen House, Walsley Road, Yongston, Gedard, MK42 7JY</p> <p>Phone: +44(0) 1234 564100 Fax: +44(0) 1234 041490 E-mail: info@casellameasurement.com Web: www.casellameasurement.com</p> | <p>Casella CEL, Inc., a subsidiary of IDEAL Industries, Inc. 475 Lawrence Bell Drive Unit 4 Buffalo, NY 14221</p> <p>Toll Free: (800) 386-2968 Tel: (603) 672-0031 Fax: (603) 672-0055 E-mail: info@casellausa.com Web: www.casellausa.com</p> |
|--|---|



Certificate of Conformity and Calibration

Customer: Exova UK
 Instrument: CEL-120/1
 Serial Number: 2652045
 Job Number: 15550
 Date of Issue: 06-Jan-2017
 Engineer: M Hill

Traceable Equipment: Reference Calibrator EQ11084
 DVM type Fluke 45 EQ00691

Test Conditions:
 Ambient Temperature 21.0 °C
 Ambient Humidity 36.0 %RH
 Ambient Pressure 1033 mBar

| Results: | Level 1 | Level 2 | Frequency |
|-----------------|-----------|----------|------------|
| Initial Reading | 113.91 dB | 93.76 dB | 1.0000 kHz |
| Final Reading | 114.02 dB | 93.86 dB | 1.0000 kHz |

Uncertainty:
 Level ± 0.15 dB
 Frequency ± 0.5 Hz

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications.
 Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9000:2008 quality procedures.
 The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.
 This certificate may not be reproduced other than in full, except with prior written approval of the issuing laboratory.

| |
|---|
| Casella CEL, Regent House, Wolseley Road, Kempston, Beds, MK42 7JY. Tel +44 (0) 1234 844100 Fax. +44 (0) 1234 841490 E Mail info@casellameasurement.com Web www.casellameasurement.com |
|---|