

Environment Noise Impact Assessment Report

appertaining to the development of a
Church & Community Centre
for
The Salvation Army,
Land-off 34 Queens Road, Barnsley, S7 1AU

Prepared: December 2011

Survey & Report Prepared by:

Business Improvement Services Limited

Bretby Business Park
Ashby Road
Burton upon Trent
Staffordshire. DE15 0YZ

☎ 01-283-226-478 Fax 08-707-703-732 e-mail info@the-bis.com

Executive Summary

An environmental noise impact survey required by *Barnsley Local Authorities, Pollution Control Regulatory Services*, was commissioned by the Client, *The Salvation Army*, for a proposed Church & Community Centre, upon land at the rear of 34, Queen's Road, Barnsley, to support their Planning Application.

The Site was affected by neighbouring residential properties, commercial and school premises with the most significant noise generated from vehicle traffic using the nearby Harborough Hill Road.

The prevailing noise conditions affecting the land together with, consideration of the potential use of the proposed premises and typical mitigation measures available to the Developer were considered in our analysis, with regards to providing a good internal facility for Sunday Worship.

Based upon the proposal of the premises meeting a minimum building standards of the Building Regulations and, the adoption of acoustic attenuation provided within the basic development and construction, it is our opinion, that adequate protection can be provided by the attenuation of the envisaged road traffic emissions to support the planning permission of the Client's application.

CONTENTS

	Page
1. Introduction	1
2. Scope of the Assessment	2
3. Description of the General Locality	2
4. Planning & Choice of Measurement Position	3
5. Instrumentation & Equipment Used	4
6. Noise Survey Procedures	4
7. Noise Measurement Results	6
8. Discussion	6
9. Conclusion	8
10. Statement of Truth	8

Attachments

- Attachment 1:** Location Plan of Site & Noise Measurement Positions
- Attachment 2:** Schedule of potential activities within the Premises
- Attachment 3:** Instrument Calibration Certification
- Attachment 4:** Result Records
- Attachment 5** BS8233 Extracts
- Attachment 6:** Attenuation References

1.0 Introduction

- 1.1 This Report is an independent noise impact assessment regarding the proposed development for a Church and Community Centre, on land at the rear of 32 Queens Road, Barnsley, S71AU.
- 1.2 The noise assessment was conducted on behalf of the Client, *The Salvation Army, Property & Facilities Service Limited*, being a Christian Church and registered Charity, as part of their proposed Planning Application.
- 1.3 Following Site inspection visits and, discussions with *Barnsley Metropolitan Borough Council's*, Ms L Allen, Senior Environmental Health Officer, Pollution Control Regulatory Services, a suitable protocol and noise measurement position were established.
- 1.4 This Report addresses the foreseeable noise impact on the proposed premises from events within the locality considering the current situation. This has been achieved by measurement and assessment of the surrounding environment of the development Site and, of noise levels typically encountered from the localised noise events, qualified with reference to authoritative best practice
- 1.5 Measurements were concentrated primarily on the noise emissions generated from the adjacent road traffic network, outlying businesses and commercial premises together with the neighbouring residential dwellings; these were identified from interim visits and discussions with the Council as the most significant noise sources that could affect the proposed worship and community premises.
- 1.6 Based on the foreseen scheduled activities of the *Salvation Army* within the premise, noise data has been collated to represent the most noise sensitive period, being typically a Day-time Worship period, an assessment survey was performed on Sunday, 6th November 2011.
- 1.7 In association with the analysis of the data obtained mitigation measures, where deemed applicable, have been provided, drawn on the recommendations with regards to *BS8233 Sound insulation & noise reduction for buildings – Code of Practice*; these have been provided to reduce the external noise effect to enable a good standard of internal Worship.

2.0 Scope of the Assessment.

2.1 The scope of the assessment was primarily to:

- a. identify the current environmental noise sources and levels typically generated within the neighbourhood;
- b. measure and quantify typical noise exposure levels of the proposed development over periods potentially schedule for Worship use;
- c. analyse and present data obtained to quantify the environmental noise;
- d. provide an independent assessment and report with regards and consideration to authoritative documentation, inclusive of the:
 - i) *BS 7445, Description & Measurement of Environment Noise, Parts 1-3, 1991;*
 - ii) *BS 8233:1999, Sound insulation & noise reduction for buildings – Code of Practice.*
- e. assess the use of reasonable measures to reduce the effect of any excessive noise exposure identified at the proposed premises, as deemed necessary, to attain a "good" standard of internal Worship.

3.0 Description of the Locality & Pre-Assessment Noise Observations

- 3.1 The proposed *Salvation Army Church & Community Centre* Site was located West of Barnsley Town Centre, separated from the Town by an elevated 40mph section of the dual carriageway road network system of the A61, *Harborough Hill Road*.
[Ref: Attachment 1]
- 3.2 To the immediate North of the Site was the side elevation of the well-established residential dwelling and garden of No:15 Harborough Hill Road together with the rest of adjoining residential properties.
- 3.3 To the North-East was situated *Pipers Grove Primary School* with access to the School provided by the drive located up the Site's East boundary: speed prohibited to 10mph.
- 3.4 Further East, over from the School's access driveway at No: 34 *Queen's Road* was the premises of *Barnsley Age UK* and, at the rear of these a small self-contained Trading Estate housing the businesses of *Cash & Carry Carpets* and *Frensco Builders*.
- 3.5 To the North-East of the Site, across the *Queen's Road* was an *NHS Clinic*. Neighbouring this and, located on the rest of *Queen's Road* to the South of the Site were further residential housing.

- 3.6 To the immediate West of the Site was the Site's access road and a series of detached car garages, possibly left over from the Site's former usage. Beyond these was the 30mph Southern sliproad of the adjoining A61, *Harborough Hill Road* dual-carriageway. Across from the A61 was the premises of *Gala Bingo* and then, the Town Centre's Bus and Train Stations known as, the "Interchange".
- 3.7 It is expected that the *Salvation Army's* use of the premises will be predominantly for community based activities such as Coffee Mornings, internet café provisions, musicians rehearsals, children's choirs and feeding the homeless over a weekday day with formalised Worship Services performed on Sunday's. [Ref: Attachment 2]
- 3.8 In comparison with the *Salvation Army*, businesses within the locality appeared to only operate over the Monday to Saturday periods.
- 3.8 Our pre-assessment of the environment noise that could affect the sensitive Worship periods realistically identified that this would be from the Sunday road traffic using the *Harborough Hill* Carriageway together with, the possible bus and train movement using the Town Centre's Interchange.

4.0 Planning & Choice of the Noise Measurement Position

- 4.1 Based upon our pre-survey Site visit and information obtained from the *Salvation Army*, *Barnsley Council's* EHO and local residents, it was decided that the "worst-case" noise scenario possibly affecting the Development Site was on the Western boundary created in the main by road traffic using the A61, *Harborough Hill Road* dual-carriageway and adjoining slipway.
- 4.2 It was established on Site that road traffic was slightly attenuated by the present "barrier" effect of the garage block, elevated road section and the reducing incline of the development plot. To counteract this, the noise meter was positioned on a tripod, 3-metres from the ground-level and located to reduce the effect of the garage block and embankment with a line-of-sight of the road traffic on the A61 and the sliproad judged to be established.
- 4.3 The noise survey was scheduled to be carried out over a period when worship was to be taken, between 12:00-noon until 15:00-hrs on a Sunday, with suitable weather conditions prevailing.
- 4.4 It should be noted this measuring location was proven to be acceptable due to the frequency of visits caused by several postponements taking place because of the wind and rain conditions exceeding the required measurement standards.

- 4.5 For the purpose of undertaking the assessment, a sound level meter, referenced as *Noise Measurement Point, NMP1*, was positioned on the Site's front, Western boundary; noise "maximum" levels were obtained for the benefit and application of *BS8233*, to establish possible attenuation controls.
- 4.4 *Noise Measurement Point, NMP1* was established on the Site's eastern kerbline of the access road, 36-metres from the junction of *Queen's Road* which positioned *Harborough Hill Road* about 20-metres away and the adjoining slip-road at 12-metres. [Ref: Attachment 1]
- 4.5 Spot-measurements, in particular of traffic events were taken to compliment the main readings, as deemed appropriate.

5.0 Instrumentation & Equipment Used

For the purpose of this Report, the following equipment was used as detailed:

Sound Meter 1:	Norsonic 118 Real Time Analyser, Type 1, No.31341
Modules:	1, 3, 4, 6, 9, 17
Certification:	Calibrated, 29 th October 2010
Sound Meter 2:	Norsonic 131 Real Time Analyser, Type 1, No.1312934
Certification:	Calibrated, 8 th September 2011
Site Calibrator:	Nor 1251, 114dB @1000-Hz, No.30875
Certification:	Calibrated, 7 th September 2011
Linear Measure:	10m Stanley, Type 33-443 Grade II & Trumeter Measuring Wheel
Climate:	Davis Vantage Pro 2 Weather Station (Factory & Site Calibrated)

[Ref: Attachment 3]

6.0 Noise Survey Procedures

- 6.1 The survey was carried out with regards to the requirements of the *methodology* as described in *PPG 24*, *BS 4142:1997* and *BS 7445:1991*.
- 6.2 Measurements were taken with two high precision integrating sound level meters, with associated sound & environmental filters utilised; a static and portable meter were provided.
- 6.3 To minimise ground reflection and, maximise the affect of road traffic from a "barrier" affect of residential garages and embankment, the microphone was set at 3-metres to enable a line-of-sight measurement of the Road (ie. whilst this exceeded the defined range of 1.2 & 1.5m of *PPG 24* overcoming the attenuation effect was deemed more critical); during recording personnel were sited away from the meter.

- 6.4 To ensure against sound reflections, the meter microphones were positioned at least 3.5-metres from any reflective surfaces or buildings.
- 6.5 An effective wind shield was secured to the sound meter's microphones to minimise wind noise and turbulence.
- 6.6 No notable electrical interference were evident as, no overhead electrical cables or alarm systems were apparent.
- 6.7 Instrumentation calibrations were checked and recorded at the start and end of the assessment with an acoustic calibrator; no variations were noted.
- 6.8 Measurements were taken to accommodate the road traffic and commercial noise emissions affecting the Site.
- 6.9 The recording duration was performed on the 6th November 2011, over a 3-hour period, between 12:00-hr to 15:00-hrs with a 15-minute time interval applied. This was chosen to reflect the characteristic nature of the noise events encountered during previous Site visits and views of the EHO.
- 6.11 The instruments, for each period were used to measure and present data in the following formats:

L _{Aeq} (15-minute)	(equivalent continuous sound level over 15-minute periods)	A-weighted
L _{AMax Fast}	(requirement defined in BS8233)	A-weighted
- 6.12 No events were manually paused from the continuous noise measurements recorded within the survey period.
- 6.13 Weather conditions were monitored and recorded indicating wind variations to be suitable, ranging between 0 m/s & 1.8 m/s with the wind direction predominately being from the North West over the noise measurement period; Microphone windshields used were adequate for the weather conditions experienced.
- 6.16 Temperature variations ranged between 1^{0c} to 5.5^{0c}.
- 6.17 The weather was judged not to have significantly influenced the sound recordings measured.
- 6.18 The Site's perimeter was lined with mesh-fencing which was demonstrated by on-site trials to have no attenuation affect. Health, safety & welfare provisions were provided in accordance with the Company Method Statement Document, *BiS/S472/01110/Issue1*, submitted to individual Team Members, all were valid CSCS Cardholders. Observations were made from the vicinity over the duration of the Survey periods with significant single events noted.

7.0 Noise Measurements Results

- 7.1 From the recorded measurements, the $L_{Aeq,15\text{-minute}}$ noise values taken over a 3-hour period were presented in a tabulated format that illustrated the steady state of the encountered Daytime traffic at *NMP 1*, between 65(64.6) & 66(66.0)dBL_{Aeq-15-min} [Ref: Attachment 4]
- 7.2 The ambient noise level conditions, L_{Aeq} taken over the measurement period were equated to 65(65.3)dBL_{Aeq-3hrs} and 58(58.1) $L_{Aeq-16hr}$
- 7.3 Single occurring maximum events taken within the measurement period were recorded at between 70(70.4) & 75(75.3) $L_{Amax,fast}$, attributed to road traffic vehicles, the highest being a motorbike.

8.0 Discussion

- 8.1 From previous Site visits and discussion with the Council, Local Residents and Traders, it was established that typically the ambient noise levels would be dominated by the road traffic events from the adjoining *Harborough Hill Road* complex; this was confirmed from our Site observations and results.
- 8.2 The section of *Harborough Hill Road* opposite to the Site provided 4-lane traffic flow, although this was restricted to 40mph and governed by a speed camera. As the West bound traffic had previously travelled up the hill and reached their maximum speed, vehicle noise was regarded as constant.
- 8.3 The slip-road off the carriage way was restricted down to 30-mph and signposting directed user to the Markets, *Metrodome* and *Barnsley Football Ground*. Although such featured events would increase the use of the slipway it was considered that these would not directly affect the premises use as, worship was scheduled for between 10:30 & 13:00-hrs and, bible study between 17:00 & 18:00-hrs on Sundays only. Additionally, there appeared to be no increased noise with vehicle gear changing and braking that could be described as been offensive. [Ref: Appendix 2]
- 8.4 There were the additional features such an occasional noises associated with passing pedestrians together with the train and bus stations beyond the road structure although, maximum levels were typically generated from cars at about 72dBL_{A-Max} although, 75dBL_{A-Max} was attributed to a passing motor bike.
- 8.5 It is appreciated from the schedule provided by the *Salvation Army* that the premises will not be dominated by pray and, even then, from personal experience of their services, they are not generally a quiet event with the practitioner's worship accompanied by up-beat song, brass band and electrical instruments. However, in accommodating for the facility of worship and bible study within the premises it is considered still necessary to provide these particular internal rooms with a "good" level of acoustic design.

- 8.6 With reference to *British Standards BS8233 Sound insulation & noise reduction for buildings – Code of Practice*, it is our opinion that the external road traffic noise should be attenuated so that an indoor ambient level within the worship areas are at least $30\text{dB}_{\text{LAeq-3hrs}}$ and ideally, have no individual noise event greater than a maximum of $45\text{dB}_{\text{LAmax,fast}}$. [Ref: Appendix 5]
- 8.7 Although, such mitigation measures are to include consideration of the premises orientation, siting of the windows, use of trickle vents and/or mechanical ventilation and the provision of sound insulation in the construction, the lowest resistance to noise that generally occurs within a build, is normally created by single glazed windows; according to *BS8233* this provides an attenuation of about 25dB_A . [Ref: Appendix 5]
- 8.8 In comparing the established worst-case scenario noise levels, to that of obtaining a “good” environment for worship, the criteria of *BS 8233* would NOT be met with normal glazing (ie. worst-case taking, $65\text{dB}_{\text{LAeq-3hour}}$ rather than $58\text{dB}_{\text{LAeq-16hr}}$, therefore, $65-25 = 40\text{dB}_A$ & $75-25 = 50\text{dB}_{\text{LAmax,fast}}$).
- 8.9 Whilst special acoustic glazing units can be obtained to provide attenuation levels of 46dB , typical thermal insulating commercial units would be suitable as they can provide 33dB to 35dB , as stated in *BS8233*; such a specification as having a glazing attenuation of 35dB would be ideal for any of the proposed “worship” windows. (ie. worst-case taken, $65-35 = 30\text{dB}_A$ & $75-35 = 40\text{dB}_{\text{LAmax,fast}}$). [Ref: Appendix 5]
- 8.10 Furthermore, it is reasonable to expect and also, a *Building Regulation* requirement, to provide adequate ventilation.
- 8.11 A partially open-window or the installation of a normal window/wall vent would dramatically reduce the effect of the original closed-window level, providing only 10 to 15 dB attenuation.
- 8.12 Due to construction artefacts currently on the market, the installation of acoustic window vents or acoustic air bricks could provide the ventilation requirements whilst the window units maintained close. Noise reduction typical of these air vents offer a reduction of 44dB . [Ref: Appendix 5]
- 8.13 As the lowest noise protection of 21dB_A (ie. worst-case taken, $65-44 = 21\text{dB}_A$ & $75-44 = 31\text{dB}_{\text{LAmax,fast}}$) this would be appropriate within worship areas; installing these ventilation devices would be suitable and no specific requirement to have fixed windows with an internal mechanical ventilation system needed.

9.0 Conclusion

- 9.1 The proposed Site for the *Salvation Army* was identified as primarily being affected by road traffic noise; this was proven to be upheld from observation and from the collated Noise Survey Data.
- 9.2 From noise measurements taken at the Premise's Site, over a typical Sunday period in that worship was scheduled to be performed, it was assessed that suitable mitigation measures were needed to reduce the impact of the road traffic noise experienced.
- 9.3 It is our opinion, that with the Development meeting a minimum build standard required of current *Building Regulations* and selective fitment of noise attenuation articles such as double glazing units, acoustic vents for the worship areas, as outlined within our Report, a "good" standard can be adequately achieved and sustained with regards to *British Standards BS8233 Sound insulation & noise reduction for buildings – Code of Practice*.

10.0 Statement of Truth

I believe that the facts I have stated in this report are true and that the opinions I have expressed are correct.



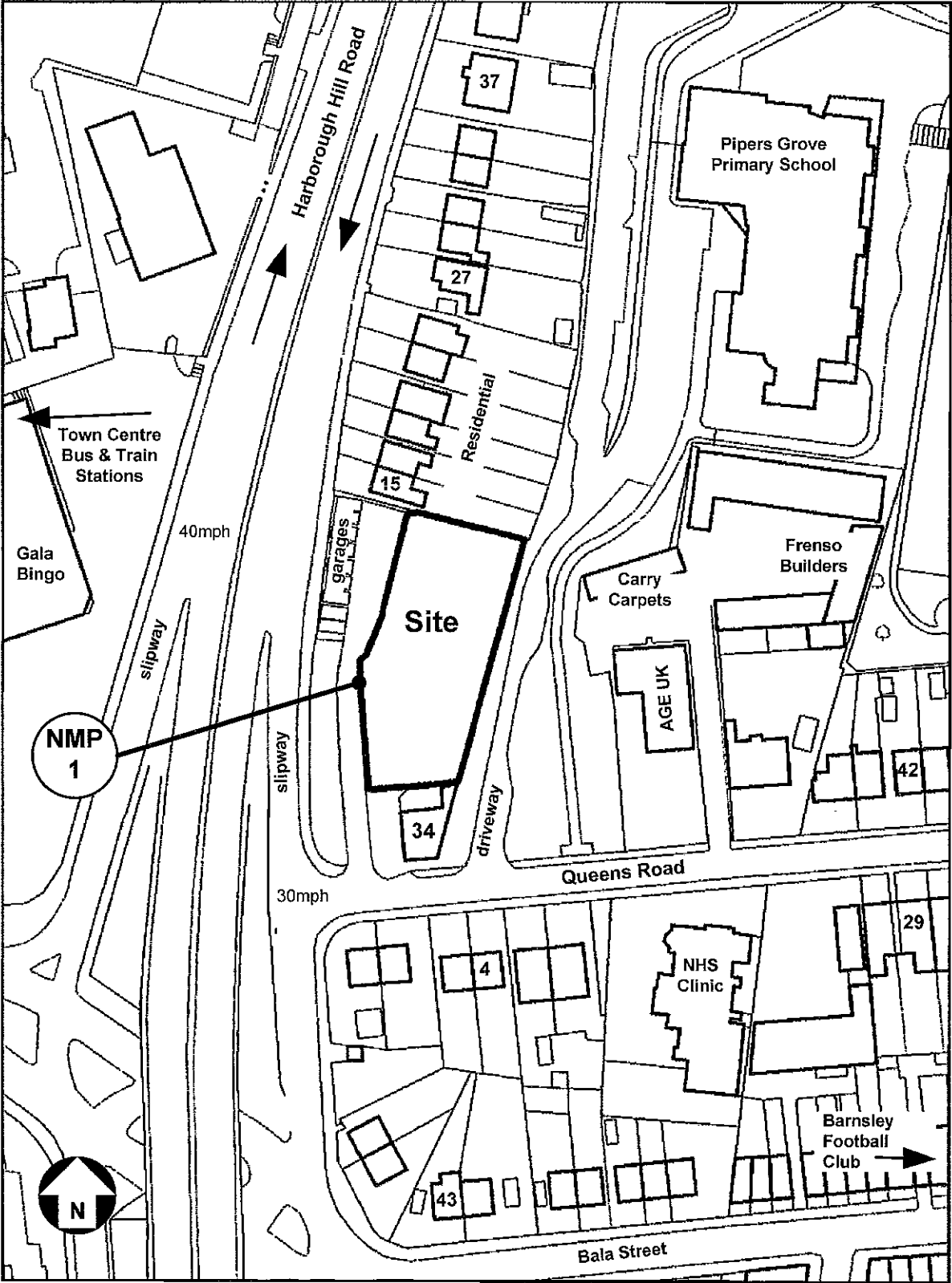
JM Beighton

BSc(Hons) CEng FIMechE CMIOSH MIOA

JM Dec 2011



Attachment 1



**Location Plan showing
Site Layout & Noise Measurement Position**

Attachment 2

Tel. 01226 772455
Fax. 01226 775699
E-mail: LucyAllen@barnsley.gov.uk

From: Steve Saunders [<mailto:steve.saunders@wm-saunders.co.uk>]
Sent: 04 October 2011 14:51
To: Allen , Lucy
Subject: Land at 32 Queens Road, Barnsley

williamsaunders architecture : engineering : building consultancy

Hello Lucy,

Further to our telephone conversation of yesterday. I have now obtained some initial information from the Client as to the use of the proposed building.

The following reflects the initial expectations upon opening of the new building. Obviously over time the aspirations are that these activities will develop and new ones will be added:

Our brass band currently has 4 players and does not practice. Currently they only play during our Sunday worship at between 2.00 and 3.00pm. Does the electric piano and audio-visual equipment count?

Sunday worship currently starts at 2.00pm. We will change to either the morning or late afternoon when we move. This is being discussed by our Corps Council.

Depending on the time of year we open we could have a "coffee morning" every weekday, (but this will depend on the availability of people to run it) and if there is no 'passing trade' it would not continue.

We anticipate running 'Parent & Toddler' groups (mornings - frequency to be decided - but probably not from day one). We have an Over 60s Group and if this was to continue it would run one afternoon. Based on our currently programme and extrapolating our usage would be:

*Sunday - a couple of hours
Monday-Friday - mornings - "coffee mornings" and office work
Thursday - evening - junior choir
Friday - afternoon - Over 60s*

I have attached the current sketch proposals to give you an idea of what is proposed in terms of the building layout.

Should you require any further information, then please do not hesitate to contact me.

I look forward to hearing from you.

Regards,

Steve Saunders

William Saunders
Sheppard Lockton House,
Cafferata Way,
Newark,
Notts.
NG24 2TN

Tel. 01636 704361
Fax 01636 702809
web site. www.wm-saunders.co.uk

info

From: Steve Saunders [steve.saunders@wm-saunders.co.uk]
Sent: 03 November 2011 10:59
To: info@the-bis.com
Subject: SA Barnsley - Additional Information

williamsaunders architecture : engineering : building
consultancy

Hello John,

Further to our conversation of yesterday afternoon. The Client has responded with the following information regarding use of the building:

Monday - Friday 9.00am to 12.00 Coffee Morning/Open drop in for Young Families after school drop off. Office in use.

Monday - Friday 1.00pm-3.00pm Internet Cafe

Wednesday 7.00pm-9.00pm Musicians Rehearsal

Thursday 6.00pm-7.00pm Community Children's Choir

Friday 4.00pm-6.00pm - Family 'messy church'.

Sunday 10.30am - 1.00pm morning worship

Sunday 5.00pm-6.30pm Bible Study

We also will be feeding the homeless/lonely on a needs/ad hoc basis.

Occasional Seasonal BBQ/Christmas fellowship/Easter Celebrations

Hope this is of some use to you.

Should you require any further information, then please do not hesitate to contact me.

Regards,

Steve Saunders

William Saunders
Sheppard Lockton House,
Cafferata Way,
Newark,
Notts.
NG24 2TN

Tel. 01636 704361

Fax 01636 702809

web site. www.wm-saunders.co.uk

Pleasley Colliery - WINNER of the English Heritage Angel Award 2011 "Best Rescue of an Industrial Building"

Pleasley Colliery - WINNER of the East Midlands Constructing Excellence Regional

05/11/2011

Attachment 3

Campbell Associates Ltd
5b Chelmsford Road Industrial Estate
GREAT DUNMOW, Essex, CM6 1HD
www.campbell-associates.co.uk

Certificate of Calibration and Conformance

Certificate No.: U9672



CALIBRATION



0789

Test object : Sound Calibrator
Manufacturer: Norsonic
Type : 1251
Serial no: 30875

Customer: BIS Ltd
Address: Bretby Business Park, Ashby Road,
Burton upon Trent, Staffordshire. DE15 0YZ.

Measurement Results:	Level	Level Stability	Frequency	Frequency Stability	Distortion
1:	114.00 dB	0.06 dB	1000.07 Hz	0.00 %	0.56 %
2:	113.99 dB	0.06 dB	1000.07 Hz	0.00 %	0.56 %
3:	114.00 dB	0.06 dB	1000.06 Hz	0.00 %	0.56 %
Result (Average):	114.00 dB	0.06 dB	1000.06 Hz	0.00 %	0.56 %
Expanded Uncertainty:	0.10 dB	0.02 dB	1.00 Hz	0.01 %	0.10 %
Degree of Freedom:	>100	>100	>100	>100	>100
Coverage Factor:	2.00	2.00	2.00	2.00	2.00

The stated level is relative to 20 μ Pa. The level is traceable to National Standards.

The stated level is valid at reference conditions. The following correction factors have been applied during the measurement: Pressure : 0.0005 dB/kPa Temperature : 0.003 dB/ $^{\circ}$ C Relative humidity : 0.000 dB/%RH Load volume : 0.0003 dB/mm³

The reported expanded uncertainty of measurements is based on a standard uncertainty multiplied by the coverage factor of k=2, providing a level of confidence of approximately 95%. Where the degrees of freedom are insufficient to maintain this confidence level, the coverage factor is increased to maintain this confidence level. The uncertainty has been determined in accordance with UKAS requirements.

Records : K:\C A\Calibration\Nor-1504\Nor-1018 CalCal2011\NOR1251_30875_M1.nmf

Environmental conditions:	Pressure :	Temperature :	Relative humidity :
Reference conditions:	101.325 kPa	23.0 $^{\circ}$ C	50 %RH
Measurement conditions :	100.461 kPa	23.9 $^{\circ}$ C	54.1 %RH

Date received for calibration : 01/09/2011
Date of calibration: 07/09/2011
Date of issue: 07/09/2011
Engineer

Supervisor

Michael Tickner

Darren Batten TechIOA



This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to recognised national standards, and to the units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full without the prior written approval of the issuing laboratory.

CA

Certificate number: U9672

Preconditioning

The equipment was preconditioned for more than 4 hours in the specified calibration environment.

Measurements

The calibrator has been tested as described in the following annexes to BS EN IEC60942:2003 Sound Calibrators; B3.4 for sound pressure level, B3.5 for frequency, B3.6 for total distortion and A4.4 for short term stability of the pressure level.

Method

Calibration has been performed as set out in the current version of CA Technical procedure TP01

Instruments and program

A complete list of equipment, hardware and software that has been used in this calibration is available from the calibration laboratory on request.

Traceability

The measured values are traceable to the following laboratories:

Sound Pressure Level: National Physical Laboratory, United Kingdom

Voltage: National Physical Laboratory, United Kingdom

Frequency: National Physical Laboratory, United Kingdom

Ambient Pressure: National Physical Laboratory, United Kingdom

Temperature & Relative Humidity: National Physical Laboratory, United Kingdom



Comment

Calibrated as received, no adjustments made.

Statement of conformance

As public evidence was available¹, from a testing organisation responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in annex A of BS EN IEC 60942:2003, the sound calibrator tested is considered to conform to all the class 1 requirements of that BS EN IEC 60942:2003.

¹ This evidence is held on file at the calibration laboratory.

Notes:

The sound pressure level generated by the calibrator in its ½ inch configuration was measured five times and averaged by a WS2P working standard microphone for class 1 or 2 devices or a LS2P reference microphone for class 0 or LS devices as specified in the International Standard BS EN 61094-4. The results of three replications and the mean of the measurements obtained are given in the measurement results table of this certificate. The frequency and distortion were measured in a similar manner. The figures in **BOLD** are the final results; a small correction factor may need to be added to the sound pressure level quoted here if the device is used to calibrate a sound level meter that is fitted with a free field response microphone. See manufacturer's handbooks for full details of this and other corrections that may be applicable.

Measurements performed by



**Campbell
Associates**

Sonitus House, 5b Chelmsford Road Industrial Estate, Great Dunmow, GB-CM6 1HD

Tel (+44) 01371 871030 Fax (+47) 01371 879106

email calibration@campbell-associates.co.uk

Page 2 of 2

Campbell Associates Ltd
5b Chelmsford Road Industrial Estate
GREAT DUNMOW, Essex, CM6 1HD
www.campbell-associates.co.uk
Phone 01371 871030 Facsimile 01371879106



Certificate of Calibration

Certificate number: U9674

CALIBRATION

0789

Test object : Sound Level Meter, Type 1 (Precision)
Manufacturer: Norsonic
Type : 131
Serial no: 1312934

Customer: BIS Ltd
Address: Bretby Business Park, Ashby Road,
Burton upon Trent, Staffordshire. DE15 0YZ.

Method :

Calibration has been performed as set out in CA Technical Procedures TP01 & 02 as appropriate. The following items have been calibrated as set out in BS 7580 Part 1:1997



	Producer:	Type:	Serial No:	Certificate number
Microphone	Norsonic	1228	00843	9673
Calibrator*	Norsonic	1251	30875	U9672
Preamplifier	Norsonic	1207	12188	Included

Additional items that also have been submitted for verification

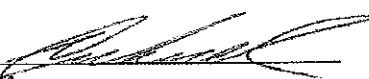
Wind shield None
Attenuator None
Extension cable None

These items have been taken into account wherever appropriate.

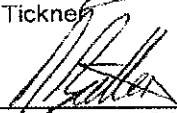
Environmental conditions:	Pressure :	Temperature :	Relative humidity :
Reference conditions:	101.325 kPa	23.0 °C	50 %RH
Measurement conditions :	100.141 kPa	21.9 °C	47.1 %RH

Date received : 01/09/2011
Date of calibration: 08/09/2011
Date of issue: 08/09/2011

Engineer


Michael Tickner

Supervisor


Darren Batten Tech IOA

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to recognized national standards, and to the units of measurement realized at the National Physical Laboratory or other recognized national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

* The calibrator was complete with any required coupler for the microphone specified

Calibration Certificate

UKAS Laboratory Number 0789

Certificate No.: U9674

Method

From markings on the sound level meter or by reference to the manufacturer's published literature it has been determined that the instrument submitted for verification was originally manufactured to BS EN 60651 and or BS EN 60804. The reference range, reference sound pressure level, primary indicator range, secondary indicator range, pulse range, linearity range and display range as specified by the manufacturer were used for the verification. The sound level meter was set to A weighting and adjusted to read correctly in response to the associated sound calibrator the reading was derived from the calibrator calibration certificate and manufacturer's instruction manuals. A measurement of the self noise of the sound level meter was then made using a dummy microphone having a capacitance of $\pm 20\%$ of the associated microphones self capacitance. The sound level meter was then tested, and its overall sensitivity adjusted, in accordance with Section 5 of BS 7580:Part 1:1997. The acoustic calibration at 1 kHz specified in sub-clause 5.6.1 of the standard was performed by application of a reference sound calibrator, whilst the tests at 125 Hz and 8k Hz (sub-clause 5.6.2) were performed by the electrostatic actuator method. At the end of the test, the associated sound calibrator was reapplied to the sound level meter and the meter reading was recorded and is noted below in the statements section.

Traceability :

The following measured values are traceable National Physical Laboratory, United Kingdom
Sound Pressure Level, Voltage, Frequency, Barometric Pressure, Temperature & Relative Humidity

Measurement Results:

Calibration of sound level meter - BS7580 #5.4	Passed
Noise test - BS 7580 #5.5.2	Passed
Level Linearity Test - BS 7580, #5.5.3	Passed
Frequency weightings: A Network - BS 7580 #5.5.4	Passed
Frequency weightings: C Network - BS 7580 #5.5.4	Passed
Frequency weightings: Z Network - BS 7580 #5.5.4	Passed
Time weightings F and S - BS7580 #5.5.5	Passed
Peak response - BS7580 #5.5.6	Passed
RMS accuracy - BS7580 #5.5.7	Passed
Time weighting I - BS7580 #5.5.8	Passed
Integrating Test : Time averaging - BS7580 #5.5.9	Passed
Integrating Test : Pulse range - BS7580 #5.5.10	Passed
Integrating Test : Sound exposure level - BS7580 #5.5.11	Passed
Overload SPL Test - BS 7580 #5.5.12	Passed
Overload Leq Test - BS 7580 #5.5.12	Passed
Acoustic tests - BS 7580 #5.4 and 5.6	Passed
Summation of acoustic tests - BS 7580 #5.5.4	Passed



Statements

The sound level meter in the configuration tested conforms to the requirements of BS 7580 Part 1.

The self-generated noise recorded in the test specified in § 5.5.2 was: (Below MSD) 15.7dB(A), (Below MSD) 14.8dB(C) and (Below MSD) 19.7dB(Z).

The following response was finally obtained using the associated calibrator.(§5.6.3): 113.8dB(A)

This reading should be used henceforth to set up the sound level meter for field use.

A stricter test than that specified in paragraphs 5.5.6 of BS7580:1997 has been used by verifying that the 10 ms reference pulse is also correct. The level uncertainty of the Laboratory's 1 kHz sound calibrator used during this verification is ± 0.1 dB.

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%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

The sound level meter in the configuration tested was found to comply with BS 7580:1997 part 1 for a type 1 device. The associated calibrator has been corrected for barometric pressure at the time of calibration in accordance with the relevant manufacturer's instructions

Campbell Associates Ltd
5b Chelmsford Road Industrial Estate
GREAT DUNMOW, Essex, CM6 1HD
www.campbell-associates.co.uk
Phone 01371 871030 Facsimile 01371879106



Certificate of Calibration

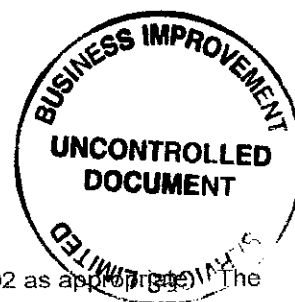
Certificate number: U7778

CALIBRATION

0789

Test object : Sound Level Meter
Manufacturer: Norsonic
Type : 118
Serial no: 31341

Customer: BIS Ltd
Address: Bretby Business Park, Ashby Road,
Burton upon Trent, Staffordshire. DE15 0YZ.
Contact Person: John Beighton
Order No: JMB007



Method

Calibration has been performed as set out in CA Technical Procedures TP01 & 02 as appropriate. The following items have been calibrated as set out in BS 7580 Part 1:1997

	Producer:	Type:	Serial No:	Certificate number
Microphone	Norsonic	1225	79653	7777
Calibrator*	Norsonic	1251	30875	U7776
Preamplifier	Norsonic	1206	30369	Included

Additional items that also have been submitted for verification

Wind shield None
Attenuator None
Microphone cable None

These items have been taken into account wherever appropriate.

Environmental conditions:	Pressure :	Temperature :	Relative humidity :
Reference conditions:	101.325 kPa	23.0 °C	50 %RH
Measurement conditions :	99.038 kPa	23.1 °C	49.9 %RH

Date received : 29/10/2010
Date of calibration: 29/10/2010
Date of issue: 29/10/2010

Engineer

Michael Tickner

Supervisor

David Egan - Laboratory Manager

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to recognized national standards, and to the units of measurement realized at the National Physical Laboratory or other recognized national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

* The calibrator was complete with any required coupler for the microphone specified

Calibration Certificate

UKAS Laboratory Number 0789

Certificate No.: U7778

Method

From markings on the sound level meter or by reference to the manufacturer's published literature it has been determined that the instrument submitted for verification was originally manufactured to BS EN 60651 and or BS EN 60804. The reference range, reference sound pressure level, primary indicator range, secondary indicator range, pulse range, linearity range and display range as specified by the manufacturer were used for the verification. The sound level meter was set to A weighting and adjusted to read correctly in response to the associated sound calibrator the reading was derived from the calibrator calibration certificate and manufacturer's instruction manuals. A measurement of the self noise of the sound level meter was then made using a dummy microphone having a capacitance of $\pm 20\%$ of the associated microphones self capacitance. The sound level meter was then tested, and its overall sensitivity adjusted, in accordance with Section 5 of BS 7580:Part 1:1997. The acoustic calibration at 1 kHz specified in sub-clause 5.6.1 of the standard was performed by application of a reference sound calibrator, whilst the tests at 125 Hz and 8k Hz (sub-clause 5.6.2) were performed by the electrostatic actuator method. At the end of the test, the associated sound calibrator was reapplied to the sound level meter and the meter reading was recorded and is noted below in the statements section.

Traceability

The measured values are traceable to the following laboratories:

Sound Pressure Level: National Physical Laboratory, United Kingdom

Voltage: National Physical Laboratory, United Kingdom

Frequency: National Physical Laboratory, United Kingdom

Ambient Pressure: National Physical Laboratory, United Kingdom

Temperature & Relative Humidity: National Physical Laboratory, United Kingdom

Measurement Results:

Calibration of sound level meter - BS7580 #5.4	Passed
Noise test - BS 7580 #5.5.2	Passed
Level Linearity Test - BS 7580, #5.5.3	Passed
Frequency weightings: A Network - BS 7580 #5.5.4	Passed
Frequency weightings: C Network - BS 7580 #5.5.4	Passed
Frequency weightings: Z Network - BS 7580 #5.5.4	Passed
Time weightings F and S - BS7580 #5.5.5	Passed
Peak response - BS7580 #5.5.6	Passed
RMS accuracy - BS7580 #5.5.7	Passed
Time weighting I - BS7580 #5.5.8	Passed
Integrating Test : Time averaging - BS7580 #5.5.9	Passed
Integrating Test : Pulse range - BS7580 #5.5.10	Passed
Integrating Test : Sound exposure level - BS7580 #5.5.11	Passed
Overload SPL Test - BS 7580 #5.5.12	Passed
Overload Leq Test - BS 7580 #5.5.12	Passed
Acoustic tests - BS 7580 #5.4 and 5.6	Passed
Summation of acoustic tests - BS 7580 #5.5.4	Passed



Statements

The sound level meter in the configuration tested conforms to the requirements of BS 7580 Part 1.

The self-generated noise recorded in the test specified in § 5.5.2 was: (Below MSD) 12.2dB(A), (Below MSD) 11.9dB(C) and (Below MSD) 15.7dB(Z).

The following response was finally obtained using the associated calibrator. (§5.6.3): 113.8dB(A)

This reading should be used henceforth to set up the sound level meter for field use.

A stricter test than that specified in paragraphs 5.5.6 of BS7580:1997 has been used by verifying that the 10 ms reference pulse is also correct. The level uncertainty of the Laboratory's 1 kHz sound calibrator used during this verification is ± 0.1 dB.

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%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

The sound level meter in the configuration tested was found to comply with BS 7580:1997 part 1 for a type 1 device. The associated calibrator has been corrected for barometric pressure at the time of calibration in accordance with the relevant manufacturer's instructions

Attachment 4

Tabulated Results: Land off 32 Queens Road, Barnsley, S7 1AU - 6th November 2011

Period	Time	L _{Aeq} dB	L _{A(max)} dB	Frequency Spectra / hz												
				8	16	32	63	125	250	500	1k	2k	4k	8k	16k	
1	13:00	65.8	72.1													
	13:15			77.6	74.3	71.6	71.2	67.8	60.7	60.3	63.5	57.4	45.8	37.7	32.1	
	13:30			73.1	71.0	69.2	68.1	63.6	59.2	59.8	62.8	56.9	45.4	34.4	27.6	
	13:45			74.7	71.9	69.5	70.2	67.1	60.5	60.0	62.9	56.1	44.3	34.1	29.3	
4	14:00	65.5	71.9	77.4	74.9	72.3	71.5	65.6	60.3	59.8	63.3	56.9	45.1	34.6	30.5	
5	14:15	64.6	75.1	79.4	76.4	73.3	71.4	67.2	60.6	58.7	62.2	56.1	43.9	33.5	30.4	
6	14:30	65.3	71.7	70.0	67.8	67.1	68.5	66.0	59.1	59.2	63.1	57.0	45.0	39.3	41.9	
7	14:45	65.6	71.5	74.0	71.3	68.8	70.1	65.2	60.4	60.1	63.4	57.0	45.7	36.7	28.3	
8	15:00	65.6	71.5	75.1	72.1	69.2	69.1	65.2	60.0	59.8	63.4	57.1	45.2	35.2	28.8	
9	15:15	65.6	74.9	77.2	74.5	72.0	71.8	65.8	60.5	59.8	63.4	57.2	44.8	34.4	30.9	
10	15:30	66.0	73.1	77.4	74.8	72.6	71.6	67.7	61.0	60.4	63.8	57.3	48.2	40.9	34.3	
11	15:45	65.2	72.1	80.2	76.8	74.3	72.0	66.7	60.3	59.4	62.9	56.7	44.6	34.7	32.4	
12	16:00	65.1	70.4	73.3	70.8	68.6	69.1	62.2	58.8	59.0	63.2	56.6	44.4	34.0	28.6	

Calculation Results :

- 1 Noise Level over the Period = $65\text{dB}L_{Aeq-3\text{hour}} = 58\text{dB}L_{Aeq-16\text{hour}}$

Universal Time: Sunday, 06 Nov 2011, 08:54

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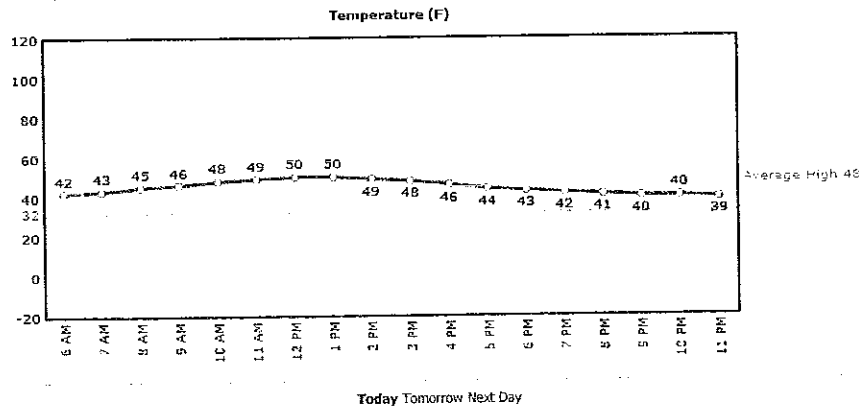
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6 AM	42°	38°	42°	0 Low	40°	93%	10%	0%	20%	10mi 16KM	N 7mph	M Clear
7 AM	43°	39°	43°	0 Low	40°	89%	10%	0%	20%	10mi 16KM	N 7mph	M Clear
8 AM	45°	41°	45°	0 Low	41°	86%	10%	0%	20%	10mi 16KM	N 7mph	M Sunny
9 AM	46°	42°	46°	0 Low	42°	86%	10%	0%	20%	10mi 16KM	N 7mph	M Sunny
10 AM	48°	45°	48°	1 Low	42°	80%	0%	0%	7%	10mi 16KM	N 7mph	Sunny
11 AM	49°	46°	49°	1 Low	43°	80%	0%	0%	6%	10mi 16KM	N 7mph	Sunny
12 PM	50°	47°	50°	1 Low	43°	77%	0%	0%	5%	10mi 16KM	N 7mph	Sunny
1 PM	50°	47°	50°	1 Low	43°	77%	0%	0%	4%	10mi 16KM	N 7mph	Sunny
2 PM	49°	46°	49°	0 Low	43°	80%	0%	0%	3%	10mi 16KM	N 6mph	Sunny
3 PM	48°	45°	48°	0 Low	42°	80%	0%	0%	2%	10mi 16KM	N 6mph	Sunny
4 PM	46°	43°	46°	0 Low	42°	86%	0%	0%	1%	10mi 16KM	N 6mph	Sunny
5 PM	44°	41°	44°	0 Low	41°	89%	0%	0%	0%	10mi 16KM	N 5mph	Clear
6 PM	43°	40°	43°	0 Low	40°	89%	0%	0%	0%	10mi 16KM	N 5mph	Clear
7 PM	42°	39°	42°	0 Low	39°	89%	0%	0%	0%	10mi 16KM	N 5mph	Clear
8 PM	41°	38°	41°	0 Low	38°	89%	0%	0%	0%	10mi 16KM	N 4mph	Clear
9 PM	40°	37°	40°	0 Low	37°	89%	0%	0%	1%	10mi 16KM	N 4mph	Clear
10 PM	40°	37°	40°	0 Low	36°	86%	0%	0%	1%	10mi 16KM	N 4mph	Clear
11 PM	39°	36°	39°	0 Low	35°	86%	0%	0%	2%	10mi 16KM	N 4mph	Clear

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Attachment 5

Table 5 — Indoor ambient noise levels in spaces when they are unoccupied

Criterion	Typical situations	Design range $L_{Aeq,T}$ dB	
		Good	Reasonable
Reasonable industrial working conditions	Heavy engineering	70	75
	Light engineering	65	75
	Garages, warehouses	65	75
Reasonable speech or telephone communications	Department store	50	55
	Cafeteria, canteen, kitchen	50	55
	Wash-room, toilet	45	55
	Corridor	45	55
Reasonable conditions for study and work requiring concentration	Library, cellular office, museum	40	50
	Staff room	35	45
	Meeting room, executive office	35	40
Reasonable listening conditions	Classroom	35	40
	Church, lecture theatre, cinema	30	35
	Concert hall, theatre	25	30
	Recording studio	20	25
Reasonable resting/sleeping conditions	Living rooms	30	40
	Bedrooms ^a	30	35

^a For a reasonable standard in bedrooms at night, individual noise events (measured with F time-weighting) should not normally exceed 45 dB L_{Amax} .

Table 6 — Indoor ambient noise levels in spaces when they are unoccupied and privacy is also important

Criterion	Typical situations	Design range $L_{Aeq,T}$ dB
Reasonable acoustic privacy in shared spaces	Restaurant	40–55
	Open plan office	45–50
	Night club, public house	40–45
	Ball room, banquet hall	35–40
	Reception room	35–40

7.6.1.4 Other precautions

It is recommended that any partition separating a WC from a noise sensitive room should have a weighted standardized level difference ($D_{nT,w}$) of at least 38 dB.

In flats, sound absorbent materials should be applied to the ceiling surfaces of internal corridors and stairwells to reduce propagation of noise through the building.

NOTE Carpets can also provide useful absorption.

Resilient floor coverings, such as carpet with underlay, can be used to minimize noise from footsteps on stair treads, corridors and landings. Noise will be reduced at the same floor level and to rooms below the floor or stair. The quietest types of sanitary, heating and plumbing equipment (e.g. WCs, ball valves, refuse chutes etc.) should be used; however their location is more important than their detailed design.

It is good practice to isolate vibration in the heating pipework from the building structure, at least near the pump. This may be achieved by using resilient fixings on pipe runs. Where pipes penetrate walls and floors, air gaps should be sealed to reduce airborne noise transmission in such a way that structure-borne noise is not transmitted: this may be achieved by packing the gap with mineral wool, and sealing the faces with non-hardening mastic. Building Regulations guidance for fire safety should be taken into account [24], [25], [26]. Ventilation fans and similar equipment should have resilient mountings where structure-borne noise could be a problem. Care should be taken to position lifts to minimize noise disturbance from the operation of the control gear. Lift doors should operate quietly, and acoustic signals to herald lift arrival should not be audible within dwellings.

NOTE For additional guidance see [10].

8.4.7 Windows

8.4.7.1 General

Table 10 gives guide values for the sound insulation of windows, as measured in the field.

NOTE Further information is given in BS 6262 and [31].

The nomogram in annex A can be used to estimate the insulation of a wall containing a window.

The full insulation value of any window cannot be realized if there are air gaps. These commonly occur around frames due to insecure fixing, shrinkage of wood and poor maintenance, and between frames and opening lights.

Glass often shows a pronounced dip in insulation at its critical frequency (see annex E). For 6 mm glass, this is around 2 000 Hz. Laminated glass performs better because the increased damping reduces the effect.

When adjoining rooms have their windows open the sound reduction from one to the other will be limited to about 30 dB if there are other buildings close to the windows to reflect the sound back. When the window is closed in one of the rooms, a reduction of over 50 dB between the rooms should be obtainable, and with both windows closed, this flanking path should not limit the insulation provided by normal separating elements.

8.4.7.2 Double glazed thermal insulating glass units

An insulating unit is unlikely to perform better than a single pane of mass equivalent to the thicker pane of the sealed unit and should be used in a frame with good seals to realize its full potential.

8.4.7.3 Secondary windows

In addition to the need for good sealing, the following recommendations apply for double windows.

- The air space should be at least 100 mm, although for good performance over the main frequency range of interest a cavity of about 300 mm is desirable.
- The sides and top of the reveal should be lined with sound absorbent (the bottom should be left clear to avoid staining due to condensation).
- The best results are obtained if both windows are sealed, but this has obvious difficulties for cleaning (and means of escape where appropriate). When opening lights are used some loss of insulation will occur, but this can be minimized by good quality fittings and weather stripping.
- The outer pane can be an insulating glass unit to improve performance and reduce condensation.

Table 10 — Sound insulation of typical windows

Description	Weighted sound reduction index R_w dB
Any type of window in a façade when partially open	10–15
Single glazed windows (4 mm glass)	22–30
Thermal insulating units (6-12-6)	33–35
Secondary glazed windows (6-100-6)	35–40
Secondary glazed windows (4-200-4)	40–45

8.4.7.4 Ventilation

The Building Regulations on ventilation [32], [33], [34] recommend that habitable rooms in dwellings have background ventilation. Trickle ventilators can provide this, and sound attenuating types are available. Where sound insulation requirements preclude opening windows for rapid ventilation and cooling, acoustic ventilation units incorporating fans are available for insertion in external walls; these can provide sound reduction comparable with domestic secondary glazing. However, ducted systems with intakes on the quiet side of the building may be required in very noisy situations, or where appearance rules out through-the-wall fans.

8.4.8 Floors and ceilings

8.4.8.1 General

As far as sound insulation is concerned, ground floors are of marginal interest except where they may contribute to flanking transmission by passing through a separating wall. Intermediate floors are the main concern and these are available with a variety of structural components and finishes.

Intermediate separating floors suitable for use in dwellings, which are described in the technical documents that support the Building Regulations [21], [22], [23], fall into the following three broad categories for new buildings:

- a concrete base with a soft covering;
- a concrete base with a floating layer; and
- a timber base with a floating layer.

Guidance on upgrading existing floors is also provided. The technical documents contain details of points to watch and should be consulted for work in dwellings. As the gaps between pre-cast units in beam and block floors are difficult to seal well, a bonded screed is strongly recommended.

Dwellings that adjoin other buildings with activities that generate noise levels greater than normal domestic activities may require constructions offering better performance than those described in the documents that support the Building Regulations.

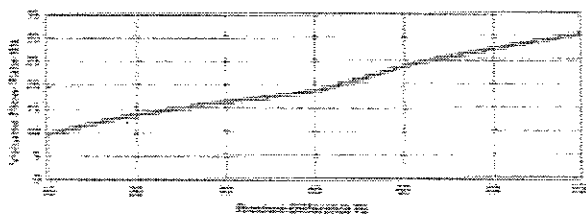
Attachment 6

AAB-4000 Acoustic Airbrick

Product Performance

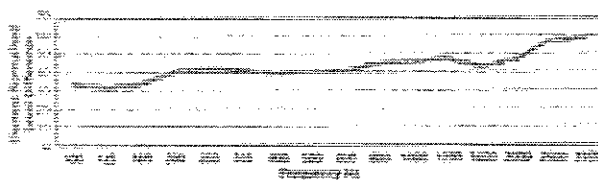
BS EN 1314-1 Airflow Performance (l/s)

Open Position



BS EN ISO 717-1: 1997 Airborne Sound Insulation (dB)

Closed Position



$$D_{n,e,w} (C_2/C_1) = 46(0-2) \text{ dB}$$

$$D_{n,e,w} (C) = 46 \text{ dB}$$

$$D_{n,e,w} (C_{tr}) = 44 \text{ dB}$$

$D_{n,e,w}$: Average weighted performance across frequency range

C: Pink Noise

C_{tr}: Road Noise

Full specification detail and test reports are available on request.

How to order

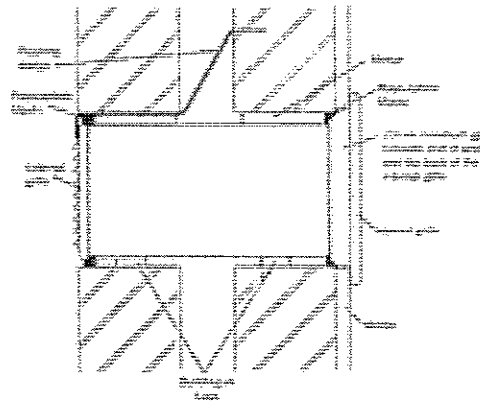
Please state:

- 1 Model – AAB
- 2 Grille – AAB-C
- 4 Quantity – 10.

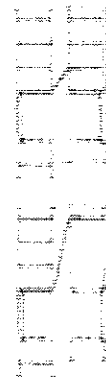
AAB x 10

AAB-C x 10

To order please contact Greenwood Customer Services on 01903 777130



- 1 Cut an opening 240mm x 165mm through the wall.
- 2 Place ventilator in opening, ensuring external grille is flush with face of wall. Building-in lugs should act as feet and should be sealed firmly in cement.
- 3 Make good prior to pointing with Polysulphide Mastic.
- 4 For cavity flashing:
For existing building – cut opening 100mm long on each side at top of prepared opening. Position 440mm wide lead flashing, allowing flashing to bridge cavity and turn up at least 75mm.
For new building – build into inner leaf of cavity at least one course above ventilator. Lead flash to extend 100mm beyond ventilator on each side.
- 5 Dress down flashing 25mm, covering edge of external grille.
- 6 Fit exposed site batts if required. Punch out 4 corner holes and fit to acoustic airbrick with self-tapping screws.
- 7 Minimum 20mm space must be left between the end of the unit and back of the internal grille. If wall does not permit 20mm space, use timber surround.
- 8 Fit internal grille.



Greenwood recommends that any dust be simply removed from the internal mechanism without dismantling.

For further information, please contact Greenwood Technical Services on: **01903 777137**

All information believed to be correct at the time of going to press. All goods are sold subject to Greenwood Air Management Ltd's standard condition of sale that are available on request. All dimensions in millimeters unless otherwise stated. Greenwood Air Management reserves the right to change specifications and prices without prior notice. Registered trademarks and patents protect Greenwood products.

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