

REPORT TITLE:

**Completion Testing for BREEAM Hea 05 acoustic performance standards at
Hornsey Town Hall, The Broadway, London N8 9JJ**

CLIENT DETAILS:

Ardmore Construction Ltd

DATE:

20th February 2025

REPORT REFERENCE:

PC-18-0326-RP11

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Report Author:	Report Checked & Authorised By:
Joan Carles Blanco Matos BSc (Honours) MIOA Associate Director	Martin Jones BSc (Honours) MIOA Managing Director
	
Dated: 21/02/2025	Dated: 21/02/2025

1. Introduction

Field measurements have been commissioned by Ardmore Construction Ltd to demonstrate compliance with the performance standards of BREEAM Hea 05 at Hornsey town Hall, The Broadway, London N8 9JJ

The following sample field measurements are detailed within this report:

- Airborne sound insulation between spaces
- Reverberation in study spaces
- Indoor ambient noise levels

The measurements were taken in line with the methodology and regime as described in BS8233:2014 *Guidance on sound insulation and noise reduction for buildings*, and BREEAM Hea 05.

2. Details of Testing

Date of Testing:	Testing conducted by:
17 th February 2025	Pace Consult Ltd, Suite 2, Oyster House, Severalls Lane, Colchester, CO4 9PD
Address of test site:	Name of Client:
Hornsey town Hall, The Broadway, London N8 9JJ	Ardmore Construction Ltd
Person in charge of tests:	Other Personnel Present:
Joan-Carles Blanco BSc MIOA Registered Test Engineer with Pace Consult - ANC Engineer Ref: 167/03	N/A
Room descriptions taken from:	
Construction Drawings	

Site conditions.

Suitable test conditions with access to all rooms.

3. Criteria.

BREEAM Hea 05 acoustic criteria is included below.

Industrial, Retail, Prisons and Other building types (two credits)	
First credit – Sound insulation and internal indoor ambient noise levels	
Industrial, Retail, Prisons and Other building types (two credits)	
Room function	All room functions
Criteria	Internal indoor ambient noise levels: Indoor ambient noise levels comply with the design ranges given in BS8233:2014 unless otherwise stated below. Where the room types below are present, the appropriate criteria for ambient noise levels, sound insulation and acoustic privacy must also be achieved.
Room function	Acoustically sensitive rooms
Criteria	Sound insulation: The sound insulation between acoustically sensitive rooms and other occupied areas complies with the example matrix relating to internal sound insulation within Section 7.5 of BS8233:2014 which takes into consideration the likely level of activity noise, the degree of privacy required and the sensitivity of the adjacent space. It may be considered appropriate to adapt the levels of sound insulation presented within the table according to a specific building's use and any modification to the criteria should be justified by an SQA. Examples of rooms with a 'confidential' privacy requirement may include human resources meeting rooms, or rooms where private conversations may be taking place, however their 'activity noise' is likely to be only 'typical' and then the level of sound insulation would be determined based on the sensitivity of the receiving space. Factory spaces are likely to be considered less sensitive as a receiving space than an adjacent office
Second credit – Reverberation	
Room function	Rooms/areas used for speech or performance, including public speaking
Criteria	Achieve reverberation times compliant with Section 1 of BB93. In addition, or alternatively, if relevant to the assessed building; classrooms, seminar rooms and lecture theatres achieve reverberation times compliant with section 1 of BB93.
Testing requirement	Reverberation times within teaching and study spaces: A programme of acoustic measurements is carried out by a compliant test body to achieve the required performance standards set out in table 6 in section 1 of BB93. Measurements should be carried out in accordance with the ANC Good Practice Guide, Acoustic testing of Schools. Open Plan teaching spaces: STI Measurements of the STI should be taken in at least one in ten typical student listening positions in the open plan spaces in accordance with the ANC Good Practice Guide, Acoustic testing of Schools. Corridors and stairwells: installation of a specification compliant with the BB93 criteria demonstrates compliance. Reference is also made to the Notes below.
Notes	Where the reverberation time required by the relevant standard is not appropriate for the type of space/building assessed, the acoustician must confirm why this is the case. In addition the acoustician must set alternative appropriate reverberation times and provide these to demonstrate compliance.

Note. The indoor ambient noise levels, sound insulation, and reverberation time testing are undertaken according to the methodology and criteria recommended by BS8233:2014.

4. Results

4.1. Airborne sound insulation between spaces

The airborne sound test was completed following the recommendations included in section 7 of BS8233:2014.

Measurements were taken in the direction of the more stringent airborne sound insulation requirement. Where the classifications of rooms above or below another are same, the testing regime includes tests with source rooms above and below to demonstrate compliance with the test requirement.

To give evidence of compliance with the values in Table 3 of BS8233:2014, measurements of airborne sound insulation have been undertaken between the following spaces:

Test Number	Partition Type	Source Room	Receiver Room	BS8233:2014	Result	Deficit / Compliant re: BS8233:2014
01	Wall	F.37 Member's room	F38 Co-working space	$\geq 47\text{dB } D_{nT,w}$	47	Compliant
02	Wall	F38 C-working space	F39 Co working space	$\geq 47\text{dB } D_{nT,w}$	50	Compliant
03	Floor	Restaurant	F 38 Co-working space	$\geq 57\text{dB } D_{nT,w}$	61	Compliant
04	Floor	F.33 Council Chamber	G.27 Permanent coworking	$\geq 47\text{dB } D_{nT,w}$	53	Compliant
05	Floor	G.50 Retail	F.45 Community Room	$\geq 57\text{dB } D_{nT,w}$	57	Compliant
06	Floor	G.48 Cafe	F.45 Community Room	$\geq 57\text{dB } D_{nT,w}$	58	Compliant
07	Wall	G.57 Assembly Hall	F.50 Cinema	$\geq 57\text{dB } D_{nT,w}$	74	Compliant

4.2. Reverberation times

BS 8233:2014 section 7.7.10.3 states the following: *guide values of reverberation time for rooms of different volume can be found in standard texts e.g Noise control in building services published by Sound Research Laboratories Ltd, Oxford: Pergamon Press. 1988.*

To give evidence of compliance with the recommended values in Figure 4.12 of the relevant acoustic text: *Noise control in building services*, measurements of reverberation times have been undertaken in the following spaces:

Room	BS8233:2014 Requirement	Result	Deficit / Compliant re: BS8233:2014
F38 Co-working space	≤ 0.8 Seconds	0.8	Compliant
F39 Co working space	≤ 0.8 Seconds	0.7	Compliant
G.27 Permanent coworking	≤ 1.0 Seconds	0.8	Compliant
F.3 Mayor Parlour	≤ 0.8 Seconds	0.8	Compliant
G.57 Assembly Hall	≤ 1.5 Seconds	1.4	Compliant
LG.40 Super Room	≤ 1.0 Seconds	0.9	Compliant
G.50 Retail	≤ 1.0 Seconds	0.7	Compliant
G.48 Cafe	≤ 0.9 Seconds	0.8	Compliant

4.3. Indoor ambient noise levels

To give evidence of compliance with the values in Table 6 of BS8233:2014, measurements of indoor ambient noise level have been undertaken in the following spaces:

Room	BS8233:2014 Requirement	Result	Deficit / Compliant re: BS8233:2014
F38 Co-working space	≤ 35 L _{Aeq,T} (dB)	33	Compliant
F39 Co working space	≤ 35 L _{Aeq,T} (dB)	34	Compliant
G.27 Permanent coworking	≤ 35 L _{Aeq,T} (dB)	25	Compliant
F.3 Mayor Parlour	≤ 35 L _{Aeq,T} (dB)	35	Compliant
G.57 Assembly Hall	≤ 35 L _{Aeq,T} (dB)	34	Compliant
LG.40 Super Room	≤ 35 L _{Aeq,T} (dB)	25	Compliant
G.50 Retail	≤ 50 L _{Aeq,T} (dB)	35	Compliant
G.48 Cafe	≤ 45 L _{Aeq,T} (dB)	34	Compliant

5. Conclusions

Field measurements have been undertaken to demonstrate compliance with the performance standards of BS8233:2014 and BREEAM Hea 05 at Hornsey Town Hall, The Broadway, London N8 9JJ in the following areas:

- Airborne sound insulation between spaces
- Reverberation in study spaces
- Indoor ambient noise levels

All tests undertaken showed compliance with the requirements of BS8233:2014 and BREEAM Hea 05.

Appendix:

A Details of Test

Test Equipment

Equipment Description	Type Number	Manufacturer	Serial Number	Date of Last Calibration	Calibration Certification Number
Sound Level Meter	NOR-118	Norsonic	31739	26/02/2024	U46916/U46917
Microphone	40AF	GRAS	45372	26/02/2024	U46916/U46917
Preamplifier	1206	Norsonic	30629	26/02/2024	U46916/U46917
Calibrator	NOR-1251	Norsonic	32199	05/09/2024	U48662
Speaker	NOR-250	Norsonic	31429	-	-
Amplifier	NOR-280	Norsonic	2803650	-	-

The calibration of the sound level meter was checked before and after the measurements, using a calibrator to an accuracy of ± 0.1 dB.

A.1. General

Testing has been undertaken in line with BS8233:2014 and Approved Document E (2003, as amended 2004) of The Building Regulations, in general accordance with the applicable standards for sound insulation testing, being: Airborne; ISO 16283-1 and Impact; ISO 140-7 1998.

A.2. For Airborne Tests:

5 fixed Microphone positions within both the source and receiver rooms were used for each source positions. The averaging time for each speaker position (source and receiver side) in each case was 30 seconds.

The Standardized Level Difference ($D_{nT(T_{mf,max})}$) was calculated as follows:

$$D_{nT} = D + 10\text{Log} (T / T_{(0.5s)}) \text{ dB}$$

Where:

D (dB) is the mean sound pressure level difference $L_1 - L_2$
 L_1 (dB) is the mean sound pressure level in the source room
 L_2 (dB) is the mean sound pressure level in the receive room
T is the mean reverberation time in seconds of the receive room
 $T_{(0.5\text{seconds})}$ is the normalised RT.

A.3. *Reverberation times:*

A total of 6 reverberation time measurements were taken in each receiver room, using three fixed microphone positions for a single pink noise source location.

A.4. *Background noise:*

Background noise measurements were taken within each receiver room. Background measurements were recorded at typically the same locations as those used for the fixed microphone receiver room (L2) measurements. This method is discussed within the ANC Good Practice Guide for pre-completion testing.

B References:

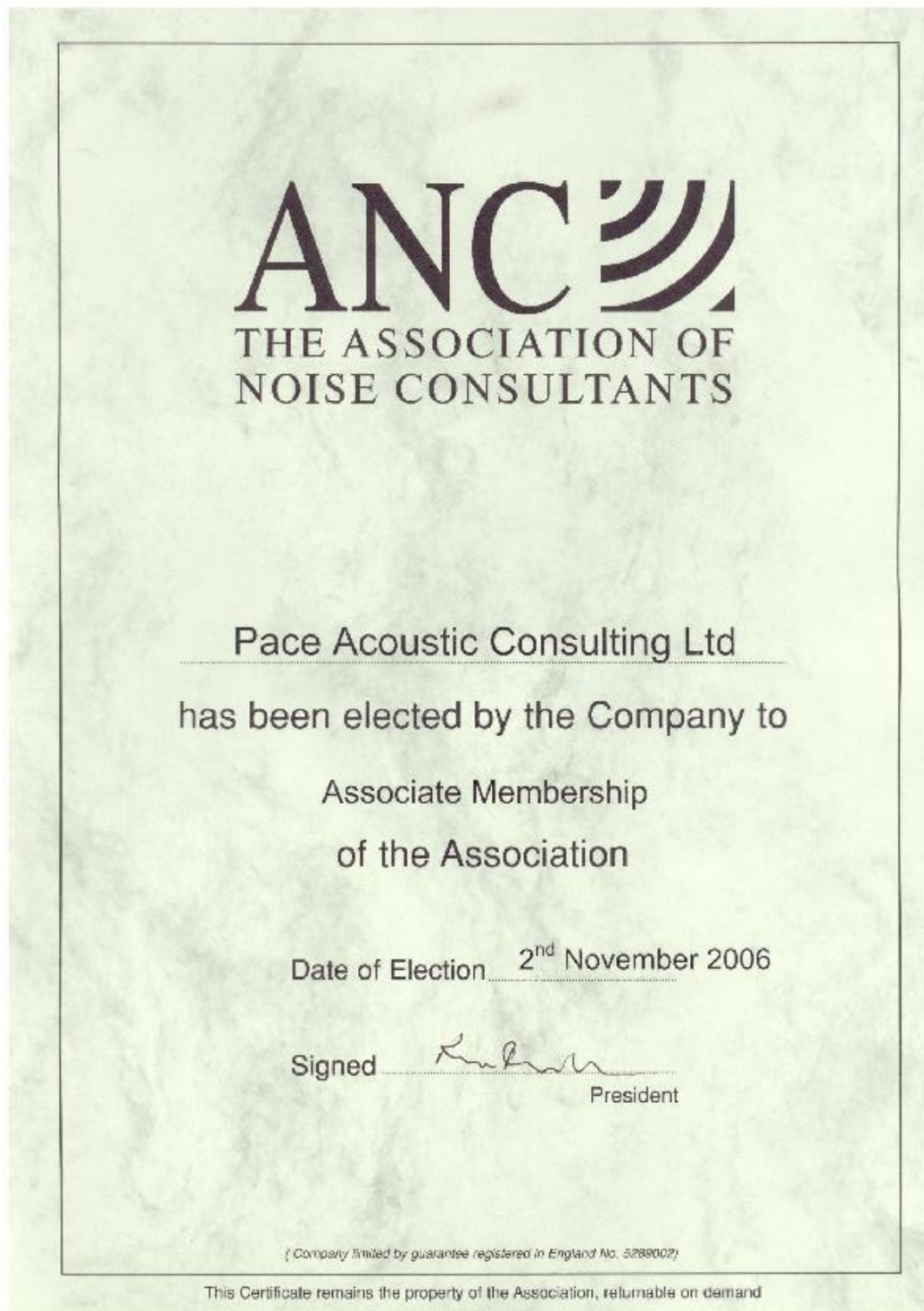
The sound insulation tests were carried out and rated in accordance with BB93, and Building Regulations Approved Document E and the following international standards:

- BS8233:2014 Guidance on sound insulation and noise reduction for buildings.
- BS EN ISO 16283-1: 2014 Acoustics – Field measurement of sound insulation in buildings and of building elements. Part 1 – Airborne sound insulation.
- BS EN ISO 140-14:2004 Acoustics. Measurement of sound insulation in buildings and of building elements. Guidelines for special situations in the field (where appropriate)
- ISO 140-7:1998 Acoustics – Measurement of sound insulation in buildings and of building elements. Part 7. Field measurements of impact sound insulation of floors.
- BS EN ISO 717-1: 2013 Acoustics – Rating of sound insulation in buildings and of building elements. Part 1: Airborne sound insulation.
- BS EN ISO 717-2: 2013 Acoustics – Rating of sound insulation in buildings and of building elements. Part 2: Impact sound insulation.
- BS EN ISO 3382-2:2008 Acoustics. Measurement of room acoustic parameters. Reverberation time in ordinary rooms
- ANC Good Practice Guide Acoustic Testing of Schools. Version 2, 2015.

Pace Consult Limited site testing is undertaken to a quality procedure following the guidance from ISO 17025:2005 'General Requirements for the competence of testing and calibration laboratories'.

ANC Membership.

The author is a corporate member of the Institute of Acoustics (IOA) which satisfies the experience and qualification requirements for a 'suitably qualified acoustician'. Pace Consult are also full member of the Association of Noise Consultants.



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Suitable test conditions with access to all rooms.

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G.48 Cafe	≤ 45 L _{Aeq,T} (dB)	34	Compliant

5. Conclusions

Field measurements have been undertaken to demonstrate compliance with the performance standards of BS8233:2014 and BREEAM Hea 05 at Hornsey Town Hall, The Broadway, London N8 9JJ in the following areas:

- Airborne sound insulation between spaces
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Speaker	NOR-250	Norsonic	31429	-	-
Amplifier	NOR-280	Norsonic	2803650	-	-

The calibration of the sound level meter was checked before and after the measurements, using a calibrator to an accuracy of ± 0.1 dB.

A.1. General

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A.3. *Reverberation times:*

A total of 6 reverberation time measurements were taken in each receiver room, using three fixed microphone positions for a single pink noise source location.

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