



**Report of Sound Insulation Testing  
at  
Fountain House  
Welwyn Garden City  
Hertfordshire**

**Report No:** DJB/6982/A  
**Date of Issue:** 26 April 2017  
**Property Type:** Dwellings to be formed by a material change of use

**Date of Test:** 13 April 2017

**ACOUSTICAL INVESTIGATION & RESEARCH ORGANISATION LTD**

Duxons Turn, Maylands Avenue, Hemel Hempstead, Herts, HP2 4SB Telephone: 01442 247146

AIRO is a UKAS accredited testing laboratory No. 0483 and measurements to British Standards BS EN ISO 140-4 & 7:1998 and BS EN ISO 717-1 & 2:1997 together with Approved Document E to The Building Regulations are included on our schedule of accreditation. UKAS is the United Kingdom Accreditation Service.

**Test Engineer:**

**Client:** GPL 2014 Ltd  
9 Bridewell Pace  
London  
EC4V 6AW

*D J Boaden*

**D J Boaden BSc MInstP MIOA  
Managing Consultant**

**Comparison with Approved Document E (2003) to The Building Regulations 2010 (ref 1)**

Test No.	Rooms	$D_{nT,w} + C_{tr}$ (dB)		
		Measured	Required	Pass/Fail
1	Club 67, 1 <sup>st</sup> Floor to Ladies Toilet, 1 <sup>st</sup> Floor, Fountain House	47	≥ 43	<b>PASS</b>
2	Club 67, 1 <sup>st</sup> Floor to Office Above, 2 <sup>nd</sup> Floor Fountain House	52	≥ 43	<b>PASS</b>

**Equipment**

Type	Serial No.	Type	Serial No.
Norsonic 140 Sound Analyzer	1403123	Norsonic 1209 Microphone Pre-Amplifier	12703
Norsonic 140 Sound Analyzer	1403164	Norsonic 1209 Microphone Pre-Amplifier	12554
GRAS 40AE ½" Condenser Microphone	97969	B&K 4231 Sound Level Calibrator	1795485
GRAS 40AE ½" Condenser Microphone	97972		

The test procedures in Annex B of Approved Document E (2003) have been followed except as follows:

Exception	Reason
B2.1 – Minimum distances as specified by Standards.	Minimum distances not satisfied due to room conditions.

**Approved by:**

*D L Watts*

**Eur Ing D L Watts BEng CEng FIOA  
Principal Consultant**

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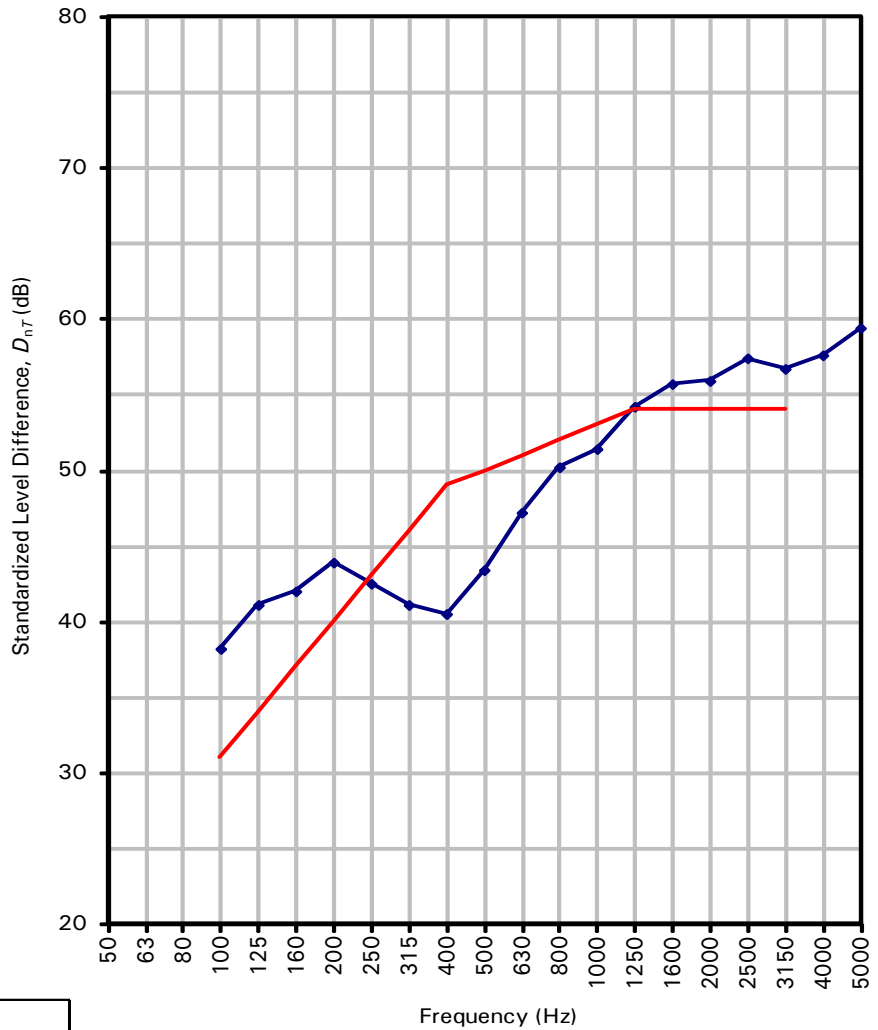
Date of Test: 13 April 2017

### Test 1 – Airborne Sound Insulation across Separating Floor

Test No.	SOURCE ROOM		RECEIVE ROOM	
	Room	Vol. (m <sup>3</sup> )	Room.	Vol. (m <sup>3</sup> )
1	Club 67, 1 <sup>st</sup> Floor	> 150	Ladies Toilet, 1 <sup>st</sup> Floor Fountain House	16

Standardized Level Difference according to BS EN ISO 140-4:1998

Frequency (Hz)	$D_{nT}$ (dB)
50	
63	
80	
100	≧ 38.2
125	≧ 41.1
160	42.0
200	43.9
250	42.5
315	41.1
400	40.5
500	43.4
630	47.2
800	50.2
1000	51.4
1250	54.2
1600	55.7
2000	55.9
2500	57.4
3150	56.7
4000	57.6
5000	59.4
6300	
8000	
10000	



Rating according to BS EN ISO 717-1:1997	
$D_{nT,w} (C; C_{tr}) =$	50 (-1;-3) dB
$D_{nT,w} + C_{tr} =$	<b>47 dB</b>

—◆— Measured Standardized Level Difference,  $D_{nT}$  (dB)  
— Reference curve (BS EN ISO 717-1:1997)

$C_{50-3150}$ : --       $C_{50-5000}$ : --       $C_{100-5000}$ : 0 dB  
 $C_{tr,50-3150}$ : --       $C_{tr,50-5000}$ : --       $C_{tr,100-5000}$ : -3 dB

Evaluation based on a result obtained by a field method

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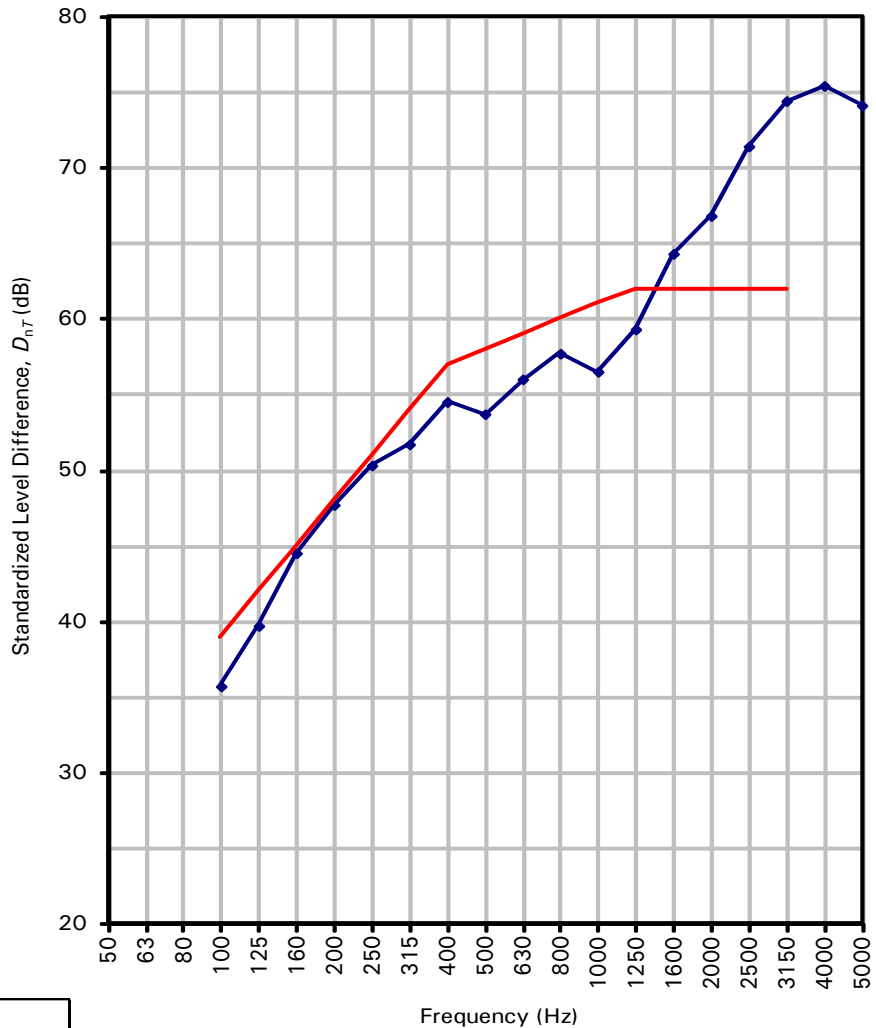
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### Test 2 – Airborne Sound Insulation across Separating Wall

Test No.	SOURCE ROOM		RECEIVE ROOM	
	Room	Vol. (m <sup>3</sup> )	Room	Vol. (m <sup>3</sup> )
2	Club 67, 1 <sup>st</sup> Floor	> 79	Office above Fountain House 2 <sup>nd</sup> Floor	101

Standardized Level Difference according to BS EN ISO 140-4:1998

Frequency (Hz)	$D_{nT}$ (dB)
50	
63	
80	
100	35.7
125	39.7
160	44.5
200	47.7
250	50.3
315	51.7
400	54.5
500	53.7
630	56.0
800	≧ 57.7
1000	≧ 56.5
1250	≧ 59.3
1600	≧ 64.3
2000	≧ 66.8
2500	≧ 71.4
3150	≧ 74.4
4000	≧ 75.4
5000	≧ 74.1
6300	
8000	
10000	



Rating according to BS EN ISO 717-1:1997	
$D_{nT,w} (C;C_{tr}) =$	58 (-1;-6) dB
$D_{nT,w} + C_{tr} =$	52 dB

◆ Measured Standardized Level Difference,  $D_{nT}$  (dB)  
 — Reference curve (BS EN ISO 717-1:1997)

$C_{50-3150}$ : --       $C_{50-5000}$ : --       $C_{100-5000}$ : 0 dB  
 $C_{tr,50-3150}$ : --       $C_{tr,50-5000}$ : --       $C_{tr,100-5000}$ : -6 dB

Evaluation based on a result obtained by a field method

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## Procedure

### Airborne Sound Insulation to BS EN ISO 140-4:1998

Airborne sound insulation measurements were performed according to a prescribed procedure that specifies that the sound generated in the source room shall be steady and have a continuous spectrum in the frequency bands of interest. Measurements of the sound levels were made in both source and receive rooms at the one-third octave intervals from 100 Hz to 5000 Hz as recommended in the Standard (ref 2). The measurements were made such as to obtain a spatial average of the sound pressure level in each room. Reverberation time measurements were made in the receive room following the procedures of British Standard BS EN 20354:1993 (ref 3).

The Standardized Level Difference ( $D_{nT}$ ) in decibels (dB) is calculated in each frequency band using the equation:

$$D_{nT} = L_1 - L_2 + 10 \lg \frac{T}{T_0} \quad \text{dB}$$

where

- $D_{nT}$  is the Standardized Level Difference (dB)
- $L_1$  is the average sound pressure level in the source room (dB)
- $L_2$  is the average sound pressure level in the receive room (dB)
- $T$  is the average reverberation time of the receive room (seconds)
- $T_0$  is the reference reverberation time of 0.5 seconds

The Weighted Standardized Level Difference ( $D_{nT,w}$ ) in decibels (dB) and the Spectrum Adaptation Terms ( $C$  and  $C_{tr}$ ), also in decibels, are calculated in accordance with BS EN ISO 717-1:1997 (ref 4) by comparison of the sixteen values of Standardized Level Difference from 100 Hz to 3150 Hz with the relevant reference curves.

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## References

1. The Building Regulations 2010

Approved Document E: Resistance to the passage of sound (2003 Edition incorporating 2004, 2010, 2013 and 2015 amendments)

E1 Protection against sound from other parts of the building and adjoining buildings

E2 Protection against sound within a dwelling-house etc

E3 Reverberation in the common internal parts of buildings containing flats or rooms for residential purposes

E4 Acoustic conditions in schools

2. British Standard BS EN ISO 140

Acoustics - Measurements of sound insulation in buildings and of building elements

BS EN ISO 140-4:1998

Field measurements of airborne sound insulation between rooms

3. British Standard BS EN 20354:1993

Acoustics - Measurement of sound absorption in a reverberation room

4. British Standard BS EN ISO 717

Acoustics - Rating of sound insulation in buildings and of building elements

BS EN ISO 717-1:1997

Airborne sound insulation