



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

Report No: DJB/6982
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)			$L'_{nT,w}$ (dB)		
		Measured	Required	Pass/Fail	Measured	Required	Pass/Fail
1 & 2	2 nd Floor Office Space, to 1 st Floor Office Space	52	≥ 43	PASS	45	≤ 64	PASS
3	1 st Floor Side Office to 1 st Floor Side Office	26	≥ 43	FAIL	--	--	--

Equipment

Type	Serial No.	Type	Serial No.
Norsonic 140 Sound Analyzer	1403164	B&K 4231 Sound Level Calibrator	1795485
GRAS 40AE ½" Condenser Microphone	97972	Norsonic 211A Tapping Machine	25175
Norsonic 1209 Microphone Pre-Amplifier	12703		

The test procedures in Annex B of Approved Document E (2003) have been followed.

Approved by:

D L Watts

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

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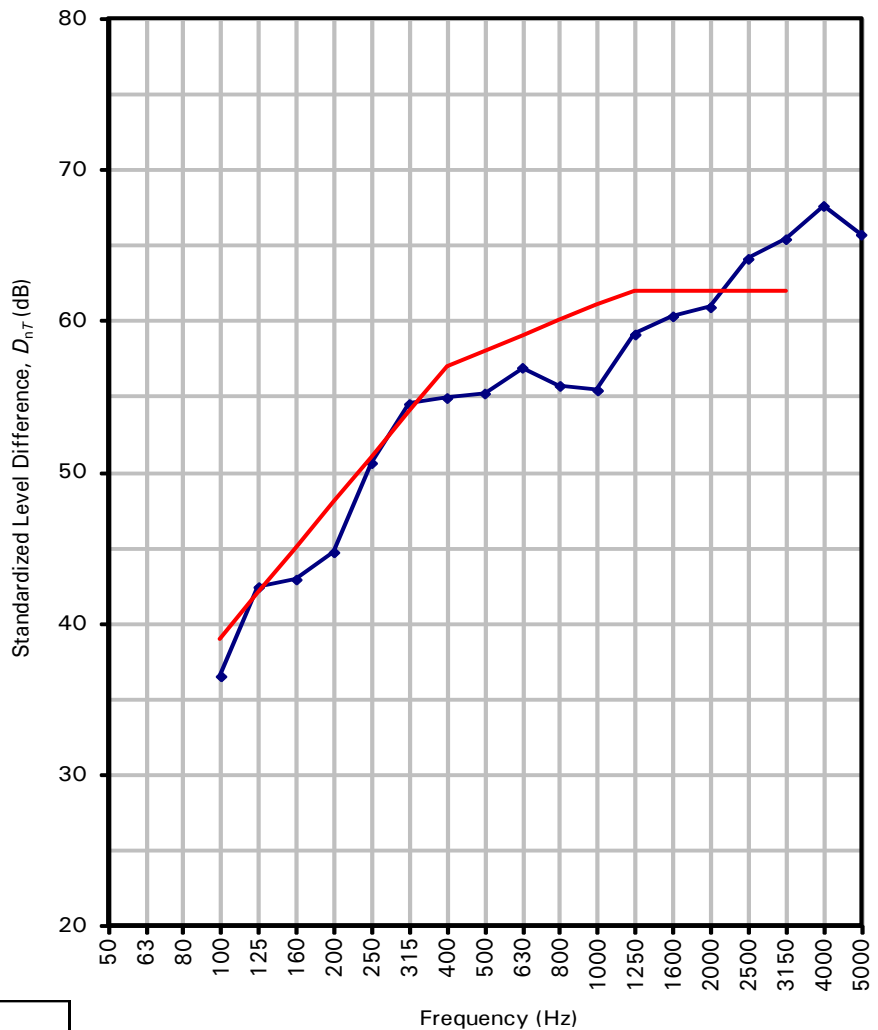
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Test 1 – Airborne Sound Insulation across Separating Floor

Test No.	SOURCE ROOM		RECEIVE ROOM	
	Room	Vol. (m ³)	Room	Vol. (m ³)
1	2 nd Floor Office Space	> 100	1 st Floor Office Space	> 100

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

Frequency (Hz)	D_{nT} (dB)
50	
63	
80	
100	36.5
125	42.4
160	42.9
200	44.7
250	50.6
315	54.5
400	54.9
500	55.2
630	≧ 56.9
800	≧ 55.7
1000	≧ 55.4
1250	≧ 59.1
1600	≧ 60.3
2000	≧ 60.9
2500	≧ 64.1
3150	≧ 65.4
4000	≧ 67.6
5000	≧ 65.7
6300	
8000	
10000	



Rating according to BS EN ISO 717-1:1997	
$D_{nT,w} (C; C_{tr}) =$	58 (-2;-6) dB
$D_{nT,w} + C_{tr} =$	52 dB

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

$C_{50-3150}$: -- $C_{50-5000}$: -- $C_{100-5000}$: -1 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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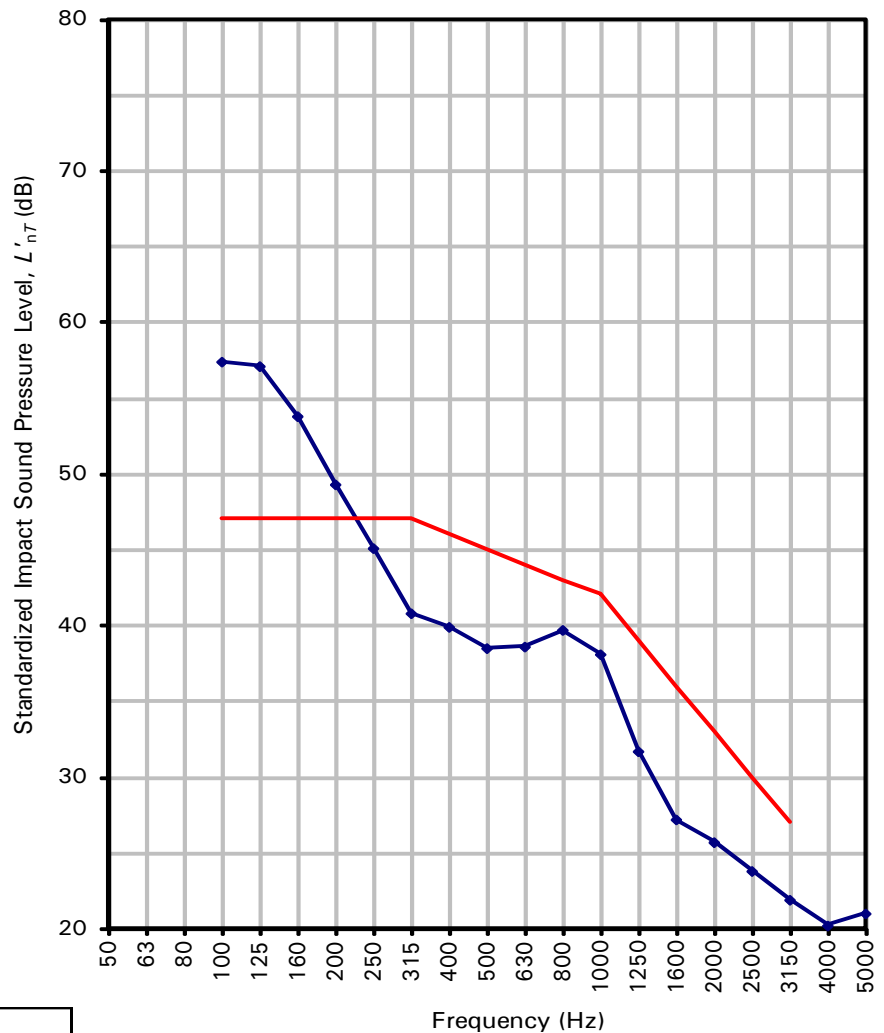
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Test 2 – Impact Sound Transmission through Separating Floor

Test No.	SOURCE ROOM		RECEIVE ROOM	
	Room	Vol. (m ³)	Room	Vol. (m ³)
2	2 nd Floor Office Space	> 100	1 st Floor Office Space	> 100

Standardized Impact Sound Pressure Level according to BS EN ISO 140-7:1998

Frequency (Hz)	L'_{nT} (dB)
50	
63	
80	
100	57.4
125	57.1
160	53.8
200	49.3
250	45.1
315	40.8
400	39.9
500	38.5
630	38.6
800	39.7
1000	38.1
1250	31.7
1600	27.2
2000	25.7
2500	23.8
3150	21.9
4000	20.2
5000	21.0
6300	
8000	
10000	



Rating according to BS EN ISO 717-2:1997	
$L'_{nT,w} (C_1) =$	45 (2) dB
$L'_{nT,w} =$	45 dB

—◆— Measured Standardized Impact Sound Pressure Level, L'_{nT} (dB)
— Reference curve (BS EN ISO 717-2:1997)

$C_1:$ 2 dB $C_{1,50-2500}:$ --

Evaluation based on a result obtained by a field method

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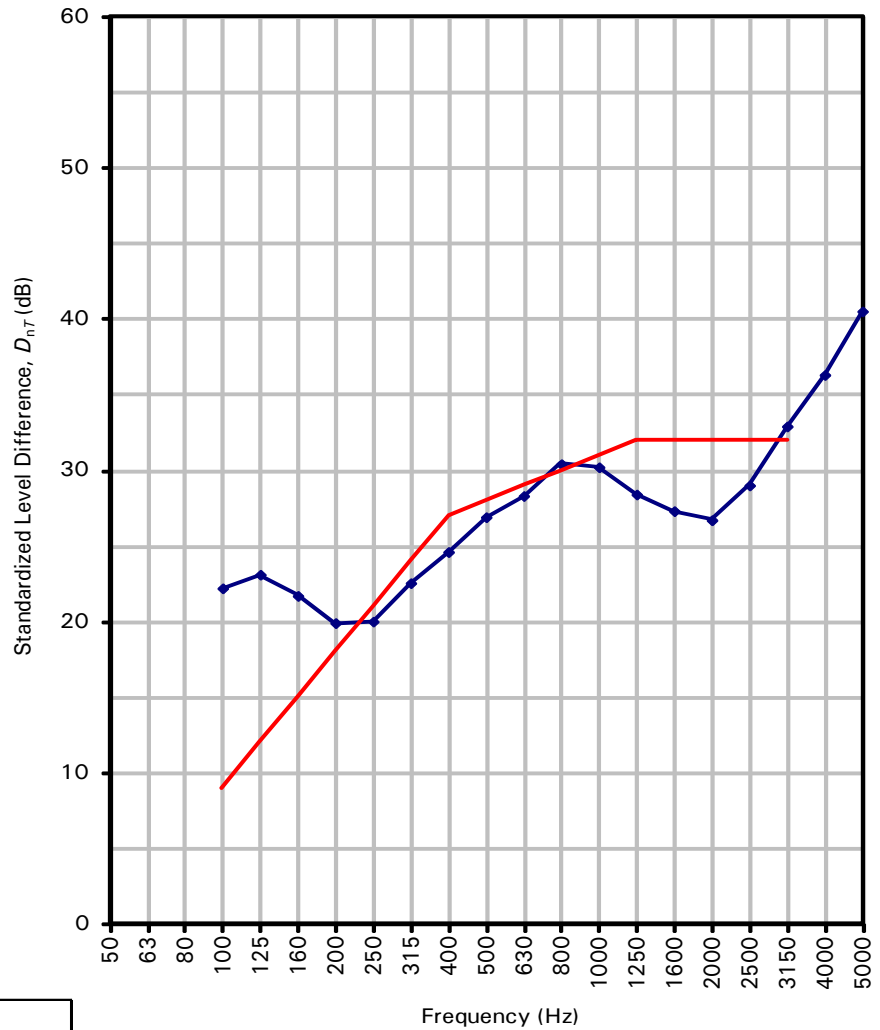
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Test 3 – Airborne Sound Insulation across Separating Wall

Test No.	SOURCE ROOM		RECEIVE ROOM	
	Room	Vol. (m ³)	Room	Vol. (m ³)
3	1 st Floor Side Office	36	1 st Floor Side Office	35

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

Frequency (Hz)	D_{nT} (dB)
50	
63	
80	
100	22.2
125	23.1
160	21.7
200	19.9
250	20.0
315	22.5
400	24.6
500	26.9
630	28.3
800	30.4
1000	30.2
1250	28.4
1600	27.3
2000	26.7
2500	29.0
3150	32.9
4000	36.3
5000	40.5
6300	
8000	
10000	



Rating according to BS EN ISO 717-1:1997	
$D_{nT,w} (C;C_{tr}) =$	28 (0;-2) dB
$D_{nT,w} + C_{tr} =$	26 dB

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

$C_{50-3150}$: -- $C_{50-5000}$: -- $C_{100-5000}$: 1 dB
 $C_{tr,50-3150}$: -- $C_{tr,50-5000}$: -- $C_{tr,100-5000}$: -2 dB

Evaluation based on a result obtained by a field method

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Construction Details

The construction details for the area of the building tested are unclear.

Separating Floor:

The separating floor appeared to be of concrete construction with an in-grid tile ceiling beneath. The ceiling was suspended via metal supports approximately 280 mm below the underside of the concrete floor. The depth and mass per unit area of the concrete floor is unknown.

External Walls:

The external walls appeared to be of solid masonry construction. The mass per unit area of the wall is unknown.

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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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Procedure

Impact Sound Transmission to BS EN ISO 140-7:1998

A standard tapping machine fitted with steel hammers was used as the impact source. Measurements of the transmitted sound levels were made in the receive room 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 the room. Reverberation time measurements were made in the receive room following the procedures of British Standard BS EN 20354:1993 (ref 3).

The Standardized Impact Sound Pressure Level (L'_{nT}) in decibels (dB) is calculated in each frequency band using the equation:

$$L'_{nT} = L_i - 10 \lg \frac{T}{T_0} \quad \text{dB}$$

where L'_{nT} is the Standardized Impact Sound Pressure Level (dB)
 L_i is the average impact 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 Impact Sound Pressure Level ($L'_{nT,w}$) in decibels (dB) and the Spectrum Adaptation Term (C_1), also in decibels, are calculated in accordance with BS EN ISO 717-2:1997 (ref 4) by comparison of the sixteen values of Standardized Impact Sound Pressure Level 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

BS EN ISO 140-7:1998

Field measurements of impact sound insulation of floors

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

BS EN ISO 717-2:1997

Impact sound insulation