Acoustic Test Report Number

040901

SITE AIRBORNE AND IMPACT SOUND INSULATION MEASUREMENTS BETWEEN ROOMS IN STUDENT ACCOMODATION AT COLMAN HOUSE, UEA NORWICH

Client
The Concrete Centre
Riverside House
4 Meadows Business Park
Camberley
Surrey GU17 9AB

Philip E Jones MIOA, 44 Stathern Lane, Harby, Melton Mowbray, Leics LE14 4DA

Test standards	Test code(s)	Dates of Tests
BS EN ISO 140 : Part 4: 1998 BS EN ISO 140 : Part 7: 1998	04/09/01, 02, 05, 06 and 04/09/03, 03i, 04, 04i	2nd September 2004
Test location	Block F, Colman House, UEA Norwich	
Report Prepared by	Signed	Date
P E Jones		22nd September 2004

1. CONSTRUCTION DETAILS (Supplied by site personnel)
A newly built block of student accommodation constructed using the Tunnel Form concrete system to give concrete separating floors and alternate concrete separating walls. External walls constructed from cavity blockwork and intermediate separating walls from solid blockwork. See pages 21 to 26 for details, plans and photographs.

1.1 Separating Walls (Tunnel Form)
180mm concrete (nominal density 2330kg/m^3, surface mass 420kg/m^2) with 2mm plaster skim coat.

1.2 Separating Walls (at bathroom pods)
100mm Lignacite concrete blocks (nominal density 1550kg/m^3) with 2mm plaster skim finish.

1.3 External Walls
Inner leaf of 100mm Lignacite blocks (nominal density 1550kg/m^3) with a 2mm plaster skim finish. Variable cavity 100mm to 150mm to accommodate building curve. 50mm Celotex Tuff R insulation fixed to inner leaf. On ground floor, outer leaf of 140mm facing blockwork (nominal density 1550kg/m^3) stack bonded. On upper floors, outer leaf of 100mm Lignacite blocks (nominal density 1550kg/m^3) finished with a sand / cement render coat.

1.4 Separating Floors
250mm concrete (nominal density 2310kg/m^3, surface mass 578kg/m^2) with a 50mm sand / cement screed (nominal density 2300kg/m^3, surface mass 115kg/m^2). Fair faced painted soffit and 6mm carpet adhesive fixed to floor.

1.5 Ground Floors
250mm concrete (nominal density 2310kg/m^3) with a 100mm sand / cement screed (nominal density 2300kg/m^3). 6mm carpet adhesive fixed to floor.

1.6 Internal partitions
Prefabricated concrete bathroom pods incorporating service risers.

1.7 Room conditions
Ground floor rooms contained a bed frame, under bed drawer, mattress and built in desk unit. On first floor, mattress and under bed drawer removed for test to prevent shielding of floor. Corridors were carpeted.

2. MEASUREMENTS

Airborne sound insulation measurements were made between rooms in Flat 28 on the ground floor.

Tests 04/09/01 and 04/09/05 were between rooms with Tunnel Form concrete separating walls.

Tests 04/09/02 and 04/09/06 were between rooms with 100 concrete block separating walls.

Airborne and Impact Sound Insulation measurements were made from Flat 30 on the first floor to Flat 28 on the ground floor.

Tests 04/09/03, 03i and 04/09/04, 04i give the results for the two Tunnel Form separating floors.

Airborne and Impact Sound Insulation measurements were made to BS EN ISO 140-4 and 7 : 1998 and the Weighted Standardized Level Difference ($D_{nT,w}$) and Weighted Impact Sound Pressure Level ($L'_{nT,w}$) calculated in accordance with BS EN ISO717-1 and 2:1997. Spectrum adaption terms C, C_{tr} and C_I were also calculated as described in BS EN ISO 717-1 and 2 (see 4. below). The test method, test procedure and equipment used are described on page 27.

3. REQUIREMENTS OF THE CURRENT BUILDING REGULATIONS

Performance Table 1b given in Section 0 of Approved Document E to the Building Regulations 2000 gives minimum values of sound insulation to be achieved between rooms for residential purposes.

For separating walls between purpose built rooms for residential purposes, the minimum airborne sound insulation value to be achieved is:

$$D_{nT,w} + C_{tr} = 43\text{dB}$$

For separating floors between purpose built rooms for residential purposes, the minimum airborne sound insulation value to be achieved is:

$$D_{nT,w} + C_{tr} = 45\text{dB}$$

For separating floors between purpose built rooms for residential purposes, the maximum impact sound insulation value to be achieved is:

$$L'_{nT,w} = 62\text{dB}$$

Paragraph 1.41 of Section 1 in Approved Document E states that each test result should be followed by a "pass or fail" statement with respect to the values given in Table 1a.
This information is given in the Results section below.

4. RESULTS

Tunnel Form wall	Location	Room Volume (m^3)	Pass / fail
04/09/01	Ground floor Rat 28 Room C	23	
	to Ground floor Rat 28 Room B	23	
	Common area 11m^2		

$D_{nT,w}$ (C ; C_{tr}) = 51 (-1 ; -5) dB $D_{nT,w} + C_{tr}$ = 46 dB pass

Tunnel Form wall	Location	Room Volume (m^3)	Pass / fail
04/09/05	Ground floor Rat 28 Room F	20	
	to Ground floor Rat 28 Room G	20	
	Common area 10m^2		

$D_{nT,w}$ (C ; C_{tr}) = 50 (0 ; -3) dB $D_{nT,w} + C_{tr}$ = 47 dB pass

100mm block wall	Location	Room Volume (m^3)	Pass / fail
04/09/02	Ground floor Rat 28 Room A	23	
	to Ground floor Rat 28 Room B	23	
	Common area 7.5m^2		

$D_{nT,w}$ (C ; C_{tr}) = 48 (-1 ; -3) dB $D_{nT,w} + C_{tr}$ = 45 dB pass

100mm block wall	Location	Room Volume (m^3)	Pass / fail
04/09/06	Ground floor Rat 28 Room H	20	
	to Ground floor Rat 28 Room G	20	
	Common area 6.5m^2		

$D_{nT,w}$ (C ; C_{tr}) = 47 (-1 ; -4) dB $D_{nT,w} + C_{tr}$ = 43 dB pass

Tunnel Form floor	Location		
04/09/03, 03i	First floor Rat 30 Room B	23	
	to Ground floor Rat 28 Room B	23	
	Common area 9.5m^2		

$D_{nT,w}$ (C ; C_{tr}) = 62 (-2 ; -5) dB $D_{nT,w} + C_{tr}$ = 57 dB pass

$L'_{nT,w}$ (C_I) = 37 (0) dB . pass

Tunnel Form floor	Location		
04/09/04, 04i	First floor Rat 30 Room G	20	
	to Ground floor Rat 28 Room G	20	
	Common area 8.5m^2		

$D_{nT,w}$ (C ; C_{tr}) = 61 (-1 ; -4) dB $D_{nT,w} + C_{tr}$ = 57 dB pass

$L'_{nT,w}$ (C_I) = 39 (0) dB . pass

Test Code : 040901 Test Date : 2 September 2004

Site Address : UEA Norwich, Student Accomodation, Block F, Colman House

Test Location : Ground Floor, Flat 28 Room C to Room B

Client: The Concrete Centre

Construction : 180mm Thin-form concrete separating wall with 2mm plaster skim

Rec room vol (m3): 23 Source room (m3): 23

Common area (m2): 11

Frequency

(Hz)	L1	L2	BG	L2 (BG)	Corr.?	D	T	DnT
100	91.0	55.4	25.2	55.4	NO	35.6	0.56	36.1
125	89.2	52.5	24.6	52.5	NO	36.7	0.42	35.9
160	88.0	53.1	26.8	53.1	NO	34.9	0.53	35.2
200	91.0	52.2	25.2	52.2	NO	38.8	0.58	39.4
250	93.9	46.8	21.0	46.8	NO	47.1	0.48	46.9
315	94.8	49.3	21.3	49.3	NO	45.5	0.47	45.2
400	93.7	48.2	25.0	48.2	NO	45.5	0.47	45.2
500	95.4	46.9	16.0	46.9	NO	48.5	0.51	48.6
630	97.2	49.4	12.6	49.4	NO	47.8	0.42	47.0
800	98.7	47.6	10.4	47.6	NO	51.1	0.42	50.3
1000	97.1	45.3	9.7	45.3	NO	51.8	0.40	50.8
1250	95.4	41.2	8.4	41.2	NO	54.2	0.36	52.8
1600	95.5	40.1	5.3	40.1	NO	55.4	0.38	54.2
2000	96.1	41.5	4.9	41.5	NO	56.6	0.35	55.1
2500	97.0	38.6	5.3	38.6	NO	58.4	0.36	57.0
3150	95.1	32.4	6.7	32.4	NO	62.7	0.33	60.9
4000	92.6	23.9	5.9	23.9	NO	68.7	0.33	66.9
5000	90.9	22.5	6.1	22.5	NO	68.4	0.32	66.5

ADAPTION TERMS ISO 717-1 100-3150 100-5000 DnT,w (dB) 51

C -1 -0

Ctr -5 -5

DnT,w + Ctr dB = 46

B : Corrected for background noise (see section 6.6 of EN ISO 140 - 4)
B* : Corrected for background noise. These values are minimum values.
The absolute values could not be calculated due to the influence of background noise.

Tested by :

P E Jones MIOA

Philip E Jones MIOA, 44 Stathern Lane, Harby, Melton Mowbray, Leics LE14 4DA

Field Measurements of Airborne Sound Insulation between rooms to BS EN ISO 140 - 4 : 1998

Test Code : 040901 Test Date : 2 September 2004
Site Address : UEA Norwich, Student Accomodation, Block F, Colman House
Test Location : Ground Floor, Flat 28 Room C to Room B

Client : The Concrete Centre

Construction : 180mm Thin-form concrete separating wall with 2mm plaster skim

Rec room vol (m3) : 23 Common area (m2) : 11

Source room (m3) : 23

Freq.(Hz)	DnT(dB)
100	36.1
125	35.9
160	35.2
200	39.4
250	45.9
315	45.2
400	45.2
500	48.6
630	47.0
800	50.3
1000	50.8
1250	52.8
1600	54.2
2000	55.1
2500	57.0
3150	60.9
4000	66.9
5000	66.5

DnT,w (dB) 51

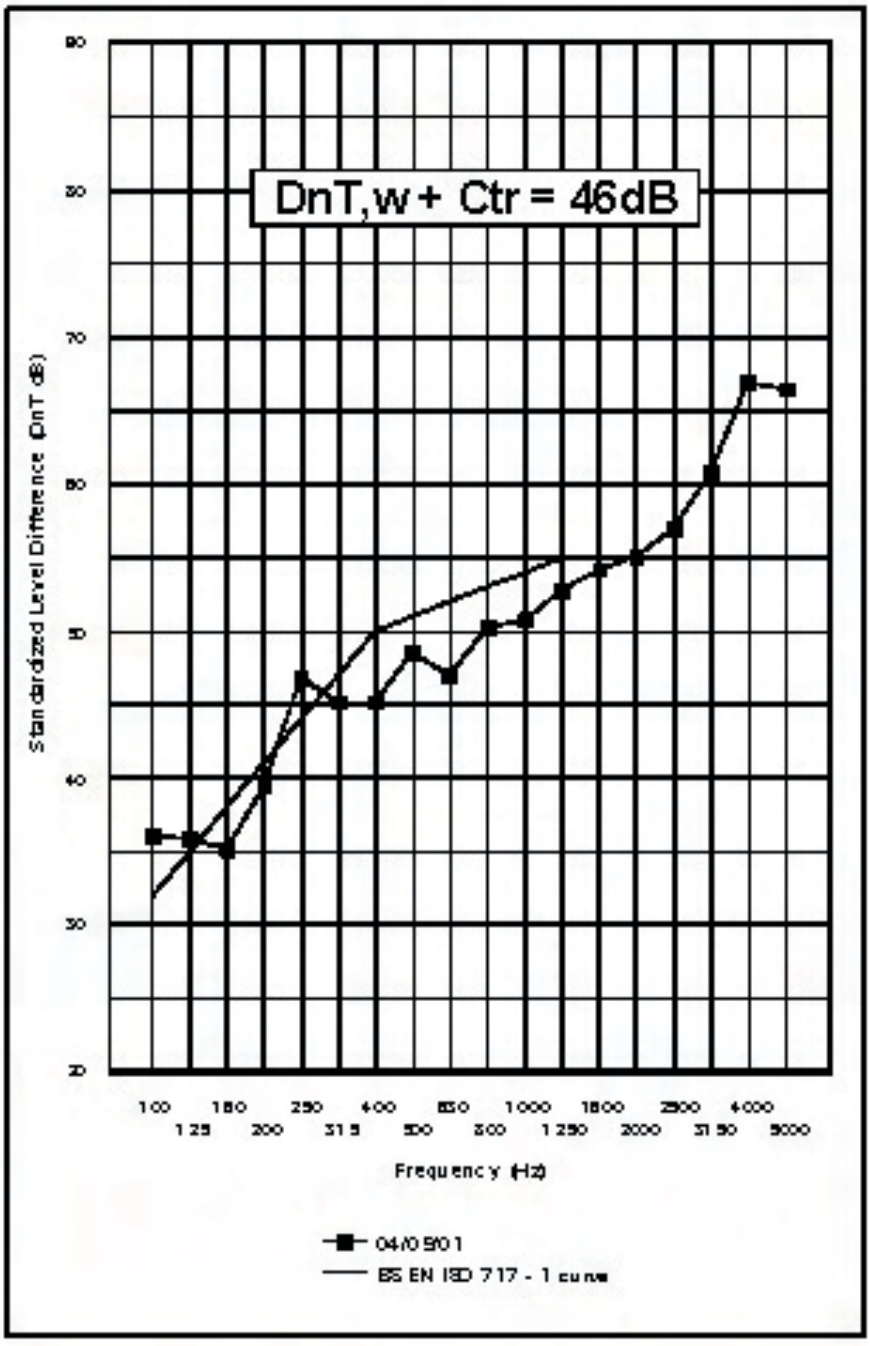
C (100-2500) -1

Ctr (100-2500) -5

B - Corrected for background noise

> - Maximum sound insulation measurable due to background noise

Measurements were made in accordance with BS EN ISO 140 - 4 : 1998.
The Standardized Level Difference (DnT) was calculated at each frequency and the values in the range 100 to 3150Hz were used to determine the Weighted Standardized Level Difference (DnT,w) and the supplementary Spectrum Adaptation Terms (C and Ctr) in accordance with BS EN ISO 717 - 1 : 1997.



Tested by:

P E Jones MIOA

FIELD AIRBORNE SOUND INSULATION MEASUREMENTS TO EN ISO 140 - 4 : 1998

Test Code : 040905 Test Date : 2 September 2004

Site Address : UEA Norwich, Student Accomodation, Block F, Colman House

Test Location : Ground Floor, Flat 28 Room F to Room G

Client: The Concrete Centre

Construction : 180mm Thin-form concrete separating wall with 2mm plaster skim

Rec room vol (m3): 20 Source room (m3): 20

Common area (m2): 10

Frequency

(Hz)	L1	L2	BG	L2 (BG)	Corr.?	D	T	DnT
100	88.2	55.0	31.3	55.0	NO	33.2	0.59	33.9
125	85.9	47.1	26.8	47.1	NO	38.8	0.44	38.2
160	89.5	51.9	25.2	51.9	NO	37.6	0.50	37.6
200	89.7	47.7	24.0	47.7	NO	42.0	0.39	40.9
250	92.2	44.6	21.7	44.6	NO	47.6	0.52	47.8
315	92.9	48.8	21.7	48.8	NO	44.1	0.45	43.6
400	92.1	46.5	19.5	46.5	NO	45.6	0.41	44.7
500	93.9	45.6	14.4	45.6	NO	48.3	0.39	47.2
630	94.2	45.7	11.4	45.7	NO	48.5	0.41	47.6
800	94.7	44.8	9.9	44.8	NO	49.9	0.36	48.5
1000	95.7	44.4	8.6	44.4	NO	51.3	0.35	49.8
1250	93.4	38.4	7.3	38.4	NO	55.0	0.35	53.5
1600	92.1	37.8	6.0	37.8	NO	54.3	0.37	53.0
2000	94.7	41.3	6.7	41.3	NO	53.4	0.34	51.7
2500	94.6	36.0	7.9	36.0	NO	58.6	0.33	56.8
3150	93.1	28.9	8.4	28.9	NO	64.2	0.34	62.5
4000	90.3	22.0	7.0	22.0	NO	68.3	0.32	66.4
5000	88.4	21.9	6.0	21.9	NO	66.5	0.32	64.6

ADAPTION TERMS ISO 717-1 100-3150 100-5000 DnT,w (dB) 50

C -0 0

Ctr -3 -3

DnT,w + Ctr dB = 47

B : Corrected for background noise (see section 6.6 of EN ISO 140 - 4)
B> : Corrected for background noise. These values are minimum values.
The absolute values could not be calculated due to the influence of background noise.

Tested by:

P E Jones MIOA

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Field Measurements of Airborne Sound Insulation between rooms to BS EN ISO 140 - 4 : 1998

Test Code : 040905 Test Date : 2 September 2004
Site Address : UEA Norwich, Student Accomodation, Block F, Colman House
Test Location : Ground Floor, Flat 28 Room F to Room G

Client : The Concrete Centre

Construction : 180mm Thin-form concrete separating wall with 2mm plaster skim

Rec room vol (m3) : 20 Common area (m2) : 10

Source room (m3) : 20

Freq.(Hz)	DnT(dB)
100	33.9
125	38.2
160	37.6
200	40.9
250	47.8
315	43.6
400	44.7
500	47.2
630	47.6
800	48.5
1000	49.8
1250	53.5
1600	53.0
2000	51.7
2500	56.8
3150	62.5
4000	66.4
5000	64.6

DnT,w (dB) 50

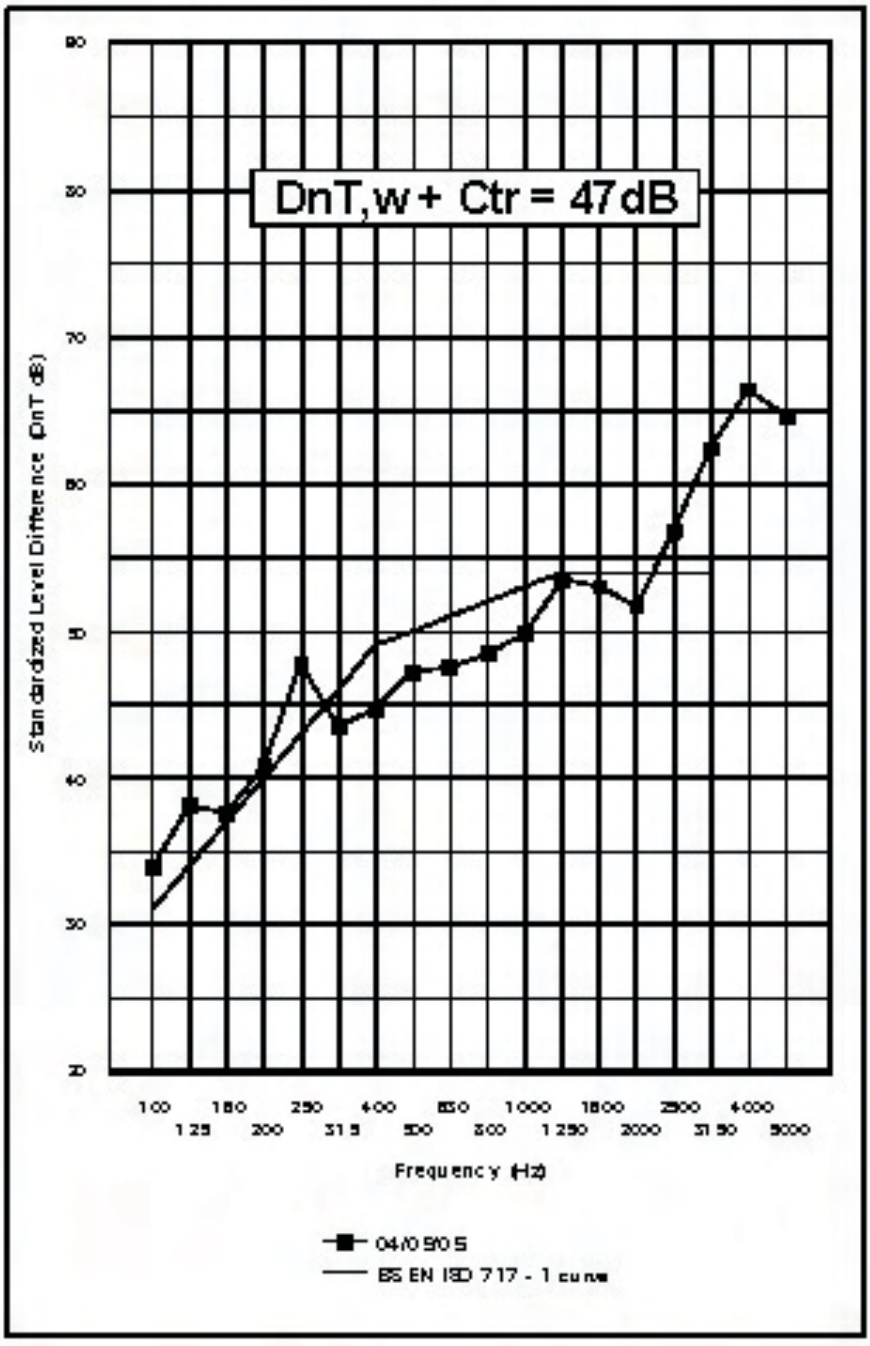
C (100-2500) -0

Ctr (100-2500) -3

B - Corrected for background noise

> - Maximum sound insulation measurable due to background noise

Measurements were made in accordance with BS EN ISO 140 - 4 : 1998.
The Standardized Level Difference (DnT) was calculated in each frequency band where the sound level in the receiving room was at least 6dB greater than the background noise level.
The Weighted Standardized Level Difference (DnT,w) and the spectrum adaptation terms (C and Ctr) were calculated in accordance with BS EN ISO 717-1 : 1997.



Tested by:

P E Jones MIOA

Test Code : 040902 Test Date : 2 September 2004

Site Address : UEA Norwich, Student Accomodation, Block F, Colman House

Test Location : Ground Floor, Flat 28 Room A to Room B

Client: The Concrete Centre

Construction : 100mm Lightcrete concrete block separating wall with 2mm plaster skim

Rec room vol (m3): 23 Source room (m3): 23

Common area (m2): 7.5

Frequency

(Hz)	L1	L2	BG	L2 (BG)	Corr.?	D	T	DnT
100	89.4	54.4	25.2	54.4	NO	35.0	0.56	35.5
125	91.9	51.3	24.6	51.3	NO	40.6	0.42	39.8
160	94.9	54.3	26.8	54.3	NO	40.6	0.53	40.9
200	94.0	55.0	25.2	55.0	NO	39.0	0.58	39.6
250	95.0	55.3	21.0	55.3	NO	39.7	0.48	39.5
315	93.2	54.5	21.3	54.5	NO	38.7	0.47	38.4
400	94.1	52.7	25.0	52.7	NO	41.4	0.47	41.1
500	95.3	52.4	16.0	52.4	NO	42.9	0.51	43.0
630	97.1	52.4	12.6	52.4	NO	44.7	0.42	43.9
800	95.5	48.2	10.4	48.2	NO	47.3	0.42	46.5
1000	95.0	43.4	9.7	43.4	NO	51.6	0.40	50.6
1250	93.7	41.6	8.4	41.6	NO	52.1	0.36	50.7
1600	93.6	40.8	5.3	40.8	NO	52.8	0.38	51.6
2000	95.9	42.8	4.9	42.8	NO	53.1	0.35	51.6
2500	95.6	39.8	5.3	39.8	NO	55.8	0.36	54.4
3150	93.9	33.8	6.7	33.8	NO	60.1	0.33	58.3
4000	91.5	27.2	5.9	27.2	NO	64.3	0.33	62.5
5000	88.4	24.9	6.1	24.9	NO	63.5	0.32	61.6

ADAPTION TERMS 100-3150 100-5000 DnT,w (dB) 48
ISO 717-1

C -1 -0

Ctr -3 -3

DnT,w + Ctr dB = 45

B : Corrected for background noise (see section 6.6 of EN ISO 140 - 4)
B> : Corrected for background noise. These values are minimum values.
The absolute values could not be calculated due to the influence of background noise.

Tested by :

P E Jones MIOA

Field Measurements of Airborne Sound Insulation between rooms to BS EN ISO 140 - 4 : 1998

Test Code : 040902 Test Date : 2 September 2004
Site Address : UEA Norwich, Student Accomodation, Block F, Colman House
Test Location : Ground Floor, Flat 28 Room A to Room B

Client : The Concrete Centre

Construction : 100mm Lightcrete concrete block separating wall with 2mm plaster skim

Rec room vol (m3) : 23 Common area (m2) : 8

Source room (m3) : 23

Freq.(Hz)	DnT(dB)
100	35.5
125	39.8
160	40.9
200	39.6
250	39.5
315	38.4
400	41.1
500	43.0
630	43.9
800	46.5
1000	50.6
1250	50.7
1600	51.6
2000	51.6
2500	54.4
3150	58.3
4000	62.5
5000	61.6

DnT,w (dB) 48

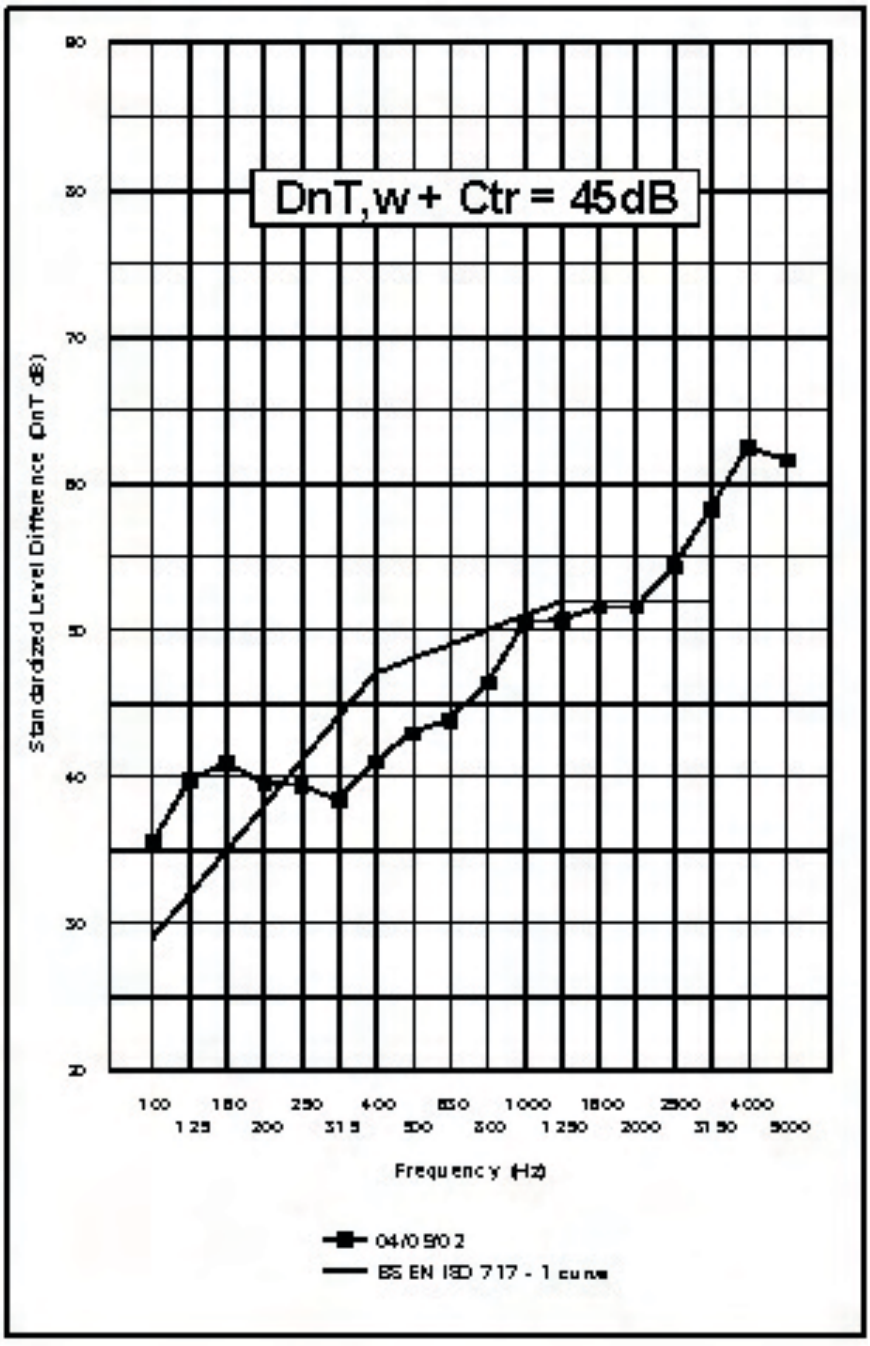
C (100-2500) -1

Ctr (100-2500) -3

B - Corrected for background noise

> - Maximum sound insulation measurable due to background noise

Measurements were made in accordance with BS EN ISO 140 - 4 : 1998. The Standardized Level Difference (DnT) was calculated at each frequency and the values in the range 100 to 3150Hz were used to determine the Weighted Standardized Level Difference (DnT,w) and the supplementary Spectrum Adaptation Terms (C and Ctr) in accordance with BS EN ISO 717 - 1 : 1997.



Tested by:

P E Jones MIOA

Test Code : 040905 Test Date : 2 September 2004

Site Address : UEA Norwich, Student Accomodation, Block F, Colman House

Test Location : Ground Floor, Flat 28 Room H to Room G

Client: The Concrete Centre

Construction : 100mm Lightcrete concrete block separating wall with 2mm plaster skim

Rec room vol (m3): 20 Source room (m3): 20

Common area (m2): 7

Frequency

(Hz)	L1	L2	BG	L2 (BG)	Corr.?	D	T	DnT
100	89.1	58.8	31.3	58.8	NO	30.3	0.59	31.0
125	88.2	51.0	26.8	51.0	NO	37.2	0.44	36.6
160	89.3	50.5	25.2	50.5	NO	38.8	0.50	38.8
200	90.5	53.8	24.0	53.8	NO	36.7	0.39	35.6
250	91.8	53.3	21.7	53.3	NO	38.5	0.52	38.7
315	92.6	54.5	21.7	54.5	NO	38.1	0.45	37.6
400	93.0	51.6	19.5	51.6	NO	41.4	0.41	40.5
500	94.1	52.2	14.4	52.2	NO	41.9	0.39	40.8
630	94.2	50.0	11.4	50.0	NO	44.2	0.41	43.3
800	95.9	46.9	9.9	46.9	NO	49.0	0.36	47.6
1000	95.1	45.9	8.6	45.9	NO	49.2	0.35	47.7
1250	92.6	39.9	7.3	39.9	NO	52.7	0.35	51.2
1600	91.9	37.6	6.0	37.6	NO	54.3	0.37	53.0
2000	94.4	37.9	6.7	37.9	NO	56.5	0.34	54.8
2500	94.0	35.8	7.9	35.8	NO	58.2	0.33	56.4
3150	92.6	30.5	8.4	30.5	NO	62.1	0.34	60.4
4000	89.9	24.2	7.0	24.2	NO	65.7	0.32	63.8
5000	87.5	22.0	6.0	22.0	NO	65.5	0.32	63.6

ADAPTION TERMS 100-3150 100-5000 DnT,w (dB) 47
ISO 717-1

C -1 0

Ctr -4 -4

DnT,w + Ctr dB = 43

B : Corrected for background noise (see section 6.6 of EN ISO 140 - 4)
B> : Corrected for background noise. These values are minimum values.
The absolute values could not be calculated due to the influence of background noise.

Tested by:

P E Jones MIOA

Philip E Jones MIOA, 44 Stathern Lane, Harby, Melton Mowbray, Leics LE14 4DA

Field Measurements of Airborne Sound Insulation between rooms to BS EN ISO 140 - 4 : 1998

Test Code : 040905 Test Date : 2 September 2004
Site Address : UEA Norwich, Student Accomodation, Block F, Colman House
Test Location : Ground Floor, Flat 28 Room H to Room G

Client : The Concrete Centre

Construction : 100mm Lightcrete concrete block separating wall with 2mm plaster skim

Rec room vol (m3) : 20 Common area (m2) : 7

Source room (m3) : 20

Freq.(Hz)	DnT(dB)
100	31.0
125	36.6
160	38.8
200	35.6
250	38.7
315	37.6
400	40.5
500	40.8
630	43.3
800	47.6
1000	47.7
1250	51.2
1600	53.0
2000	54.8
2500	56.4
3150	60.4
4000	63.8
5000	63.6

DnT,w (dB) 47

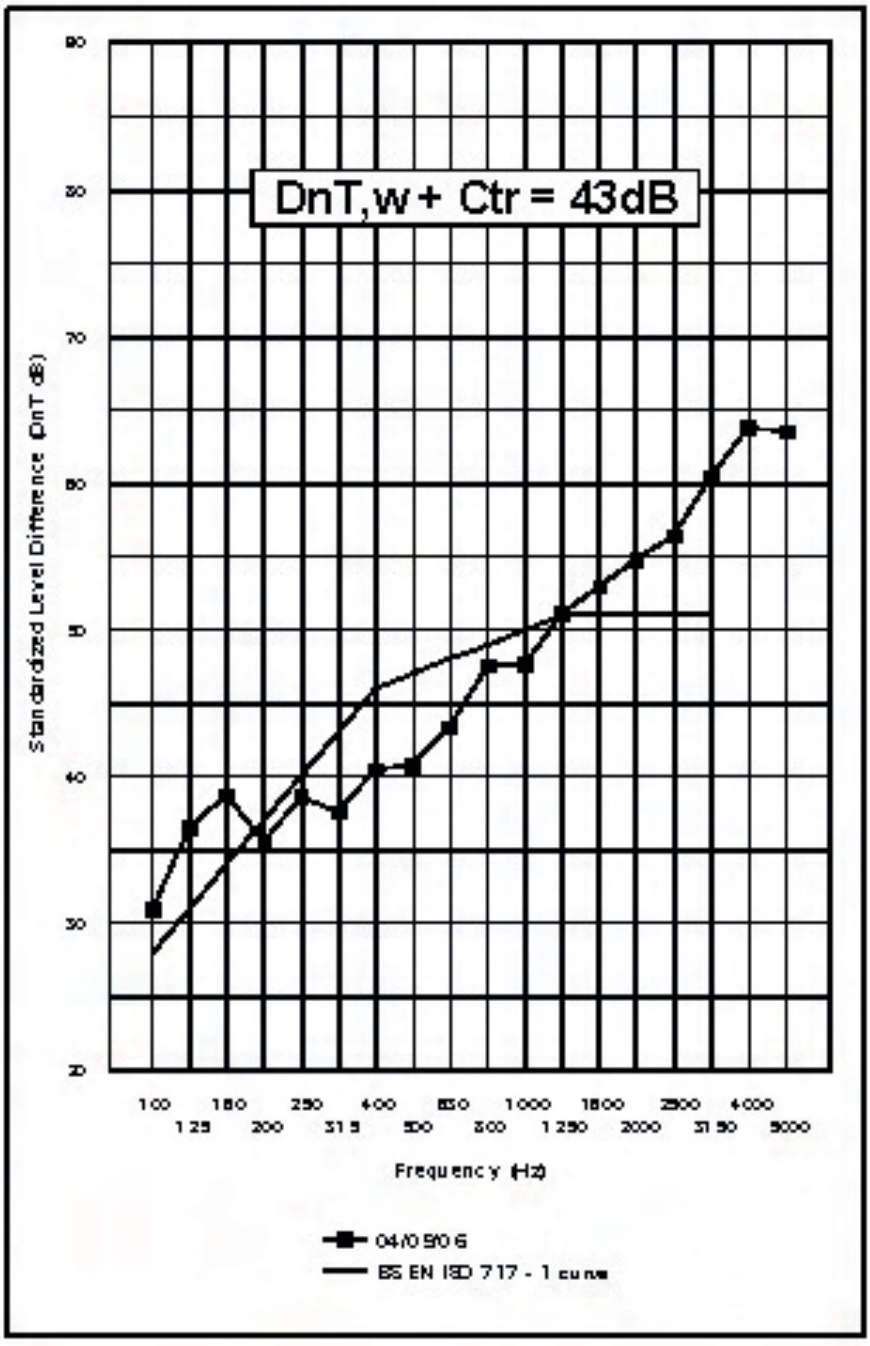
C (100-2500) -1

Ctr (100-2500) -4

B - Corrected for background noise

> - Maximum sound insulation measurable due to background noise

Measurements were made in accordance with BS EN ISO 140 - 4 : 1998. The Standardized Level Difference (DnT) was calculated in each frequency band where the sound level in the receiving room was at least 15dB greater than the background noise level. The Weighted Standardized Level Difference (DnT,w) and the associated spectrum adaptation terms (C and Ctr) were calculated in accordance with BS EN ISO 717 - 1 : 1997.



Tested by:

P E Jones MIOA

Test Code : 040903 Test Date : 2 September 2004

Site Address : UEA Norwich, Student Accomodation, Block F, Colman House

Test Location : First Floor, Flat 30 Room B to Ground Floor, Flat 28 Room B

Client: The Concrete Centre

Construction : 250mm Thin-form concrete separating floor with 50mm sand/cement screed

Rec room vol (m3): 23 Source room (m3): 23

Common area (m2): 9.5

Frequency

(Hz)	L1	L2	BG	L2 (BG)	Corr.?	D	T	DnT
100	99.9	53.0	25.2	53.0	NO	46.9	0.56	47.4
125	102.0	55.6	24.6	55.6	NO	46.4	0.42	45.6
160	103.3	54.8	26.8	54.8	NO	48.5	0.53	48.8
200	102.4	55.7	25.2	55.7	NO	46.7	0.58	47.3
250	103.6	51.4	21.0	51.4	NO	52.2	0.48	52.0
315	104.8	51.9	21.3	51.9	NO	52.9	0.47	52.6
400	104.1	47.0	25.0	47.0	NO	57.1	0.47	56.8
500	105.5	48.1	16.0	48.1	NO	58.4	0.51	58.5
630	107.5	50.2	12.6	50.2	NO	57.3	0.42	56.5
800	107.1	43.1	10.4	43.1	NO	64.0	0.42	63.2
1000	105.2	41.2	9.7	41.2	NO	65.0	0.40	64.0
1250	104.8	37.6	8.4	37.6	NO	67.2	0.36	65.8
1600	104.7	36.1	5.3	36.1	NO	68.6	0.38	67.4
2000	105.2	34.1	4.9	34.1	NO	72.1	0.35	70.6
2500	104.8	31.9	5.3	31.9	NO	72.9	0.36	71.5
3150	104.1	27.5	6.7	27.5	NO	76.6	0.33	74.8
4000	101.2	21.2	5.9	21.2	NO	80.0	0.33	78.2
5000	99.5	18.2	6.1	18.2	NO	81.3	0.32	79.4

ADAPTION TERMS 100-3150 100-5000 DnT,w (dB) 62
ISO 717-1

C	-2	-1
Ctr	-5	-5

DnT,w + Ctr dB = 57

B : Corrected for background noise (see section 6.6 of EN ISO 140 - 4)
B* : Corrected for background noise. These values are minimum values.
The absolute values could not be calculated due to the influence of background noise.

Tested by:

P E Jones MIOA

Philip E Jones MIOA, 44 Stathern Lane, Harby, Melton Mowbray, Leics LE14 4DA

Field Measurements of Airborne Sound Insulation between rooms to BS EN ISO 140 - 4 : 1998

Test Code : 040903 Test Date : 2 September 2004
Site Address : UEA Norwich, Student Accomodation, Block F, Colman House
Test Location : First Floor, Flat 30 Room B to Ground Floor, Flat 28 Room B

Client : The Concrete Centre

Construction : 250mm Thunderform concrete separating floor with 50mm sand/cement screed

Rec room vol (m3) : 23 Common area (m2) : 10

Source room (m3) : 23

Freq.(Hz)	DnT(dB)
100	47.4
125	45.6
160	48.8
200	47.3
250	52.0
315	52.6
400	56.8
500	58.5
630	56.5
800	63.2
1000	64.0
1250	65.8
1600	67.4
2000	70.6
2500	71.5
3150	74.8
4000	78.2
5000	79.4

DnT,w (dB) 62

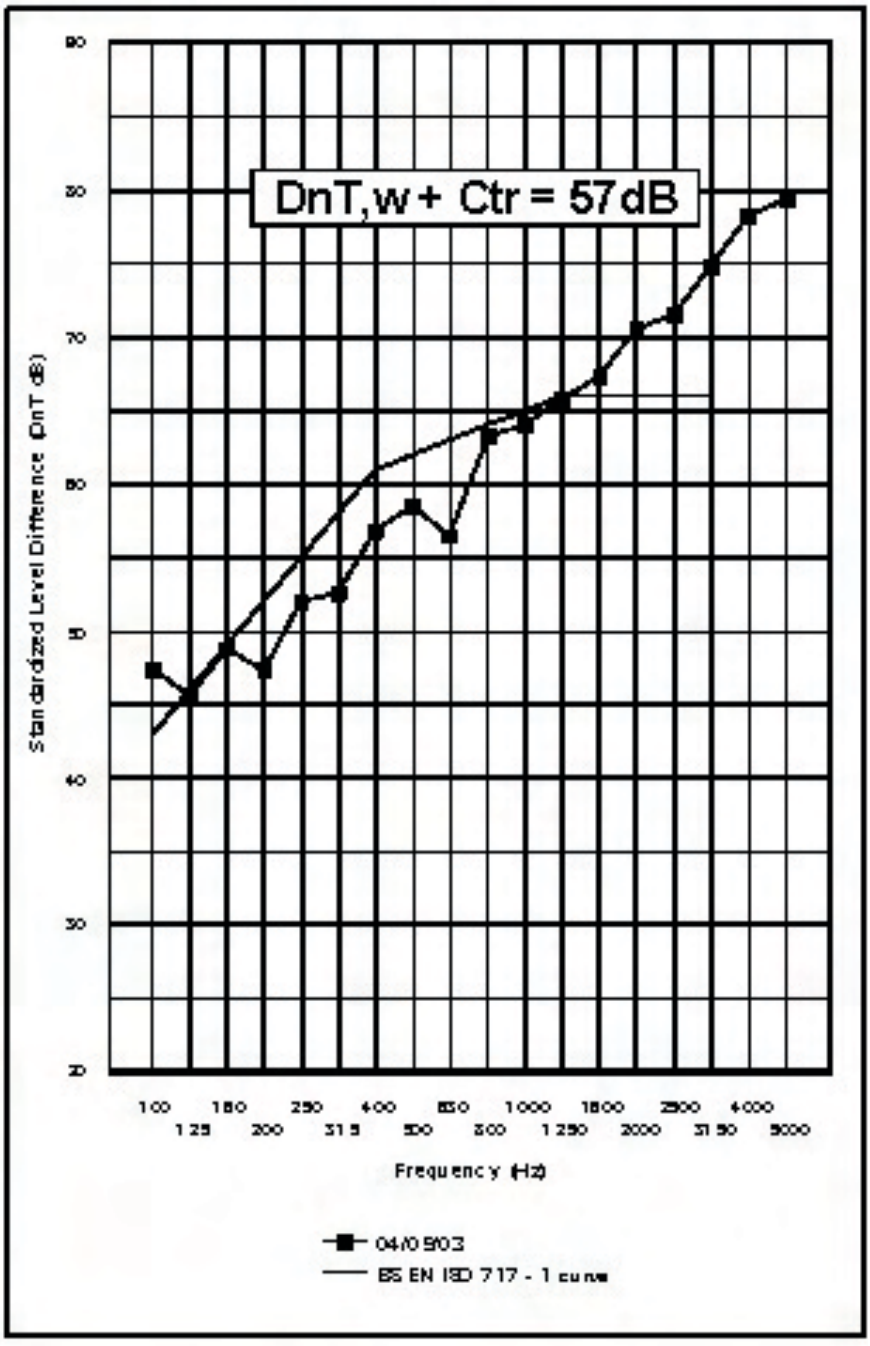
C (100-2500) -2

Ctr (100-2500) -5

B - Corrected for background noise

> - Maximum sound insulation measurable due to background noise

Measurements were made in accordance with BS EN ISO 140 - 4 : 1998.
The Standardized Level Difference (DnT) was calculated in each frequency band where the sound level in the receiving room was at least 6dB greater than the background noise level.
The Weighted Standardized Level Difference (DnT,w) and the associated spectrum adaptation terms (C and Ctr) were calculated in accordance with BS EN ISO 717 - 1 : 1997.



Tested by:

P E Jones MIOA

Test Code : 04/09/03i Test Date : 2 September 2004

Site Address : UEA Norwich, Student Accomodation, Block F, Colman House

Test Location : First Floor, Flat 30 Room B to Ground Floor, Flat 28 Room B

Client : The Concrete Centre

Construction : 250mm Tunnelform concrete separating floor with 50mm sand/cement screed

Rec room vol (m3): 23 Source room (m3): 23

Common area (m2): 9.5

Frequency (Hz)	Li	T	BG	Li (BG)	Corr.?	L'nT
100	41.3	0.56	25.2	41.3	No	40.8
125	44.6	0.42	24.6	44.6	No	45.4
160	45.4	0.53	26.8	45.4	No	45.1
200	45.3	0.58	25.2	45.3	No	44.7
250	44.9	0.48	21.0	44.9	No	45.1
315	41.9	0.47	21.3	41.9	No	42.2
400	37.8	0.47	25.0	37.8	No	38.1
500	33.6	0.51	16.0	33.6	No	33.5
630	30.9	0.42	12.6	30.9	No	31.7
800	23.0	0.42	10.4	23.0	No	23.8
1000	17.8	0.40	9.7	17.1	B	18.0
1250	14.4	0.36	8.4	13.1	B>	14.5
1600	14.6	0.38	5.3	14.1	B	15.2
2000	12.2	0.35	4.9	11.3	B	12.9
2500	8.2	0.36	5.3	6.9	B>	8.3
3150	7.1	0.33	6.7	5.8	B>	7.6
4000	7.0	0.33	5.9	5.7	B>	7.5
5000	6.6	0.32	6.1	5.3	B>	7.2

ADAPTION TERM
ISO717-2 Cl : 0

L'nT,w(dB) 37
AAD 29.3
Max Dev 6.4
at (Hz) 125

B : Corrected for background noise (see section 5.6 of EN ISO 140 - 7)
B> : Corrected for background noise. These values are minimum values.
The absolute values could not be calculated due to the influence ofbackground noise.

Tested by:

P E Jones

Field Measurements of Impact Sound Insulation between rooms to BS EN ISO 140 - 7 : 1998

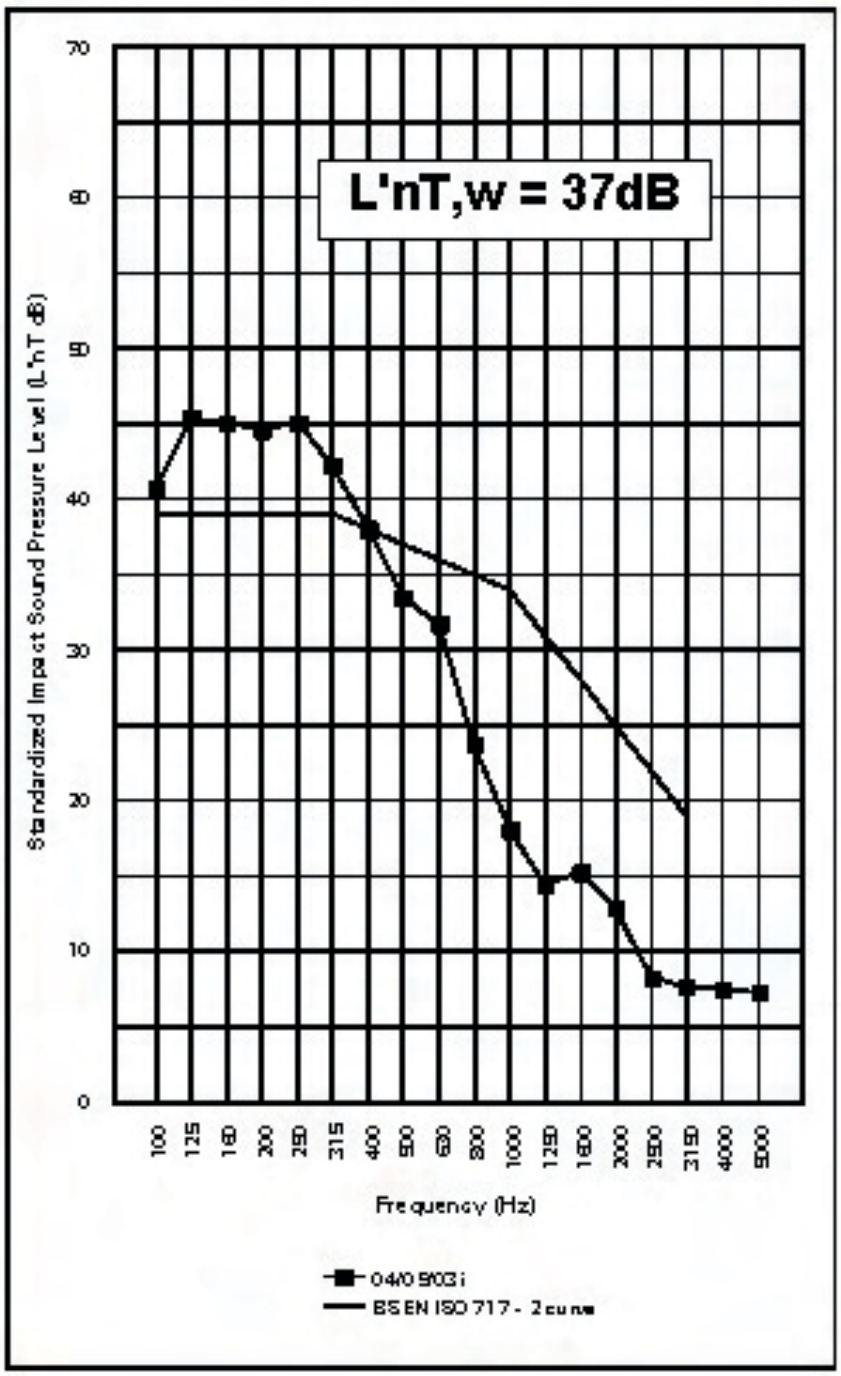
Test Code :	040903i	Test Date :	2 September 2004
Site Address :	UEA Norwich, Student Accomodation, Block F, Colman House		
Test Location :	First Floor, Flat 30 Room B to Ground Floor, Flat 28 Room B		
Client :	The Concrete Centre		
Construction :	250mm Tunnelform concrete separating floor with 50mm sand/cement screed		
Rec room vol (m3) :	23	Common area (m2) :	95

Freq. (Hz)	LnT (dB)	
100	40.8	No
125	45.4	No
160	45.1	No
200	44.7	No
250	45.1	No
315	42.2	No
400	38.1	No
500	33.5	No
630	31.7	No
800	23.8	No
1000	18.0	B
1250	14.5	B>
1600	15.2	B
2000	12.9	B
2500	8.3	B>
3150	7.6	B>
4000	7.5	B>
5000	7.2	B>
L'nT,w(dB)	37	
CI	0	

B - Corrected for background noise

> - Maximum sound insulation measurable due to background noise

Impact sound insulation between a pair of rooms to BS EN ISO 140 - 7 : 1998. The standardized impact sound pressure level (LnT) was calculated in each frequency and the values in the range 100 to 3150Hz were used to determine the Weighted Standardized Impact Sound Pressure Level (LnT,w) and the single number CI in accordance with ISO 717-2 : 1996.



Tested by .

Test Code : 040904 Test Date : 2 September 2004

Site Address : UEA Norwich, Student Accomodation, Block F, Colman House

Test Location : First Floor, Flat 30 Room G to Ground Floor, Flat 28 Room G

Client: The Concrete Centre

Construction : 250mm Thin-slab concrete separating floor with 50mm sand/cement screed

Rec room vol (m3): 20 Source room (m3): 20

Common area (m2): 8.5

Frequency (Hz)	L1	L2	BG	L2 (BG)	Corr.?	D	T	DnT
100	99.8	58.4	31.3	58.4	NO	41.4	0.59	42.1
125	100.1	51.0	26.8	51.0	NO	49.1	0.44	48.5
160	108.3	57.7	25.2	57.7	NO	50.6	0.50	50.6
200	103.5	53.1	24.0	53.1	NO	50.4	0.39	49.3
250	102.6	49.6	21.7	49.6	NO	53.0	0.52	53.2
315	107.1	52.8	21.7	52.8	NO	54.3	0.45	53.8
400	107.1	49.8	19.5	49.8	NO	57.3	0.41	56.4
500	107.7	51.3	14.4	51.3	NO	56.4	0.39	55.3
630	108.5	50.3	11.4	50.3	NO	58.2	0.41	57.3
800	105.6	44.2	9.9	44.2	NO	62.4	0.36	61.0
1000	106.3	42.3	8.6	42.3	NO	64.0	0.35	62.5
1250	104.8	38.5	7.3	38.5	NO	66.3	0.35	64.8
1600	104.9	33.7	6.0	33.7	NO	71.2	0.37	69.9
2000	105.9	33.1	6.7	33.1	NO	72.8	0.34	71.1
2500	105.3	29.8	7.9	29.8	NO	75.5	0.33	73.7
3150	103.0	27.0	8.4	27.0	NO	76.0	0.34	74.3
4000	100.3	19.0	7.0	19.0	NO	81.3	0.32	79.4
5000	99.3	14.9	6.0	14.3	B	85.0	0.32	83.1

ADAPTION TERMS ISO 717-1 100-3150 100-5000 DnT,w (dB) 61

C	-1	0
Ctr	-4	-4

DnT,w + Ctr dB = 57

B : Corrected for background noise (see section 6.6 of EN ISO 140 - 4)
B> : Corrected for background noise. These values are minimum values.
The absolute values could not be calculated due to the influence of background noise.

Tested by:

P E Jones MIOA

Philip E Jones MIOA, 44 Stathern Lane, Harby, Melton Mowbray, Leics LE14 4DA

Field Measurements of Airborne Sound Insulation between rooms to BS EN ISO 140 - 4 : 1998

Test Code : 040904 Test Date : 2 September 2004
Site Address : UEA Norwich, Student Accomodation, Block F, Colman House
Test Location : First Floor, Flat 30 Room G to Ground Floor, Flat 28 Room G

Client : The Concrete Centre

Construction : 250mm Thunderform concrete separating floor with 50mm sand/cement screed

Rec room vol (m3) : 20 Common area (m2) : 9

Source room (m3) : 20

Freq.(Hz)	DnT(dB)	
100	42.1	
125	48.5	
160	50.6	
200	49.3	
250	53.2	
315	53.8	
400	56.4	
500	55.3	
630	57.3	
800	61.0	
1000	62.5	
1250	64.8	
1600	69.9	
2000	71.1	
2500	73.7	
3150	74.3	
4000	79.4	
5000	83.1	B

DnT,w (dB) 61

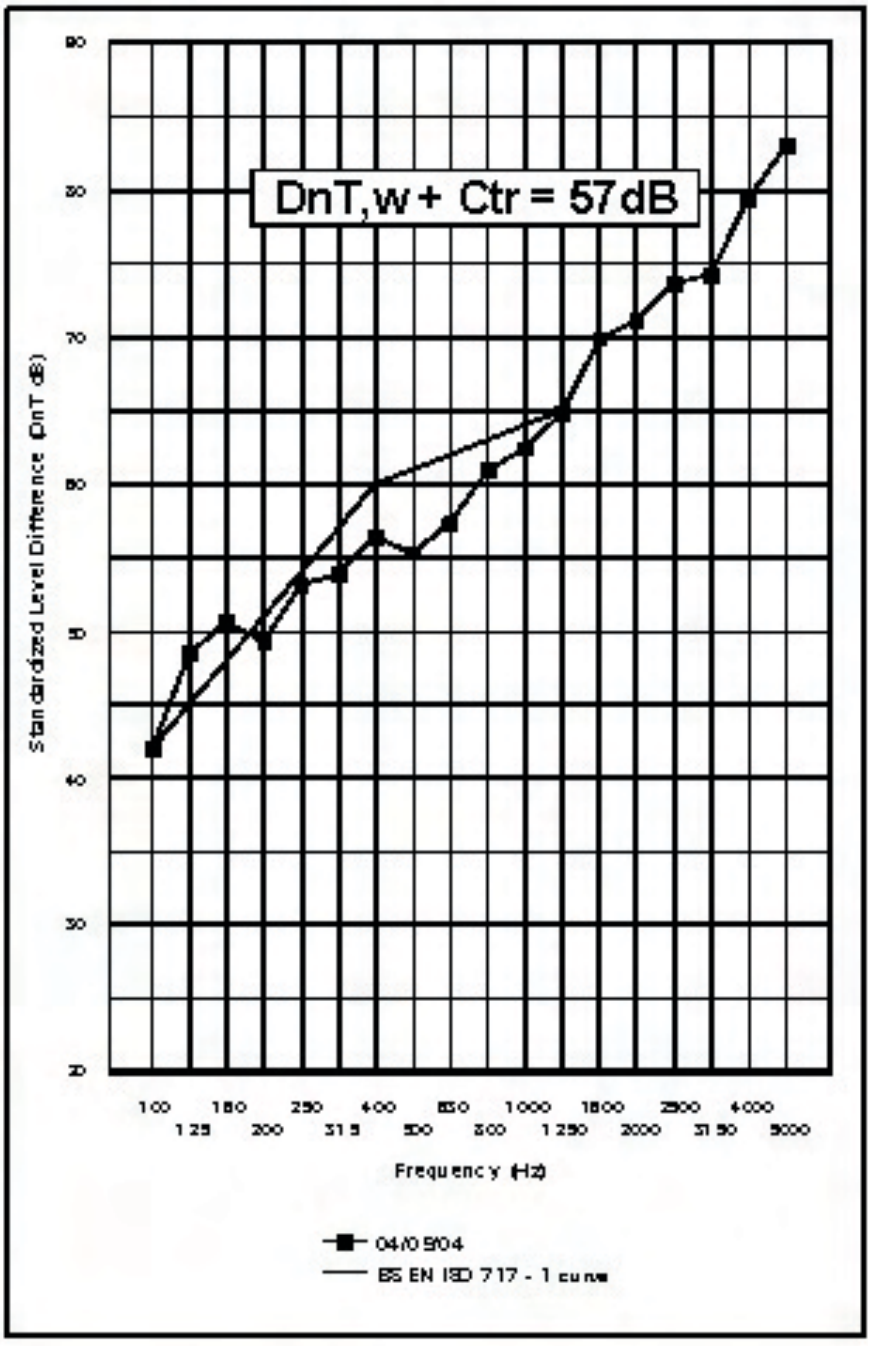
C (100-2500) -1

Ctr (100-2500) -4

B - Corrected for background noise

> - Maximum sound insulation measurable due to background noise

Measurements were made in accordance with BS EN ISO 140 - 4 : 1998. The Standardized Level Difference (DnT) was calculated in each frequency band and the values in the range 100 to 3150Hz were used to determine the Weighted Standardized Level Difference (DnT,w) and the supplementary Spectrum Adaptation Terms (C and Ctr) in accordance with BS EN ISO 717 - 1 : 1997.



Tested by:

P E Jones MIOA

Test Code : 04/09/04 Test Date : 2 September 2004

Site Address : UEA Norwich, Student Accomodation, Block F, Colman House

Test Location : First Floor, Flat 30 Room G to Ground Floor, Flat 28 Room G

Client : The Concrete Centre

Construction : 250mm Tunnelform concrete separating floor with 50mm sand/cement screed

Rec room vol (m3): 20 Source room (m3): 20

Common area (m2): 8.5

Frequency (Hz)	Li	T	BG	Li (BG)	Corr.?	L'nT
100	46.3	0.59	31.3	46.3	No	45.6
125	45.7	0.44	26.8	45.7	No	46.3
160	47.7	0.50	25.2	47.7	No	47.7
200	44.3	0.39	24.0	44.3	No	45.4
250	44.2	0.52	21.7	44.2	No	44.0
315	42.4	0.45	21.7	42.4	No	42.9
400	41.1	0.41	19.5	41.1	No	42.0
500	39.5	0.39	14.4	39.5	No	40.6
630	37.9	0.41	11.4	37.9	No	38.8
800	32.3	0.36	9.9	32.3	No	33.7
1000	26.4	0.35	8.6	26.4	No	27.9
1250	20.6	0.35	7.3	20.6	No	22.1
1600	18.4	0.37	6.0	18.4	No	19.7
2000	14.6	0.34	6.7	13.8	B	15.5
2500	9.7	0.33	7.9	8.4	B>	10.2
3150	9.1	0.34	8.4	7.8	B>	9.5
4000	7.2	0.32	7.0	5.9	B>	7.8
5000	6.4	0.32	6.0	5.1	B>	7.0

ADAPTION TERM
ISO717-2 CI : 0

L'nT,w(dB) 39
AAD 30.1
Max Dev 6.7
at (Hz) 160

B : Corrected for background noise (see section 5.6 of EN ISO 140 - 7)
B> : Corrected for background noise. These values are minimum values.
The absolute values could not be calculated due to the influence ofbackground noise.

Tested by:

P E Jones

Field Measurements of Impact Sound Insulation between rooms to BS EN ISO 140 - 7 : 1998

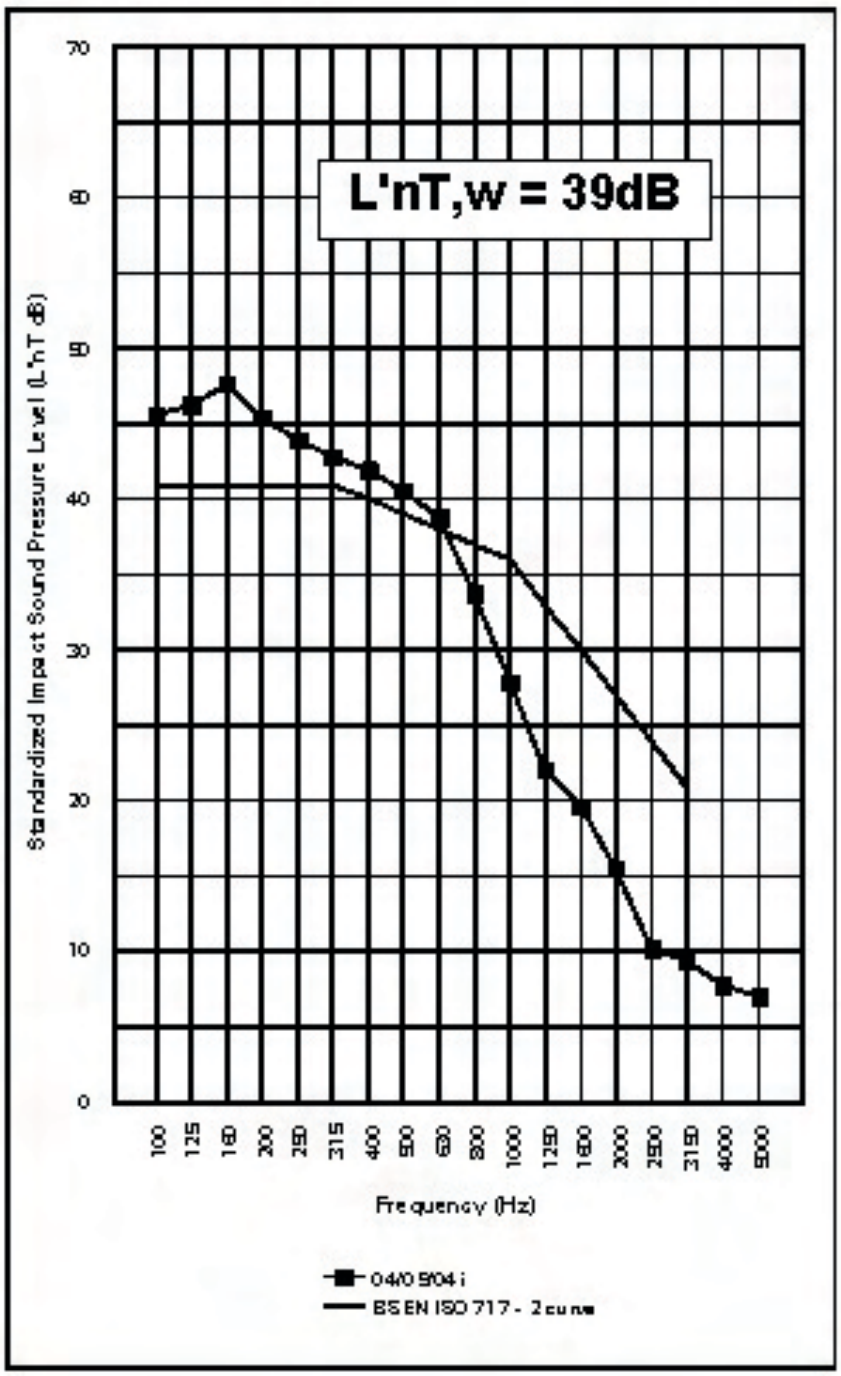
Test Code :	040904i	Test Date :	2 September 2004
Site Address :	UEA Norwich, Student Accomodation, Block F, Colman House		
Test Location :	First Floor, Flat 30 Room G to Ground Floor, Flat 28 Room G		
Client :	The Concrete Centre		
Construction :	250mm Tunnelform concrete separating floor with 50mm sand/cement screed		
Rec room vol (m3) :	20	Common area (m2) :	8.5

Freq. (Hz)	LnT (dB)	
100	45.6	No
125	46.3	No
160	47.7	No
200	45.4	No
250	44.0	No
315	42.9	No
400	42.0	No
500	40.6	No
630	38.8	No
800	33.7	No
1000	27.9	No
1250	22.1	No
1600	19.7	No
2000	15.5	B
2500	10.2	B>
3150	9.5	B>
4000	7.8	B>
5000	7.0	B>
L'nT,w(dB)	39	
CI	0	

B - Corrected for background noise

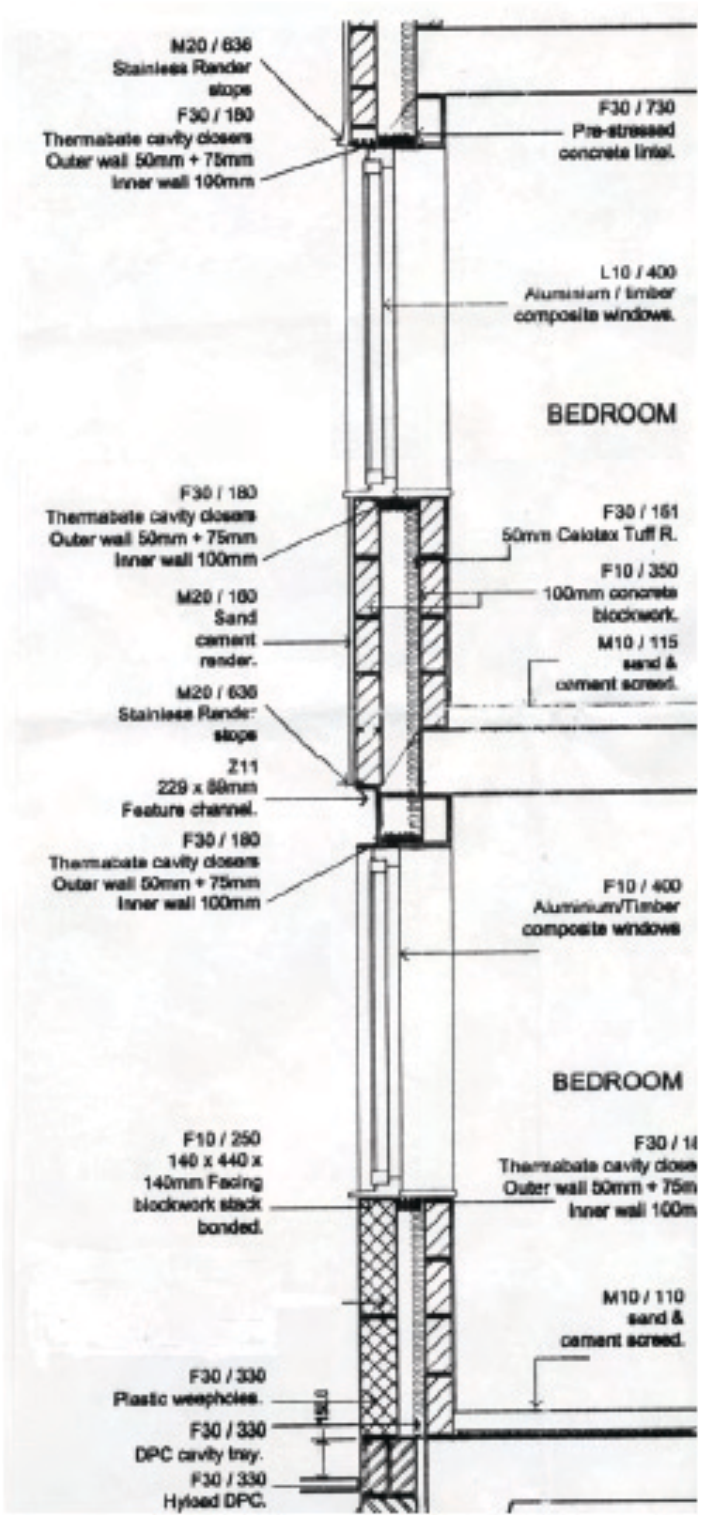
> - Maximum sound insulation measurable due to background noise

Impact sound insulation between a pair of rooms to BS EN ISO 140 - 7 : 1998.
The sum number impact sound pressure level (LnT) was calculated at each frequency and the values in the range 100 to 3150Hz were used to determine the Weighted Sum number Impact Sound Pressure Level (LnT,w) and the single number CI in accordance with ISO 717-2 : 1996.

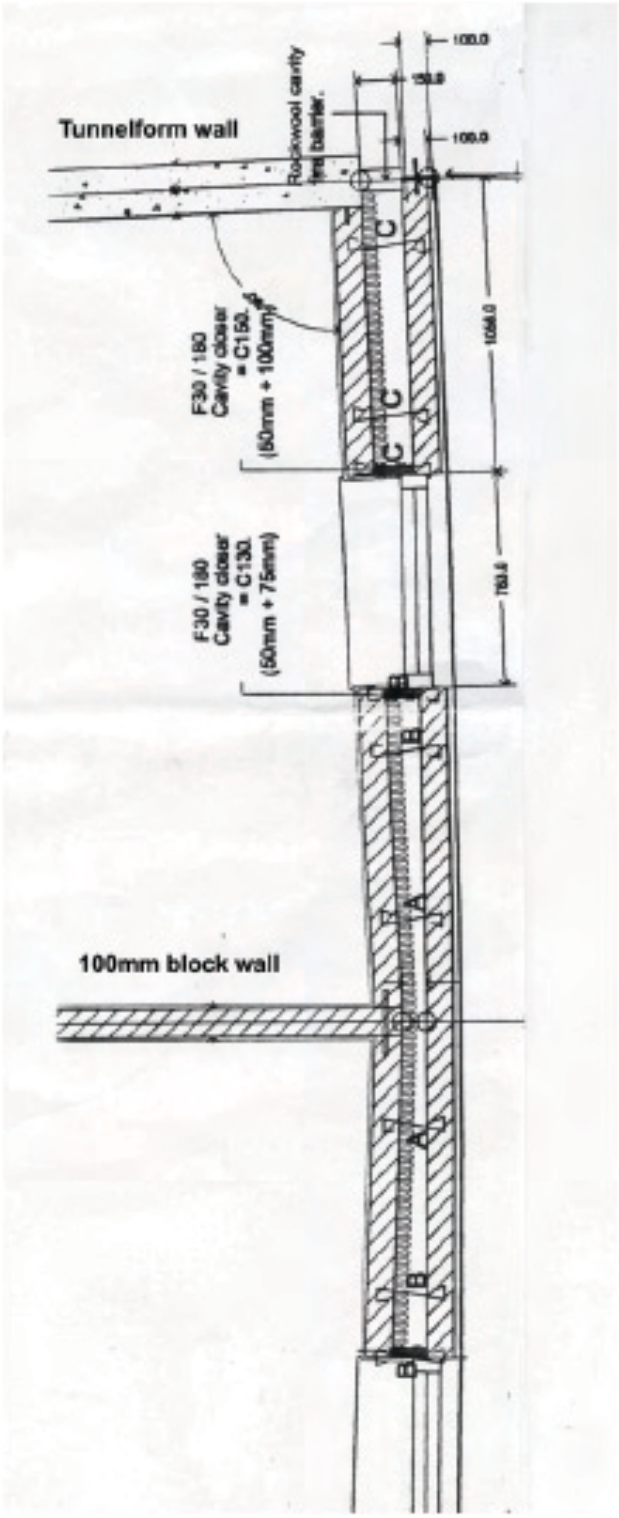


Tested by :

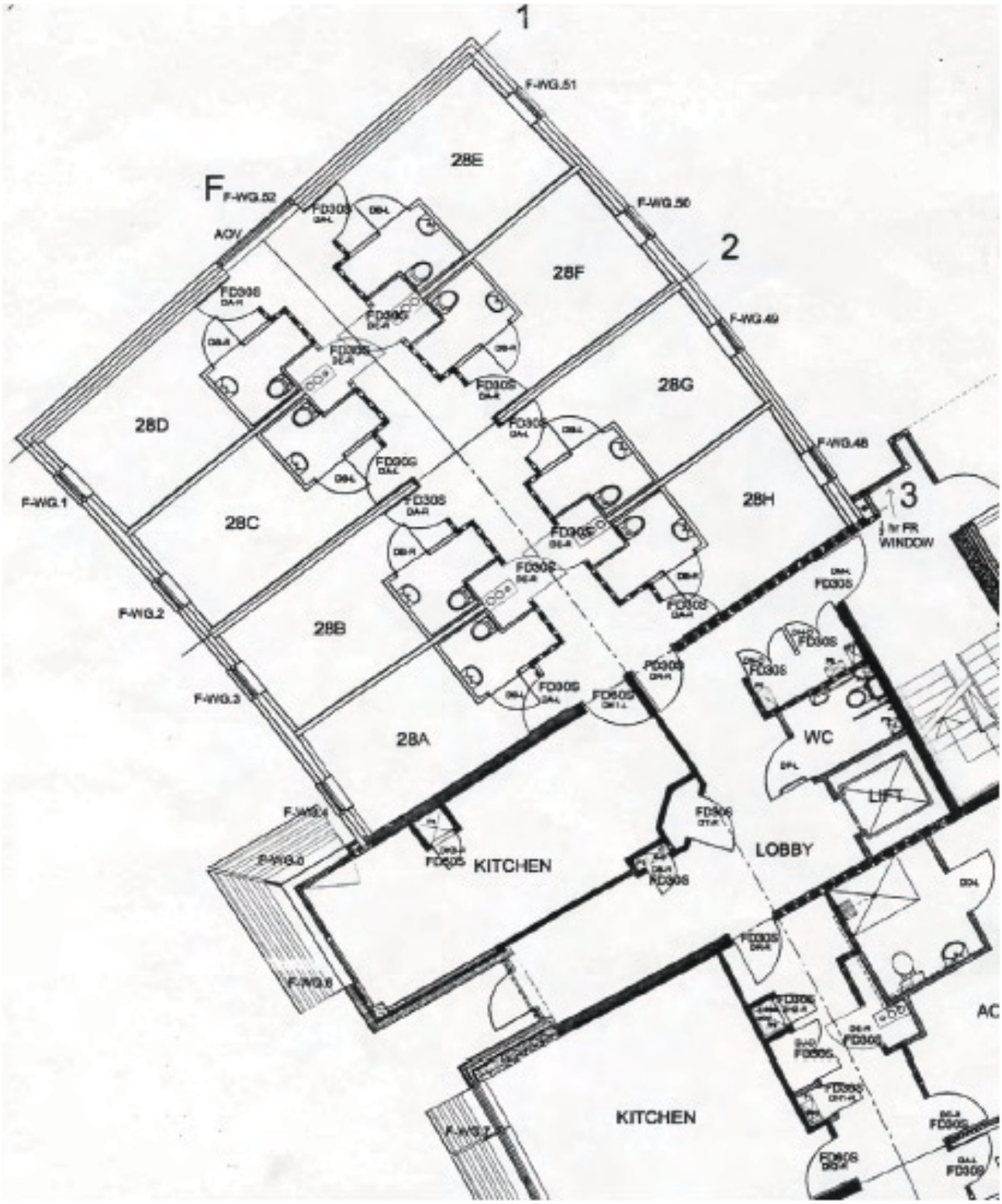
P E Jones



Colman House
External Wall Section



Colman House
External Wall Plan



Colman House
Flat 28 Ground Floor

Colman House
Flat 30 First Floor

Colman House
General Elevation

Colman House
Room Interior

Colman House Flats 28 & 30
Test Elevation Rooms A - C

Colman House Flats 28 & 30
Test Elevation Rooms F - H

TEST METHOD AND PROCEDURE

Method

Measurements were made between a pair of rooms to BS EN ISO 140 - 4 & 7 : 1998. The measurement was an evaluation of the separating building element in conjunction with its associated flanking structure.

Pink noise was created through a loudspeaker placed in the source room and the sound pressure levels L1 and L2 were measured in the source and receiving rooms respectively. Reverberation times (T) were measured in the receiving room. The frequency range was 100 - 5000Hz in one third octave bands.

The Standardized Level Difference (D_{nT}) was calculated using the equation:

$$D_{nT} = L1 - L2 + 10\log T/T_o$$

where T_o is the reference reverberation time. In this case, $T_o = 0.5s$.

A standard tapping machine was placed on the floor and the Impact Sound Pressure Level (L_i) was measured in the receiving room below. Again the frequency range was 100 - 5000Hz.

The Standardized Impact Sound Pressure Level was calculated using the equation:

$$L'_{nT} = L_i - 10\log T/T_o$$

The Weighted Standardized Level Difference ($D_{nT,w}$), Weighted Standardized Impact Sound Pressure Level ($L_{nT,w}$), and Spectrum Adaption Terms (C, C_{tr}, and C_i) were calculated in accordance with BS EN ISO717-1 and 2 : 1997

Procedure

Background measurements were made before the test and were monitored during the sound insulation measurements. If necessary, background noise corrections are applied to receiving room sound pressure levels and this is indicated in the results data tables.

Sound Pressure Level measurements were made in each room using microphones on stands. For airborne sound insulation, measurements were made at five locations in each room for each of two loudspeaker positions and the Mean Sound Pressure Level was computed from the ten measurements. Measurements were made using real time frequency analysis with pink noise.

Reverberation time measurements were made in real time. Three measurements were made at each of six microphone positions. The mean reverberation time was calculated from the eighteen measured values.

For impact sound insulation, four tapping machine positions were used and the mean sound pressure level was computed from measurements at eight microphone positions (two per tapping machine).

The Standardized Level Difference (D_{nT}) and Standardized Impact Sound Pressure Level (L_{nT}) were calculated at each frequency. These spectra were used to calculate the Weighted Standardized Level Difference ($D_{nT,w}$), Spectrum Adaption Terms (C, C_{tr}, and C_i) and Weighted Impact Sound Pressure Level ($L_{nT,w}$).

Equipment

All measurements were made using a Norsonics Type 830 Twin Channel Real Time Analyser.
Microphones and preamplifiers were Brüel and Kjær Type 4165 and 2639 respectively.
The tapping machine was a Norsonics type 211.
Microphones were calibrated before the test using a Norsonics type 1251 acoustic calibrator.