



# **The Building Test Centre**

**Fire Acoustics Structures**

**The Building Test Centre**  
British Gypsum  
East Leake  
Loughborough  
Leics. LE12 6NP  
Tel (0115) 945 1564  
Fax (0115) 945 1562  
Email [btc.testing@bpb.com](mailto:btc.testing@bpb.com)  
Website [www.btconline.co.uk](http://www.btconline.co.uk)

Report Number **BTC16527A**

An acoustic test report covering laboratory sound insulation testing to BS EN ISO 140-3:1995 on a British Gypsum Classic partition clad with double layer of 12.5mm SoundBloc with 50mm Isover APR & 100mm Modular Roll insulation in the cavity.

Test Date: 10<sup>th</sup> July 2009

[www.btconline.co.uk](http://www.btconline.co.uk)

Customer: **British Gypsum**  
East Leake  
Loughborough  
Leicestershire  
LE12 6HX

Customer: **British Gypsum**

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## FOREWORD

The test sponsor was British Gypsum.

The test specimens were installed by John Gwynne and Martin Lynch on the 10<sup>th</sup> July 2009.

The Building Test Centre played no role in the design or selection of the materials comprising the test specimen.

## REPORT AUTHORISATION

Report Author

**James Stonell**  
AMIOA  
Technologist

Authorised by

**Alexandra Ahern**  
B.Eng. AMIOA  
Section Manager

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## **TEST CONSTRUCTION**

The test specimen was constructed in an aperture having an overall opening of 2400mm (high) x 3600mm (wide).

Gypframe 94C50 Floor & Ceiling Channels were fixed to the head and base of the aperture using 25mm Gyproc drywall screw fixings spaced at 600mm centres.

Gypframe 92A550 were positioned between the head and base channels at each end of the aperture and fixed using 42mm Gyproc drywall screw fixings spaced at 600mm centres.

Gypframe 92A550 were positioned between the head and base channels at 600mm centres.

The framework was clad with 12.5mm SoundBloc as shown in Table 1.

For double layer of board specimens:

The inner layer of boards was screw fixed around the perimeter of the board at 300mm centres using 25mm Gyproc drywall screws.

The outer layer of boards was screw fixed around the perimeter of the board and the intermediate stud positions at 600mm centres using 36mm Gyproc drywall screws.

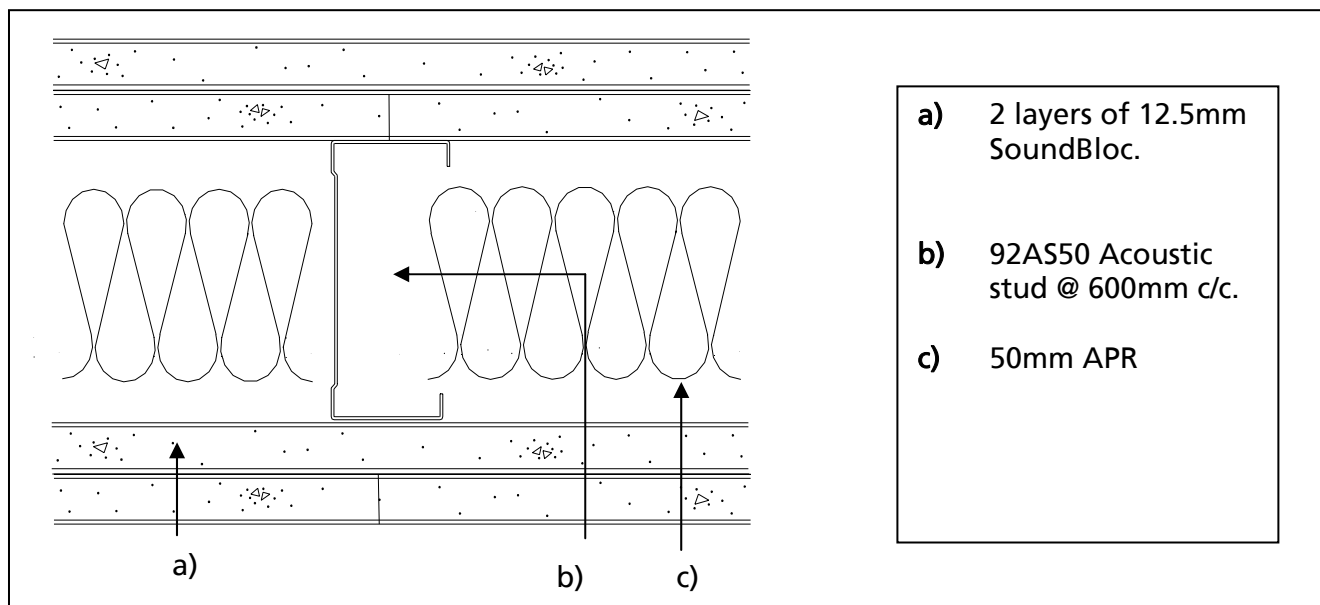
Insulation as shown in Table 1. was placed within the stud cavity/ within the separation of the two frames

All vertical joints were staggered between layers. All joints were taped and the perimeter sealed with Gyproc Sealant.

Following the test the insulation was removed from the cavity and replaced with Isover 100mm Modular Roll, before the returning the boards to the framework. The joints were taped and the perimeter resealed with Gyproc Sealant before repeating the test.

Test	No. of layers and Board Type	No. of layers and Insulation Type
A	2 x 12.5mm SoundBloc	1 x 50mm Isover APR
B	2 x 12.5mm SoundBloc	1 x100mm Modular Roll

**Table 1.** Details of board specifications and insulation used in the test series.



**Figure 1.** Horizontal cross section view through partition BTC16527AA

*The descriptions of individual components making up the test specimen were provided by the customer and were checked for accuracy wherever possible.*



## TEST MATERIALS

### Plasterboard

- i) Nominally 2400mm (long) x 1200mm (wide) x 12.5mm (thick) Gyproc SoundBloc manufactured by British Gypsum, ex East Leake.

Surface density:	11.32 kg/m <sup>2</sup>
Average thickness:	12.47 mm
Board Code:	16 140 9 19:42

The surface densities were calculated using the actual weight and size of a selection of the boards used in the test specimen.

### Insulation

- i) Nominally 50mm thick Isover APR insulation supplied by Saint Gobain Isover.

Average area	15.60 m <sup>2</sup>
Average weight	10.31 kg
Density	13.22 kg/m <sup>3</sup>

- ii) Nominally 100mm thick Isover Modular roll insulation supplied by Saint Gobain Isover.

Average area	11.00 m <sup>2</sup>
Average weight	11.33 kg
Density	10.30 kg/m <sup>3</sup>

The density was calculated using the actual weight and size of the insulation used in the test specimen.

### Metal Components

- i) 0.5mm thick Gypframe 92AS50 AcouStud  
ii) 0.5mm thick Gypframe 94C50 Floor & Ceiling Channel

All metal components are manufactured from galvanised mild steel using the 'UltraSTEEL' process and supplied by British Gypsum.

Customer: **British Gypsum**

### Fasteners

- i) 25mm Gyproc drywall screws
- ii) 36mm Gyproc drywall screws
- iii) 42mm Gyproc drywall screws

All fasteners supplied by British Gypsum

### Miscellaneous Components

- i) Gyproc Sealant supplied by British Gypsum
- ii) Joint tape supplied by The Building Test Centre

Where measurements could not be taken, then weight and dimensions were provided by the customer or the manufacturer e.g. from material labelling. Material information was recorded according to procedure MAT/1.

## **TEST RESULTS**

Test Code	Description	Weighted Airborne Sound Reduction Index $R_w$ (C; Ctr)
H16527AA	Double layer of 12.5mm SoundBloc with 50mm APR within the cavity	58 (-2; -5) dB
H16527BA	Double layer of 12.5mm SoundBloc with 100mm Modular roll within the cavity	59 (-2; -5) dB

For full data see data in Appendix A of this report.

Test conducted in accordance with BS EN ISO 140-3: 1995 except for Clause F.2 where minimum distances for measurements at frequencies under 100Hz can not be met.

Rated in accordance with BS EN ISO 717-1: 1997

## **TEST PROCEDURE**

The test specimen (3.6 m x 2.4 m) was constructed in a wall dividing two reverberant rooms of approximately 98m<sup>3</sup> and 62m<sup>3</sup>. The accuracy of the test method conforms to BS EN 20140-2:1993, the test procedure used is detailed in the test data in Appendix A of this report. Broad-band white noise was used to measure the level differences and broad-band pink noise was used to measure the reverberation times. Third octave band pass filters were used in real time mode. See appendix B for further information.

## **LIMITATIONS**

The results only relate to the behaviour of the element of construction under the particular conditions of test; they are not intended to be the sole criteria for assessing the potential acoustic performance of the element in use nor do they reflect the actual behaviour.

The specification and interpretation of test methods are subject to ongoing development and refinement. Changes in associated legislation may also occur. For these reasons it is recommended that the relevance of test reports over 5 years old should be considered by the user. The laboratory that issued the report will be able to offer, on behalf of the legal owner, a review of the procedures adopted for a particular test to ensure that they are consistent with current practices, and if required may endorse the test report.

Customer: **British Gypsum**

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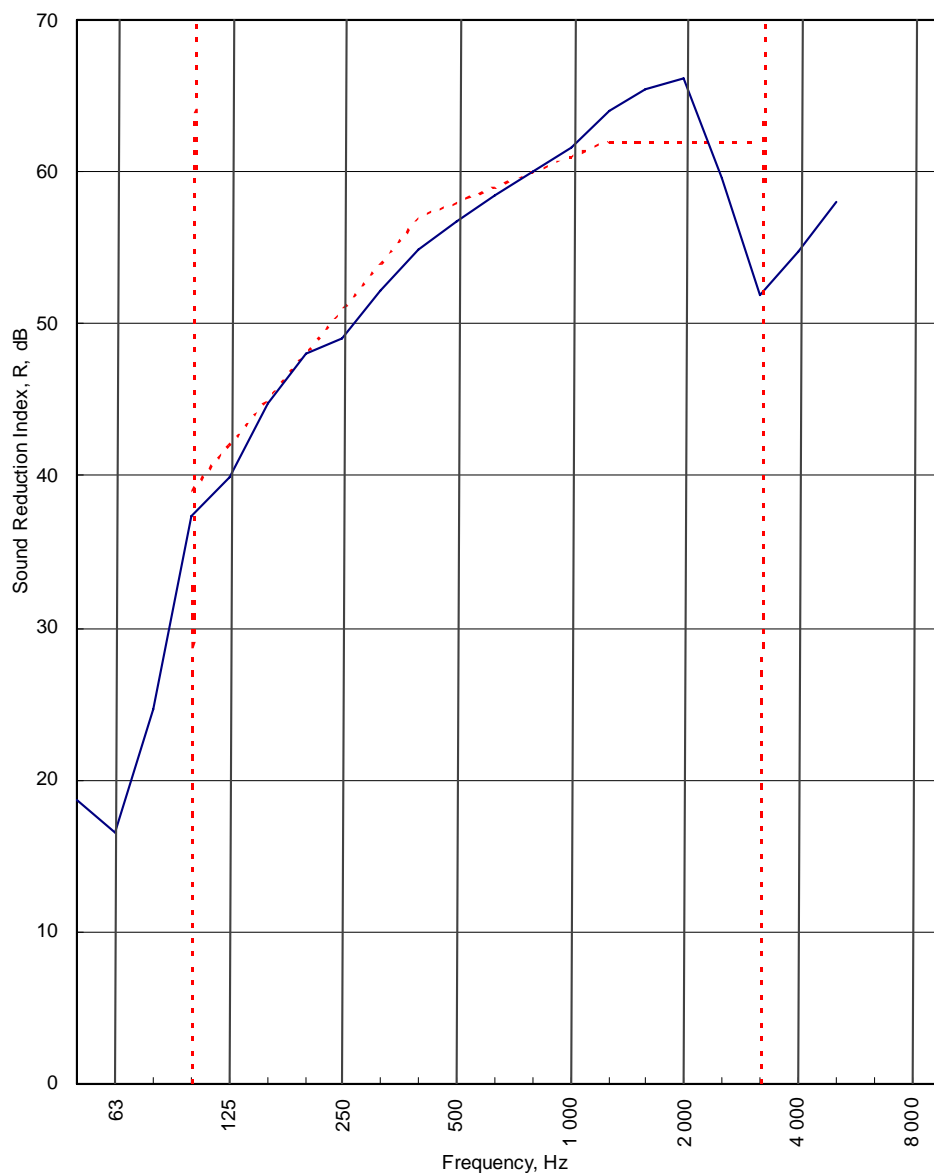
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## APPENDIX A - TEST DATA

Test Code:
H16527AA
Test Date:
10/07/2009

Freq. Hz	R dB
50	18.7
63	16.6
80	24.7
100	37.4
125	39.9
160	44.7
200	48.0
250	49.0
315	52.2
400	54.9
500	56.7
630	58.5
800	60.0
1 000	61.6
1 250	64.0
1 600	65.4
2 000	66.1
2 500	59.6
3 150	51.9
4 000	54.8
5 000	58.0
6 300	
8 000	
10 000	



----- Curve of reference values (ISO 717-1)

Rating according to  
BS EN ISO 717-1:1997

**R<sub>w</sub> (C;C<sub>tr</sub>) = 58 (-2;-5) dB**

Max dev. 10.1 dB at 3 150 Hz

Evaluation based on laboratory  
measurement results obtained by  
an engineering method:

C<sub>50-3150</sub> = **-8 dB**

C<sub>50-5000</sub> = **-8 dB**

C<sub>100-5000</sub> = **-2 dB**

C<sub>tr,50-3150</sub> = **-21 dB**

C<sub>tr,50-5000</sub> = **-21 dB**

C<sub>tr,100-5000</sub> = **-5 dB**

Customer: **British Gypsum**

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# LABORATORY AIRBORNE SOUND INSULATION TEST - BS EN ISO 140-3:1995

Test Code: **H16527AA**

Test Date: **10/07/2009**

Specimen Area, S = **8.64** m<sup>2</sup>

	Room T2	Room T1
Room Volume, m <sup>3</sup> :	<b>98</b>	<b>59.76</b>
Temperature, deg.C:	<b>20.6</b>	<b>20.9</b>
Rel. Humidity, %RH:	<b>46.9</b>	<b>47.1</b>

Freq Hz	Test Room T2 to Test Room T1						R dB	U.Dev. dB	R 1/1Oct dB
	Source dB	Rec. (uc) dB	Bgrnd dB	Rec. (corr) dB	Rev.time Sec	Corr. dB			
50	67.2	45.8	24.5	45.8	0.60	-2.7	18.7		
63	68.2	48.3	15.8	48.3	0.52	-3.3	16.6		18.9
80	76.8	49.9	6.1	49.9	0.66	-2.2	24.7		
100	87.5	49.5	15.7	49.5	0.96	-0.6	37.4	1.6	
125	86.1	46.0	4.3	46.0	1.05	-0.2	39.9	2.1	39.7
160	117.5	73.4	5.4	73.4	1.27	0.6	44.7	0.3	
200	98.0	51.0	14.1	51.0	1.40	1.0	48.0		
250	98.9	51.0	2.5	51.0	1.43	1.1	49.0	2.0	49.4
315	98.5	47.6	5.8	47.6	1.51	1.3	52.2	1.8	
400	97.1	43.5	8.8	43.5	1.50	1.3	54.9	2.1	
500	95.6	40.0	1.7	40.0	1.43	1.1	56.7	1.3	56.5
630	94.2	37.0	1.2	37.0	1.51	1.3	58.5	0.5	
800	94.6	35.9	4.2	35.9	1.50	1.3	60.0		
1 000	94.5	34.0	13.2	34.0	1.44	1.1	61.6		61.6
1 250	94.9	32.4	5.4	32.4	1.55	1.5	64.0		
1 600	97.9	33.8	8.0	33.8	1.49	1.3	65.4		
2 000	100.0	35.1	6.5	35.1	1.47	1.2	66.1		62.6
2 500	98.9	40.0	6.6	40.0	1.31	0.7	59.6	2.4	
3 150	98.4	47.0	7.2	47.0	1.23	0.5	51.9	10.1	
4 000	99.7	45.3	10.8	45.3	1.22	0.4	54.8		54.2
5 000	103.8	46.0	11.1	46.0	1.17	0.2	58.0		
6 300									
8 000									
10 000									
Single Figure Ratings		Rw	C	Ctr	Total U. Dev., dB			24.2	
BS EN ISO 717-1: 1997		dB	dB	dB					
		58	-2	-5					
		(100-5000)	-2	-5					
		(50-3150)	-8	-21					
		(50-5000)	-8	-21					
		Procedure: ISO140/3/B - issue 2							
		Worksheet: 140_3_1.XLS							

Customer: **British Gypsum**

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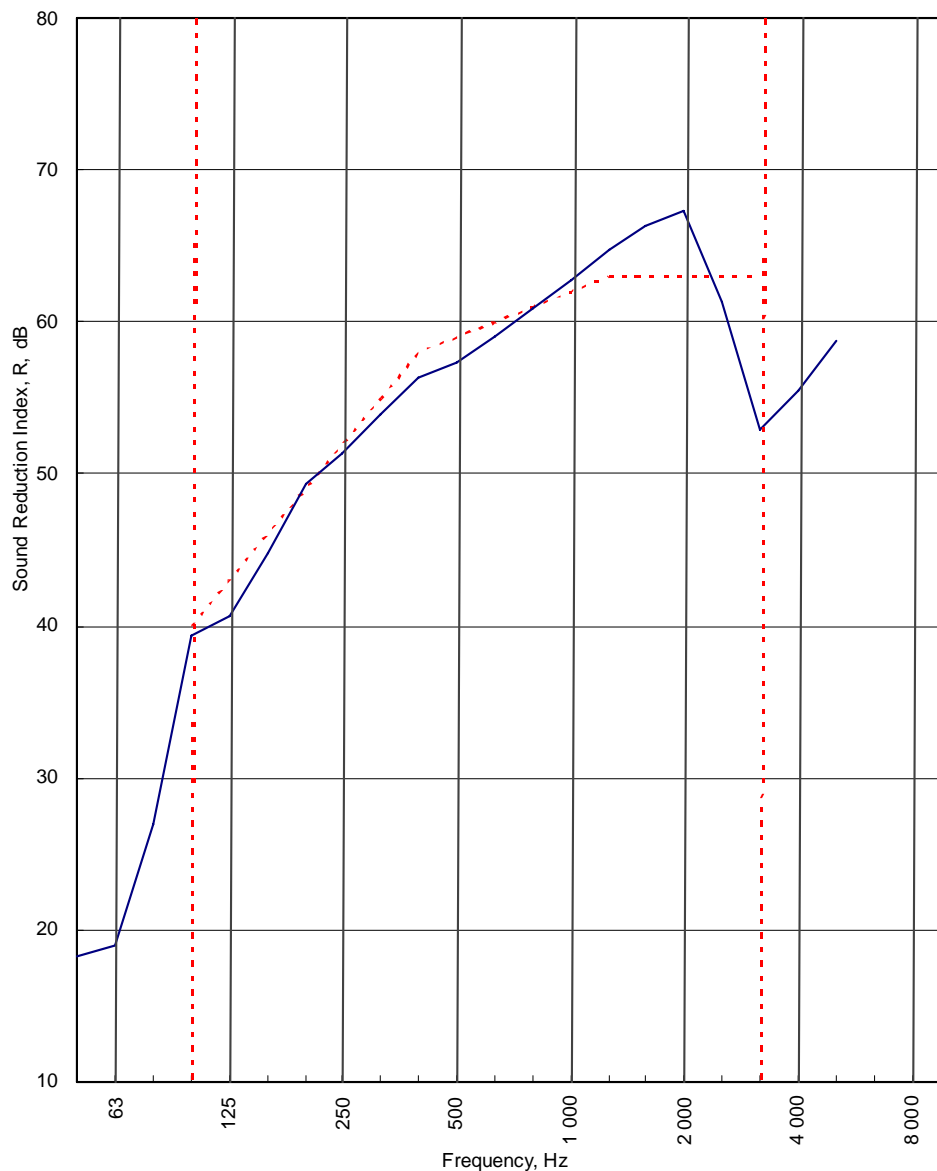


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Test Code:  
H16527BA

Test Date:  
10/07/2009

Freq. Hz	R dB
50	18.3
63	19.0
80	27.0
100	39.3
125	40.7
160	44.8
200	49.4
250	51.3
315	53.9
400	56.3
500	57.4
630	59.1
800	60.9
1 000	62.8
1 250	64.8
1 600	66.4
2 000	67.3
2 500	61.3
3 150	52.9
4 000	55.5
5 000	58.8
6 300	
8 000	
10 000	



----- Curve of reference values (ISO 717-1)

Rating according to  
BS EN ISO 717-1:1997

**R<sub>w</sub> (C;C<sub>tr</sub>) = 59 (-2;-5) dB**

Max dev. 10.1 dB at 3 150 Hz

Evaluation based on laboratory  
measurement results obtained by  
an engineering method:

C<sub>50-3150</sub> = **-8 dB**

C<sub>50-5000</sub> = **-7 dB**

C<sub>100-5000</sub> = **-2 dB**

C<sub>tr,50-3150</sub> = **-20 dB**

C<sub>tr,50-5000</sub> = **-20 dB**

C<sub>tr,100-5000</sub> = **-5 dB**

Customer: **British Gypsum**

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# LABORATORY AIRBORNE SOUND INSULATION TEST - BS EN ISO 140-3:1995

Test Code: **H16527BA**

Test Date: **10/07/2009**

Specimen Area, S = **8.64** m<sup>2</sup>

	Room T2	Room T1
Room Volume, m <sup>3</sup> :	<b>98</b>	<b>59.76</b>
Temperature, deg.C:	<b>22.2</b>	<b>21.7</b>
Rel. Humidity, %RH:	<b>44.6</b>	<b>45.4</b>

Freq Hz	Test Room T2 to Test Room T1						R dB	U.Dev. dB	R 1/1Oct dB	
	Source dB	Rec. (uc) dB	Bgrnd dB	Rec. (corr) dB	Rev.time Sec	Corr. dB				
50	67.2	45.7	14.8	45.7	0.53	-3.2	18.3	0.7	20.1	
63	67.9	47.5	9.2	47.5	0.81	-1.4	19.0			
80	78.1	49.2	4.5	49.2	0.72	-1.9	27.0			
100	87.7	48.0	15.9	48.0	1.00	-0.4	39.3			
125	86.7	45.9	3.4	45.9	1.08	-0.1	40.7	2.3	41.0	
160	117.4	72.7	2.9	72.7	1.12	0.1	44.8	1.2		
200	97.8	49.5	12.0	49.5	1.42	1.1	49.4	0.7	51.2	
250	98.9	49.1	1.2	49.1	1.55	1.5	51.3			
315	98.6	45.9	6.5	45.9	1.45	1.2	53.9			
400	97.5	42.2	6.0	42.2	1.38	1.0	56.3			
500	95.6	38.9	1.1	38.9	1.31	0.7	57.4	1.6	57.5	
630	94.2	36.2	0.8	36.2	1.42	1.1	59.1	0.9		
800	94.6	34.9	3.9	34.9	1.46	1.2	60.9	0.1	62.5	
1 000	94.5	32.8	14.1	32.8	1.42	1.1	62.8			
1 250	95.0	31.3	4.9	31.3	1.41	1.1	64.8			
1 600	97.9	32.8	6.6	32.8	1.48	1.3	66.4			
2 000	100.0	34.0	5.8	34.0	1.50	1.3	67.3	1.7	64.1	
2 500	99.0	38.5	5.9	38.5	1.33	0.8	61.3			
3 150	98.5	46.1	7.1	46.1	1.24	0.5	52.9			
4 000	99.7	44.5	11.3	44.5	1.19	0.3	55.5			
5 000	103.8	45.2	11.9	45.2	1.16	0.2	58.8	10.1	55.1	
6 300										
8 000										
10 000										
Single Figure Ratings		Rw	C	Ctr	Total U. Dev., dB			22.1		
BS EN ISO 717-1: 1997		dB	dB	dB						
		59	-2	-5						
		(100-5000)	-2	-5						
		(50-3150)	-8	-20						
RT's > factor 1.5 apart		(50-5000)	-7	-20	Procedure: ISO140/3/B - issue 2					
					Worksheet: 140_3_1.XLS					

Customer: **British Gypsum**

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**APPENDIX B - TEST METHOD AND CONDITIONS**

The source room (T2) was treated with six perspex diffusers of approximately 900mm x 1220mm. An omni-directional loudspeaker sound source is placed near a back corner of the source room (T2), rotating at 1 rpm and at least 0.7m from any room boundary to satisfy Annex C of BS EN ISO 140-3: 1995. A stationary loudspeaker sound source is placed in the corner of the receiving room (T1) opposite the test specimen.

The average sound pressure level in each 1/3 octave band is measured using a rotating microphone boom, positioned such that the minimum distance between microphone and sound source is 1m and between microphone and room boundaries is 0.7m. The rotating microphone has a sweep radius of at least 1m and is inclined in relation to the boundaries at an angle of at least 30° to the horizontal. The microphone has a traverse time of 32 seconds, and the sound pressure levels are averaged over 64 seconds which is equivalent to two complete sweeps of the microphone boom.

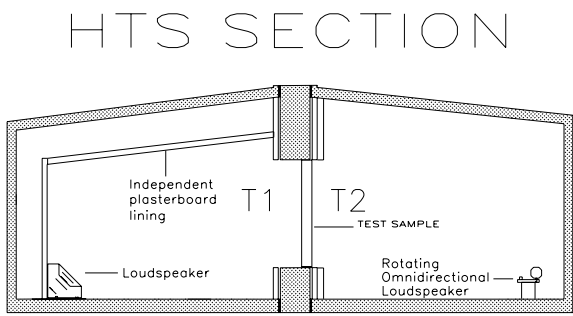
The equivalent absorption area of the receiving room is determined by producing the arithmetic average of twelve reverberation times and applying this to the Sabine formula.

The test specimen is installed in the aperture so that it finishes flush with the first independent timber in room T2 side to eliminate indirect transmission between rooms. The specimen is not installed so that the aperture depth ratio 2:1 is met as recommended in section 5.2.1 of BS EN ISO 140-3:1995. Laboratory tests have been carried out to prove the insignificance of this installation position on the test results.

The laboratory limit for measurement due to flanking is (combined BTC 11709A, BTC13562EA, BTC 15398A and BTC 15829A)

Freq Hz	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
R'max	45.0	46.9	58.5	62.4	62.9	67.7	71.2	77.2	84.2	92.0	97.7	101.5	103.8	97.6	102.4	104.8	101.8	102.9	98.7	96.4	96.2

The figure below shows flanking and isolation treatments in the test chamber.



Chamber layout