

Report Number BTC 16237A

An acoustic test report covering laboratory sound insulation testing to BS EN ISO 140-3:1995 on a British Gypsum GypWall Partition, incorporating Gypframe 92mm Studs (92S50) at 600mm centres with a double and single layer of 15mm Gyproc FireLine.

*Report amended 7<sup>th</sup> June 2012*

Test Date: 20<sup>th</sup> March 2009

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



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## FOREWORD

The test sponsor was British Gypsum Limited.

The test specimens were installed by John Gwynne and Chris Mutton on the 20<sup>th</sup> March 2009.

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

## REPORT AUTHORISATION

Report Author



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*Technologist*

Authorised by



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## TEST CONSTRUCTION

The test specimen was constructed in an aperture having an overall opening of 2400mm (high) by 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 92S50 studs were positioned between the head and base channels at each end of the aperture and fixed using 25mm Gyproc drywall screws with fixings spaced at 600mm centres.

Gypframe 92S50 studs were positioned between the head and base channels at 600mm centres.

The framework was clad in the following:

BTC 16237AA  
2 x 15mm Gyproc FireLine

BTC 16237BA  
1 x 15mm Gyproc FireLine

For single layer of boards:  
Screw fixed around the perimeter and with in the field of the boards at 300mm centres using 32mm Gyproc drywall screws.

For double layer of boards:  
The inner layer of boards was screw fixed around the perimeter at 300mm centres using 32mm Gyproc drywall screws.

The outer layer of boards was screw fixed around the perimeter and within the field of the boards at 300mm centres using 42mm Gyproc drywall screws.

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

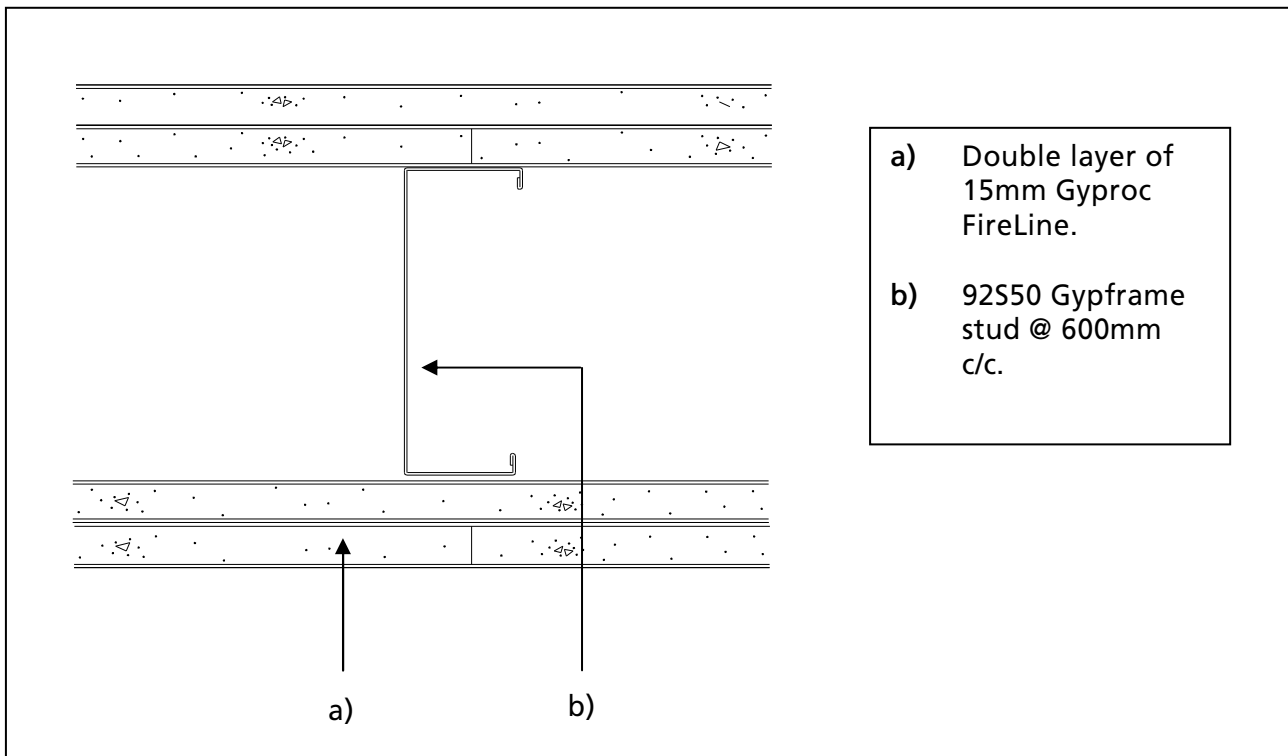


Figure 1. Cross section of BTC 16237AA

*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 15mm (thick) Gyproc FireLine manufactured by British Gypsum Limited, ex East Leake.

Surface density:	12.27 kg/m <sup>2</sup>
Average thickness:	15.34 mm
Board Code:	18 047 9 05:31

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

### Metal Components

- i) 0.5mm thick Gypframe 92S50 'C' Studs.  
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 Limited.

### Fasteners

- i) 25mm Gyproc drywall screws  
ii) 32mm Gyproc drywall screws  
iii) 42mm Gyproc Drywall screws

All fasteners supplied by British Gypsum Limited

### Miscellaneous Components

- i) Gyproc Sealant supplied by British Gypsum Limited  
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)
H16237AA	Double layer of 15mm FireLine (ex East Leake)	50(-2;-6) dB
H16237BA	Single layer of 15mm FireLine (ex East Leake)	40(-2;-7) 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 Limited

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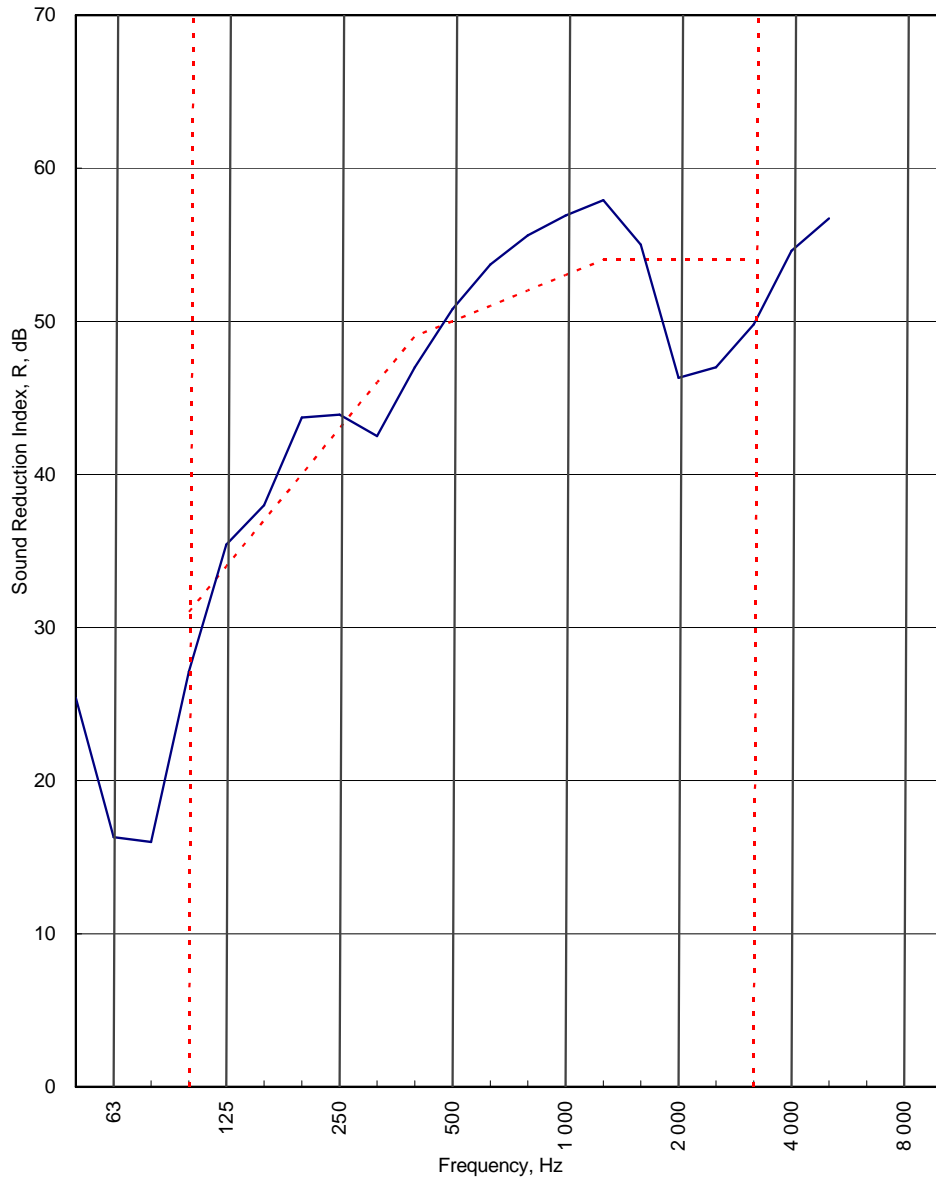


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**APPENDIX A - TEST DATA**

Test Code: <b>H16237AA</b>
Test Date: <b>20/03/2009</b>

Freq. Hz	R dB
50	25.4
63	16.3
80	16.0
100	27.1
125	35.4
160	38.0
200	43.7
250	43.9
315	42.5
400	47.0
500	50.8
630	53.7
800	55.6
1 000	56.9
1 250	57.9
1 600	55.0
2 000	46.3
2 500	47.0
3 150	49.8
4 000	54.6
5 000	56.7
6 300	
8 000	
10 000	



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

Rating according to BS EN ISO 717-1:1997	<b>R<sub>w</sub> (C;Ctr) = 50 (-2;-6) dB</b>		
Evaluation based on laboratory measurement results obtained by an engineering method:	<b>Max dev. 7.7 dB at 2 000 Hz</b>		
	C <sub>50-3150</sub> = <b>-5 dB</b>	C <sub>50-5000</sub> = <b>-4 dB</b>	C <sub>100-5000</sub> = <b>-1 dB</b>
	C <sub>tr,50-3150</sub> = <b>-16 dB</b>	C <sub>tr,50-5000</sub> = <b>-16 dB</b>	C <sub>tr,100-5000</sub> = <b>-6 dB</b>

Customer: British Gypsum Limited





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

Test Code: **H16237AA**

Test Date: **20/03/2009**

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

	Room T2	Room T1
Room Volume, m <sup>3</sup> :	<b>98</b>	<b>59.67</b>
Temperature, deg.C:	<b>16.1</b>	<b>15.8</b>
Rel. Humidity, %RH:	<b>46.7</b>	<b>45.3</b>

Freq Hz	Test Room T2 to Test Room T1						R dB	U.Dev. dB	R 1/10 Oct dB
	Source dB	Rec. (uc) dB	Bgrnd dB	Rec. (corr) dB	Rev.time Sec	Corr. dB			
50	61.0	33.0	14.1	33.0	0.61	-2.6	<b>25.4</b>		
63	64.3	46.9	12.9	46.9	0.86	-1.1	<b>16.3</b>		17.7
80	71.8	54.7	7.5	54.7	0.85	-1.1	<b>16.0</b>		
100	83.7	55.3	18.6	55.3	0.81	-1.3	<b>27.1</b>	3.9	31.0
125	83.2	47.9	7.8	47.9	1.12	0.1	<b>35.4</b>		
160	87.8	50.1	5.5	50.1	1.18	0.3	<b>38.0</b>		
200	93.3	50.5	16.4	50.5	1.35	0.9	<b>43.7</b>		
250	94.8	52.1	5.6	52.1	1.46	1.2	<b>43.9</b>		43.3
315	94.5	53.4	8.7	53.4	1.51	1.4	<b>42.5</b>	3.5	
400	93.4	47.2	11.7	47.2	1.34	0.8	<b>47.0</b>	2.0	
500	91.2	41.1	5.2	41.1	1.30	0.7	<b>50.8</b>		49.6
630	90.1	37.7	3.3	37.7	1.49	1.3	<b>53.7</b>		
800	90.8	36.6	5.1	36.6	1.53	1.4	<b>55.6</b>		
1 000	90.1	34.4	13.0	34.4	1.47	1.2	<b>56.9</b>		56.7
1 250	91.3	34.6	5.2	34.6	1.46	1.2	<b>57.9</b>		
1 600	94.0	40.2	6.1	40.2	1.46	1.2	<b>55.0</b>		
2 000	96.0	50.6	7.2	50.6	1.37	0.9	<b>46.3</b>	7.7	48.1
2 500	94.5	48.1	7.3	48.1	1.27	0.6	<b>47.0</b>	7.0	
3 150	93.8	44.4	7.3	44.4	1.21	0.4	<b>49.8</b>	4.2	
4 000	95.6	41.3	10.0	41.3	1.18	0.3	<b>54.6</b>		52.7
5 000	99.7	43.0	10.1	43.0	1.11	0.0	<b>56.7</b>		
6 300									
8 000									
10 000									

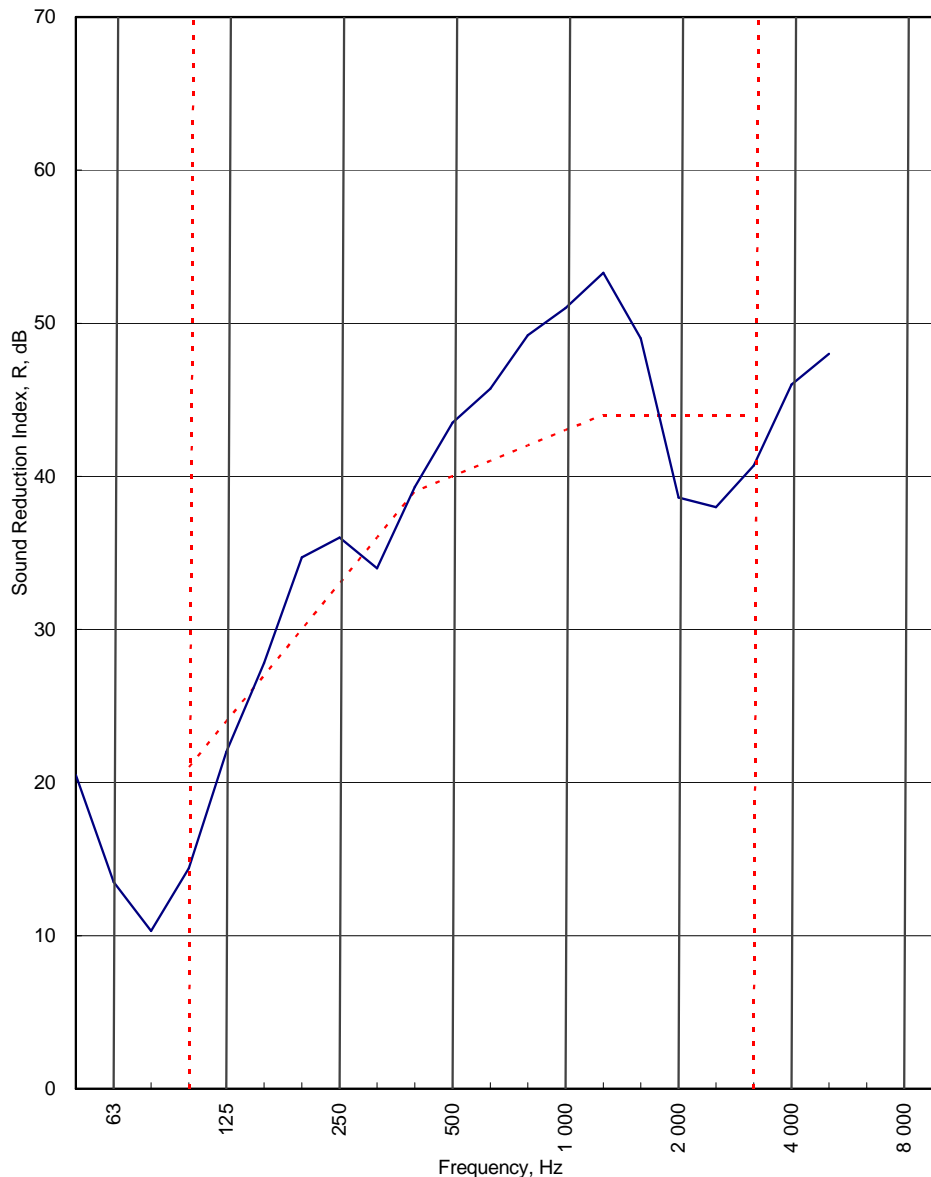
<b>Single Figure Ratings</b>	<b>Rw</b>	<b>C</b>	<b>Ctr</b>	<b>Total U. Dev., dB</b>	<b>28.3</b>
<b>BS EN ISO 717-1: 1997</b>	<b>dB</b>	<b>dB</b>	<b>dB</b>		
	<b>50</b>	<b>-2</b>	<b>-6</b>		
	<b>(100-5000)</b>	<b>-1</b>	<b>-6</b>		
	<b>(50-3150)</b>	<b>-5</b>	<b>-16</b>		
	<b>(50-5000)</b>	<b>-4</b>	<b>-16</b>		
				Procedure: ISO140/3/B - issue 2	
				Worksheet: 140_3_1.XLS	

Customer: British Gypsum Limited



Test Code:  
**H16237BA**  
 Test Date:  
**20/03/2009**

Freq. Hz	R dB
50	20.5
63	13.5
80	10.3
100	14.4
125	22.0
160	27.8
200	34.7
250	36.0
315	34.0
400	39.3
500	43.5
630	45.7
800	49.2
1 000	51.0
1 250	53.3
1 600	49.0
2 000	38.6
2 500	38.0
3 150	40.7
4 000	46.0
5 000	48.0
6 300	
8 000	
10 000	



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

Rating according to BS EN ISO 717-1:1997	<b>R<sub>w</sub> (C;Ctr) = 40 (-2;-7) dB</b>		
	<b>Max dev. 6.6 dB at 100 Hz</b>		
Evaluation based on laboratory measurement results obtained by an engineering method:	<b>C<sub>50-3150</sub> = -3 dB</b>	<b>C<sub>50-5000</sub> = -2 dB</b>	<b>C<sub>100-5000</sub> = -1 dB</b>
	<b>C<sub>tr,50-3150</sub> = -12 dB</b>	<b>C<sub>tr,50-5000</sub> = -12 dB</b>	<b>C<sub>tr,100-5000</sub> = -7 dB</b>

Customer: British Gypsum Limited

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

Test Code: **H16237BA**

Test Date: **20/03/2009**

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

	Room T2	Room T1
Room Volume, m <sup>3</sup> :	<b>98</b>	<b>59.93</b>
Temperature, deg.C:	<b>16.3</b>	<b>16.4</b>
Rel. Humidity, %RH:	<b>44.8</b>	<b>44.3</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	62.3	39.6	11.9	39.6	0.67	-2.2	20.5		
63	64.0	50.5	9.3	50.5	1.12	0.0	13.5		13.1
80	69.7	58.6	10.1	58.6	0.92	-0.8	10.3		
100	82.3	67.2	27.6	67.2	0.95	-0.7	14.4	6.6	
125	82.0	59.5	11.7	59.5	0.99	-0.5	22.0	2.0	18.3
160	87.5	60.0	5.9	60.0	1.18	0.3	27.8		
200	92.9	58.8	18.3	58.8	1.28	0.6	34.7		
250	94.9	59.9	8.0	59.9	1.40	1.0	36.0		34.8
315	94.4	61.5	10.7	61.5	1.44	1.1	34.0	2.0	
400	93.5	54.8	14.3	54.8	1.28	0.6	39.3		
500	91.2	48.5	9.5	48.5	1.32	0.8	43.5		42.0
630	90.4	45.6	5.8	45.6	1.38	0.9	45.7		
800	90.8	42.8	7.2	42.8	1.45	1.2	49.2		
1 000	90.3	40.4	14.1	40.4	1.44	1.1	51.0		50.9
1 250	91.5	39.3	6.6	39.3	1.44	1.1	53.3		
1 600	94.1	46.3	6.6	46.3	1.45	1.2	49.0		
2 000	96.0	58.5	7.8	58.5	1.44	1.1	38.6	5.4	39.9
2 500	94.5	57.1	7.9	57.1	1.28	0.6	38.0	6.0	
3 150	93.6	53.2	7.6	53.2	1.20	0.3	40.7	3.3	
4 000	95.5	49.7	10.3	49.7	1.16	0.2	46.0		43.8
5 000	99.7	51.5	10.2	51.5	1.07	-0.2	48.0		
6 300									
8 000									
10 000									
<b>Single Figure Ratings</b>	<b>Rw</b>	<b>C</b>	<b>Ctr</b>	<b>Total U. Dev., dB</b>			<b>25.3</b>		
<b>BS EN ISO 717-1: 1997</b>	<b>dB</b>	<b>dB</b>	<b>dB</b>						
	<b>40</b>	<b>-2</b>	<b>-7</b>						
	<b>(100-5000)</b>	<b>-1</b>	<b>-7</b>						
	<b>(50-3150)</b>	<b>-3</b>	<b>-12</b>						
<b>RT's &gt; factor 1.5 apart</b>	<b>(50-5000)</b>	<b>-2</b>	<b>-12</b>						
				Procedure: ISO140/3/B - issue 2					
				Worksheet: 140_3_1.XLS					

Customer: British Gypsum Limited



**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.

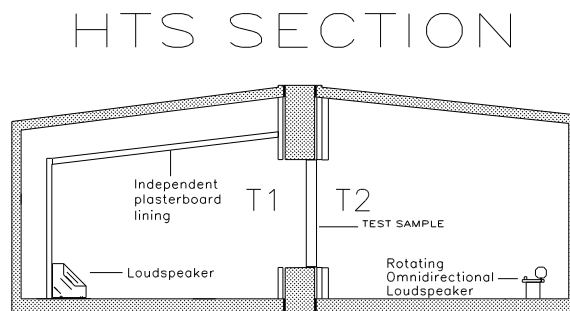
The equivalent absorption area of the receiving room is determined by producing the arithmetic average of twelve reverberation times and applying this to the Sabine formula.

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