The Building Test Centre
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Report Number **BTC16528A**

An acoustic test report covering laboratory sound insulation testing to BS EN ISO 140-3:1995 on a British Gypsum Gypwall Classic partition clad with a double layer of 12.5mm FireLine with 25mm Isover APR insulation in the cavity.

Test Date: 6th July 2009

www.btconline.co.uk

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

0296

The Building Test Centre
Fire Acoustics Structures

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FOREWORD

The test sponsor was British Gypsum.

The test specimens were installed by Liam Woodford and Martin Lynch on the 6th 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	Authorised by
Christopher Mutton M. Phys *Technologist*	**James Stonell** AMIOA *Technologist*

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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 92AS50 'C' Studs were positioned between the head and base channels at each end of the aperture and fixed using 32mm Gyproc drywall screw fixings spaced at 600mm centres.

Gypframe 92AS50 Acoustuds were positioned between the head and base channels at 600mm centres.

25mm Isover APR insulation was placed within the stud cavity.

The framework was clad with 12.5mm Fireline 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.

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 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 FireLine	1 x 25mm Isover APR
B	2 x 12.5mm FireLine	NO INSULATION

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

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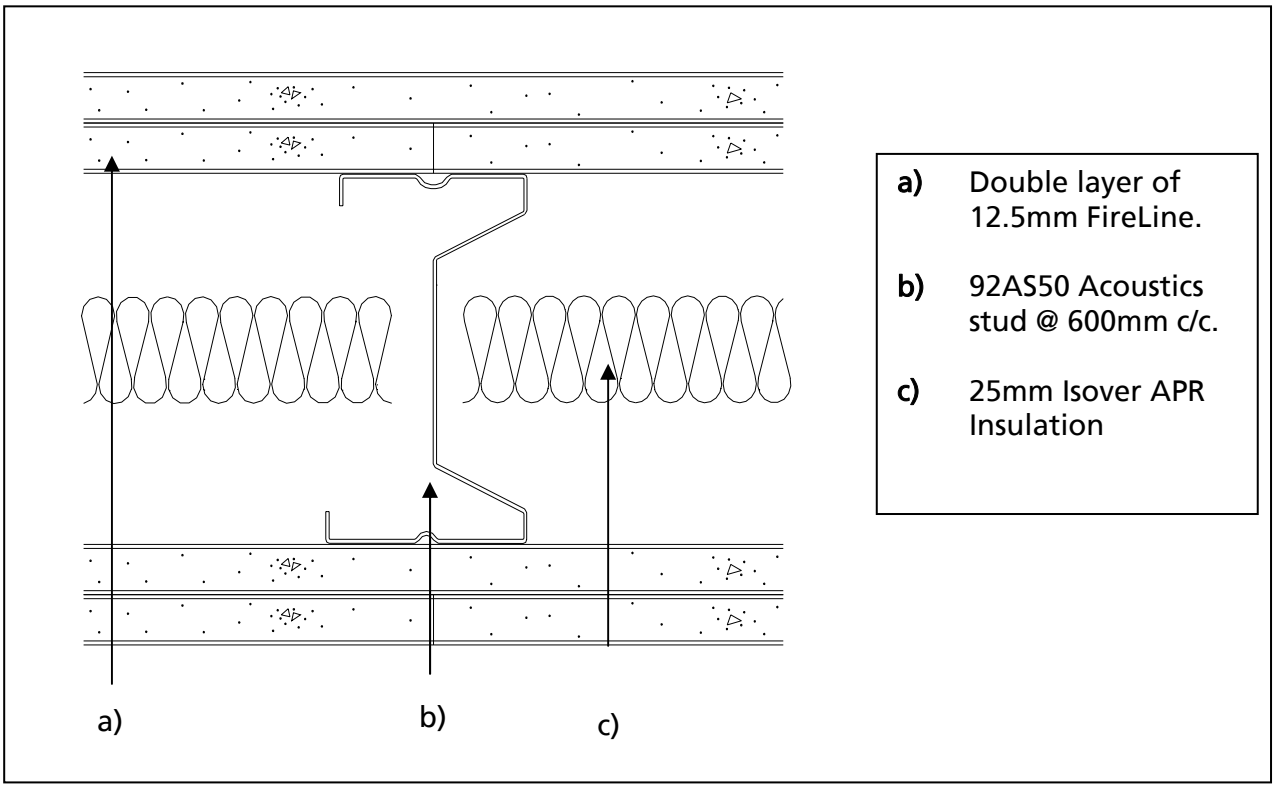

Figure 1. Horizontal cross section view through partition BTC16528AA

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

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TEST MATERIALS

Plasterboard

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

Surface density:	10.27 kg/m^2
Average thickness:	12.80 mm
Board Code:	16 138 9 00:20

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 25mm thick Isover APR insulation supplied by Saint Gobain Isover.

Average area	24.00 m^2
Average weight	10.08 kg
Density	16.80 kg/m^3

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.

Fasteners

i) 25mm Gyproc drywall screws
ii) 32mm Gyproc drywall screws
iii) 36mm Gyproc drywall screws

All fasteners supplied by British Gypsum

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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.

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TEST RESULTS

Test Code	Description	Weighted Airborne Sound Reduction Index R_w (C; Ctr)
H16528AA	Double layer of 12.5mm FireLine with 25mm APR within the cavity	54 (-2; -6) dB
H16528BA	Double layer of 12.5mm FireLine	51 (-2; -6) 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^3 and 62m^3. 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.

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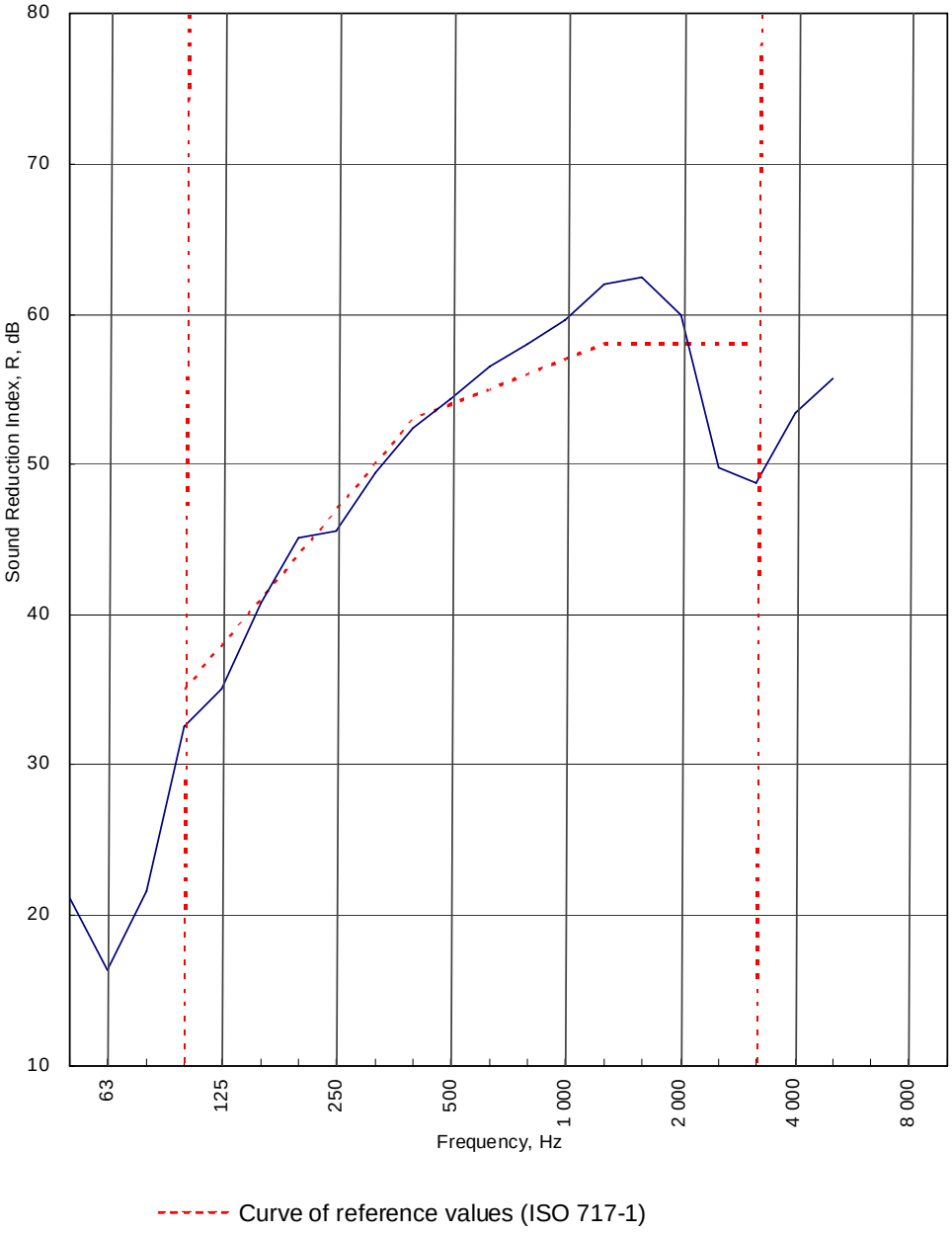
APPENDIX A - TEST DATA

Test Code:
H16528AA
Test Date:
06/07/2009

Freq. Hz	R dB
50	21.2
63	16.3
80	21.6
100	32.6
125	35.1
160	40.8
200	45.1
250	45.6
315	49.5
400	52.4
500	54.3
630	56.5
800	58.0
1 000	59.6
1 250	62.0
1 600	62.5
2 000	60.0
2 500	49.8
3 150	48.7
4 000	53.4
5 000	55.7
6 300	
8 000	
10 000	



Rating according to BS EN ISO 717-1:1997

Rw (C;Ctr) = 54 (-2;-6) dB

Max dev. 9.3 dB at 3 150 Hz

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

$C_{50\text{-}3150}$= **-6 dB** $C_{50\text{-}5000}$= **-5 dB** $C_{100\text{-}5000}$= **-2 dB**

$C_{tr,50\text{-}3150}$= **-17 dB** $C_{tr,50\text{-}5000}$= **-17 dB** $C_{tr,100\text{-}5000}$= **-6 dB**

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

Test Code: **H16528AA** Test Date: **06/07/2009**

Specimen Area, S = **8.64** m^2

	Room T2	Room T1
Room Volume, m^3:	**98**	**59.76**
Temperature, deg.C:	**21.7**	**21.9**
Rel. Humidity, %RH:	**56.1**	**54**

	Test Room T2 to Test Room T1								
Freq	Source	Rec. (uc)	Bgrnd	Rec. (corr)	Rev.time	Corr.	**R**	U.Dev.	R 1/1Oct
Hz	dB	dB	dB	dB	Sec	dB	**dB**	dB	dB
50	67.3	43.1	16.9	43.1	0.56	-3.0	**21.2**		
63	69.5	51.9	17.3	51.9	0.82	-1.3	**16.3**		19.0
80	75.6	52.4	9.7	52.4	0.76	-1.6	**21.6**		
100	86.7	53.6	21.1	53.6	0.99	-0.5	**32.6**	2.4	
125	86.2	51.2	5.3	51.2	1.13	0.1	**35.1**	2.9	35.0
160	118.1	77.7	4.1	77.7	1.20	0.4	**40.8**	0.2	
200	98.4	54.4	13.8	54.4	1.41	1.1	**45.1**		
250	99.1	55.0	4.5	55.0	1.56	1.5	**45.6**	1.4	46.3
315	98.4	50.2	6.8	50.2	1.49	1.3	**49.5**	0.5	
400	97.1	45.9	12.6	45.9	1.47	1.2	**52.4**	0.6	
500	95.3	42.1	1.9	42.1	1.43	1.1	**54.3**		54.1
630	94.0	38.7	1.5	38.7	1.47	1.2	**56.5**		
800	94.2	37.5	5.5	37.5	1.50	1.3	**58.0**		
1 000	94.1	35.8	14.6	35.8	1.51	1.3	**59.6**		59.6
1 250	94.6	34.1	6.4	34.1	1.56	1.5	**62.0**		
1 600	97.7	36.7	12.1	36.7	1.57	1.5	**62.5**		
2 000	99.6	41.0	10.1	41.0	1.53	1.4	**60.0**		54.0
2 500	98.8	50.0	9.6	50.0	1.38	1.0	**49.8**	8.2	
3 150	98.4	50.4	9.3	50.4	1.29	0.7	**48.7**	9.3	
4 000	100.2	47.5	12.0	47.5	1.30	0.7	**53.4**		51.6
5 000	104.0	48.7	11.2	48.7	1.22	0.4	**55.7**		
6 300									
8 000									
10 000									

Single Figure Ratings	**Rw**	**C**	**Ctr**	**Total U. Dev., dB**	**25.5**
BS EN ISO 717-1: 1997	**dB**	**dB**	**dB**		
	54	**-2**	**-6**		
	(100-5000)	**-2**	**-6**		
	(50-3150)	**-6**	**-17**		
	(50-5000)	**-5**	**-17**		

Procedure: ISO140/3/B - issue 2

Worksheet: 140_3_1.XLS

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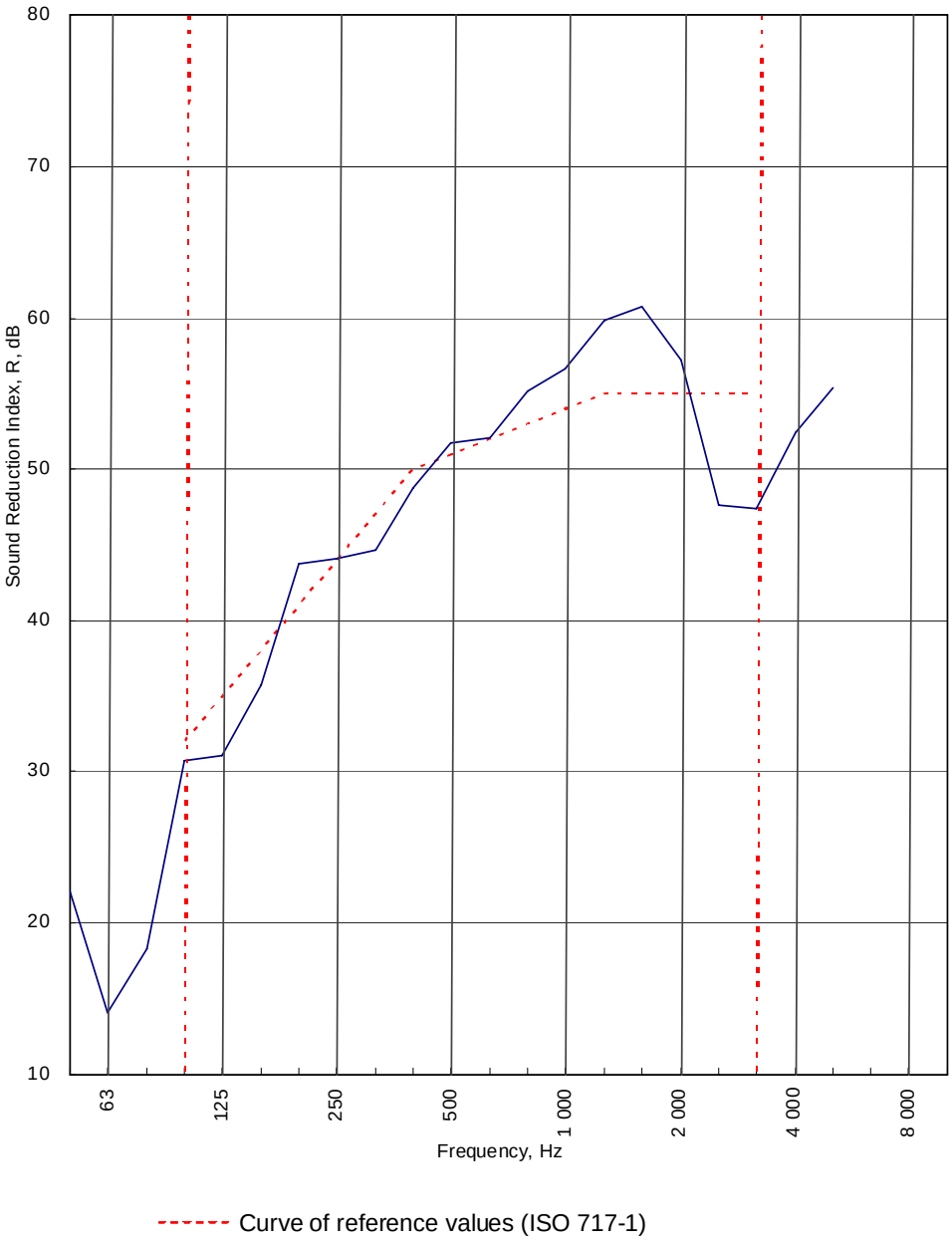
Test Code:
H16528BA
Test Date:
06/07/2009

Freq. Hz	R dB
50	22.1
63	14.1
80	18.3
100	30.7
125	31.1
160	35.8
200	43.7
250	44.1
315	44.6
400	48.7
500	51.7
630	52.1
800	55.1
1 000	56.6
1 250	59.8
1 600	60.7
2 000	57.2
2 500	47.6
3 150	47.4
4 000	52.4
5 000	55.4
6 300	
8 000	
10 000	



Rating according to BS EN ISO 717-1:1997

Rw (C;Ctr) = 51 (-2;-6) dB

Max dev. 7.6 dB at 3 150 Hz

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

$C_{50\text{-}3150}$= **-6 dB** $C_{50\text{-}5000}$= **-5 dB** $C_{100\text{-}5000}$= **-1 dB**

$C_{tr,50\text{-}3150}$= **-17 dB** $C_{tr,50\text{-}5000}$= **-17 dB** $C_{tr,100\text{-}5000}$= **-6 dB**

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Customer: **British Gypsum**

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

Test Code: **H16528BA** Test Date: **06/07/2009**

Specimen Area, S = **8.64** m^2

	Room T2	Room T1
Room Volume, m^3:	**98**	**59.76**
Temperature, deg.C:	**22.1**	**22.3**
Rel. Humidity, %RH:	**53.2**	**56**

	Test Room T2 to Test Room T1								
Freq	Source	Rec. (uc)	Bgrnd	Rec. (corr)	Rev.time	Corr.	**R**	U.Dev.	R 1/1Oct
Hz	dB	dB	dB	dB	Sec	dB	**dB**	dB	dB
50	67.0	42.5	13.5	42.5	0.64	-2.4	**22.1**		
63	69.3	54.4	10.7	54.4	0.93	-0.8	**14.1**		17.0
80	75.8	55.8	4.1	55.8	0.74	-1.7	**18.3**		
100	86.6	55.3	16.1	55.3	0.97	-0.6	**30.7**	1.3	
125	86.4	55.1	2.5	55.1	1.06	-0.2	**31.1**	3.9	32.0
160	117.7	82.7	2.8	82.7	1.34	0.8	**35.8**	2.2	
200	98.5	55.8	14.6	55.8	1.39	1.0	**43.7**		
250	99.2	56.5	2.6	56.5	1.53	1.4	**44.1**		44.1
315	98.5	55.4	4.5	55.4	1.58	1.5	**44.6**	2.4	
400	96.9	49.3	10.6	49.3	1.44	1.1	**48.7**	1.3	
500	94.9	44.4	1.3	44.4	1.45	1.2	**51.7**		50.6
630	93.9	43.0	1.2	43.0	1.47	1.2	**52.1**		
800	94.2	40.5	4.6	40.5	1.53	1.4	**55.1**		
1 000	94.1	38.6	15.0	38.6	1.44	1.1	**56.6**		56.8
1 250	94.4	36.1	4.9	36.1	1.55	1.5	**59.8**		
1 600	97.6	38.5	6.9	38.5	1.59	1.6	**60.7**		
2 000	99.5	43.7	6.3	43.7	1.53	1.4	**57.2**		51.7
2 500	98.8	52.1	6.9	52.1	1.37	0.9	**47.6**	7.4	
3 150	98.4	51.6	7.4	51.6	1.27	0.6	**47.4**	7.6	
4 000	99.9	48.1	10.0	48.1	1.27	0.6	**52.4**		50.5
5 000	103.9	48.9	10.6	48.9	1.22	0.4	**55.4**		
6 300									
8 000									
10 000									

Single Figure Ratings	**Rw**	**C**	**Ctr**	**Total U. Dev., dB**	**26.1**
BS EN ISO 717-1: 1997	**dB**	**dB**	**dB**		
	51	**-2**	**-6**		
	(100-5000)	**-1**	**-6**		
	(50-3150)	**-6**	**-17**		
	(50-5000)	**-5**	**-17**		

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.

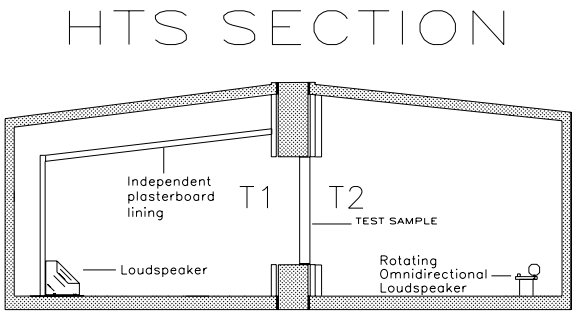
The equivalent absorption area of the receiving room is determined by producing the arithmetic average of twelve reverberation times and applying this to the Sabine formula.

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

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