The Building Test Centre
British Gypsum
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Report Number **BTC16238A**

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 single and double layer of 15mm FireLine with the void filled with 25mm Isover APR 1200.

Test Date: 2nd April 2009

www.btconline.co.uk

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

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FOREWORD

The test sponsor was British Gypsum.

The test specimens were installed by Pete Rigley on the 2nd April 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
JA Stonell	
James Stonell AMIOA *Technologist*	**Alexandra Ahern** B.Eng. MIOA *Section Manager*

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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 void was filled with 1 layer 25mm Isover Acoustic Partition Roll 1200

The framework was clad in the following:

BTC 16238AA
2 x 15mm Gyproc FireLine

BTC 16238BA
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 with in the field of the boards at 300mm centres using 42mm Gyproc drywall screws.

All vertical joints were staggered between layers. All joints and screw heads were taped. The perimeter taped and sealed with Gyproc Sealant.

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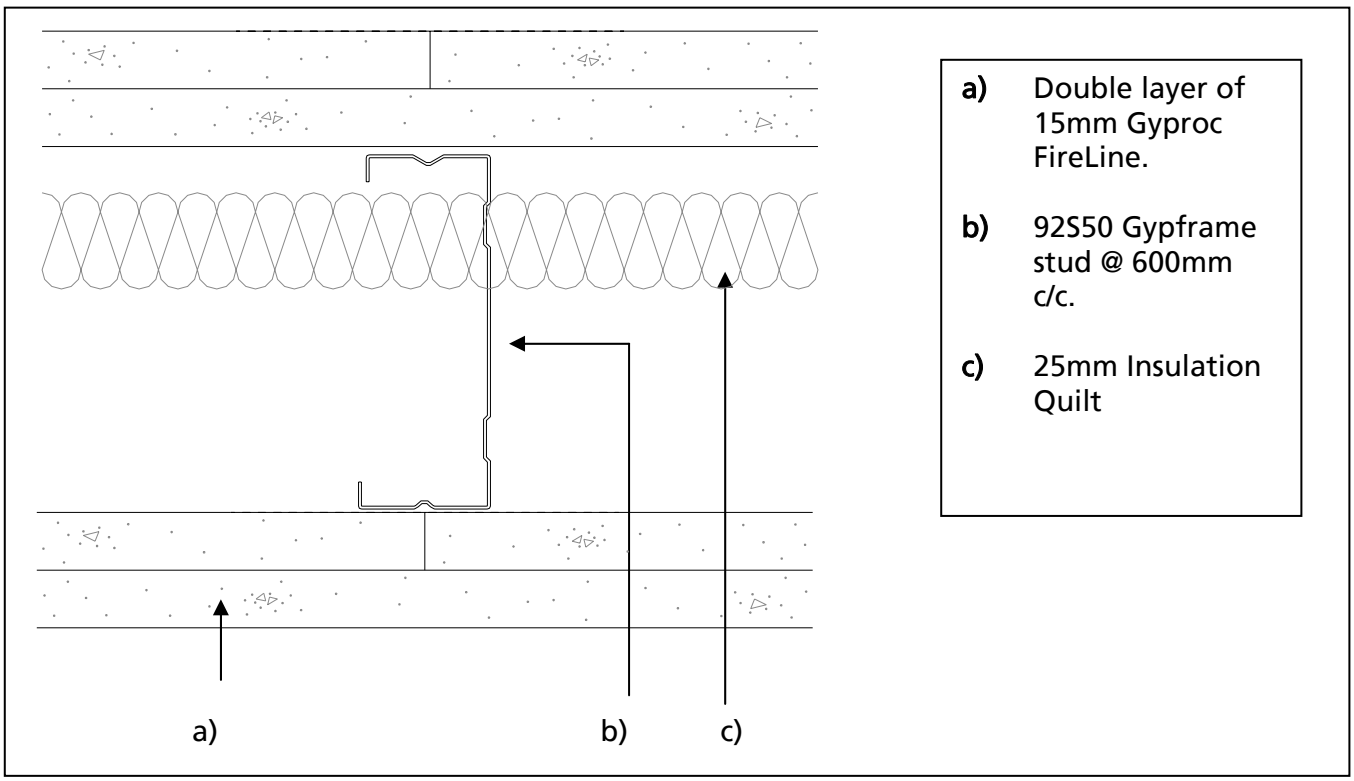

a) Double layer of 15mm Gyproc FireLine.

b) 92S50 Gypframe stud @ 600mm c/c.

c) 25mm Insulation Quilt

Figure 1. Horizontal cross section view of test BTC16238AA.

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

Surface density:	12.27 kg/m^2
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.

Insulation

i) Nominally 25mm thick Isover APR 1200 insulation supplied by Saint Gobain Isover.

Average area	24.00 m^2
Average weight	9.92 kg
Density	16.53 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 70S50 'C' Studs.
ii) 0.5mm thick Gypframe 72C50 Standard Flange 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) 42mm 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)
H16238AA	Double layer of 15mm FireLine with 25mm Isover APR 1200 within the cavity	52 (-2;-7) dB
H16238BA	Single layer of 15mm FireLine with 25mm Isover APR 1200 within the cavity	44 (-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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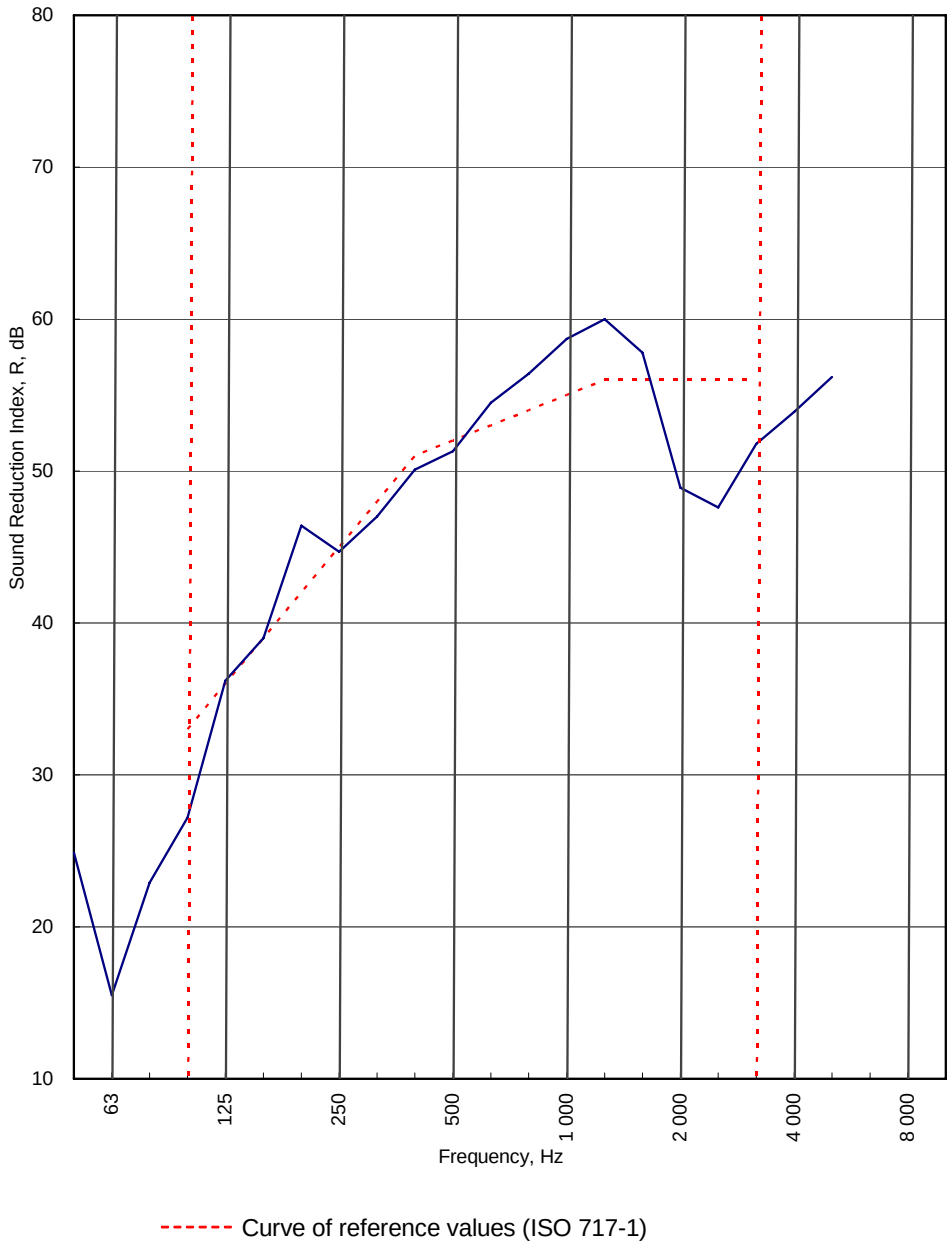
APPENDIX A - TEST DATA

Test Code:
H16238AA
Test Date:
02/04/2009

Freq. Hz	R dB
50	24.9
63	15.5
80	22.9
100	27.2
125	36.2
160	39.0
200	46.4
250	44.7
315	47.0
400	50.1
500	51.3
630	54.5
800	56.4
1 000	58.7
1 250	60.0
1 600	57.8
2 000	48.9
2 500	47.6
3 150	51.8
4 000	53.9
5 000	56.2
6 300	
8 000	
10 000	



Rating according to BS EN ISO 717-1:1997	**Rw (C;Ctr) = 52 (-2;-7) dB**		
	Max dev. 8.4 dB at 2 500 Hz		
Evaluation based on laboratory measurement results obtained by an engineering method:	$C_{50\text{-}3150}$= **-5 dB**	$C_{50\text{-}5000}$= **-4 dB**	$C_{100\text{-}5000}$= **-2 dB**
	$C_{tr,50\text{-}3150}$= **-15 dB**	$C_{tr,50\text{-}5000}$= **-15 dB**	$C_{tr,100\text{-}5000}$: **-7 dB**

Customer: **British Gypsum**

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

Test Code: **H16238AA** Test Date: **02/04/2009**

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

	Room T2	Room T1
Room Volume, m^3:	**98**	**59.67**
Temperature, deg.C:	**15.8**	**15.4**
Rel. Humidity, %RH:	**52.5**	**54**

Freq Hz	Test Room T2 to Test Room T1 Source dB	Rec. (uc) dB	Bgrnd dB	Rec. (corr) dB	Rev.time Sec	Corr. dB	R dB	U.Dev. dB	R 1/1Oct dB
50	64.9	37.8	24.9	**37.6**	0.63	-2.4	**24.9**		
63	64.1	47.4	9.4	47.4	0.84	-1.2	**15.5**		19.1
80	74.4	50.2	5.8	50.2	0.81	-1.3	**22.9**		
100	84.7	56.5	20.1	56.5	0.88	-1.0	**27.2**	5.8	
125	84.0	47.7	7.1	47.7	1.07	-0.1	**36.2**		31.2
160	88.5	49.9	4.8	49.9	1.22	0.4	**39.0**		
200	94.4	48.9	16.3	48.9	1.37	0.9	**46.4**		
250	95.8	52.6	3.7	52.6	1.55	1.5	**44.7**	0.3	45.9
315	95.9	50.3	6.3	50.3	1.51	1.4	**47.0**	1.0	
400	94.7	45.7	6.1	45.7	1.41	1.1	**50.1**	0.9	
500	92.7	42.3	1.9	42.3	1.37	0.9	**51.3**	0.7	51.6
630	91.8	38.5	2.1	38.5	1.45	1.2	**54.5**		
800	92.2	37.2	4.2	37.2	1.52	1.4	**56.4**		
1 000	91.7	34.3	13.3	34.3	1.50	1.3	**58.7**		58.1
1 250	92.8	34.1	4.7	34.1	1.48	1.3	**60.0**		
1 600	95.5	39.0	5.1	39.0	1.50	1.3	**57.8**		
2 000	97.3	49.6	5.7	49.6	1.46	1.2	**48.9**	7.1	49.7
2 500	96.0	49.0	5.9	49.0	1.27	0.6	**47.6**	8.4	
3 150	95.3	44.0	7.3	44.0	1.24	0.5	**51.8**	4.2	
4 000	97.1	43.5	10.1	43.5	1.19	0.3	**53.9**		53.6
5 000	101.2	45.2	9.9	45.2	1.16	0.2	**56.2**		
6 300									
8 000									
10 000									

Single Figure Ratings	**Rw**	**C**	**Ctr**	**Total U. Dev., dB**	**28.4**
BS EN ISO 717-1: 1997	**dB**	**dB**	**dB**		
	52	**-2**	**-7**		
	(100-5000)	**-2**	**-7**		
Background Corrected					
	(50-3150)	**-5**	**-15**		
	(50-5000)	**-4**	**-15**		

Procedure: ISO140/3/B - issue 2

Worksheet: 140_3_1.XLS

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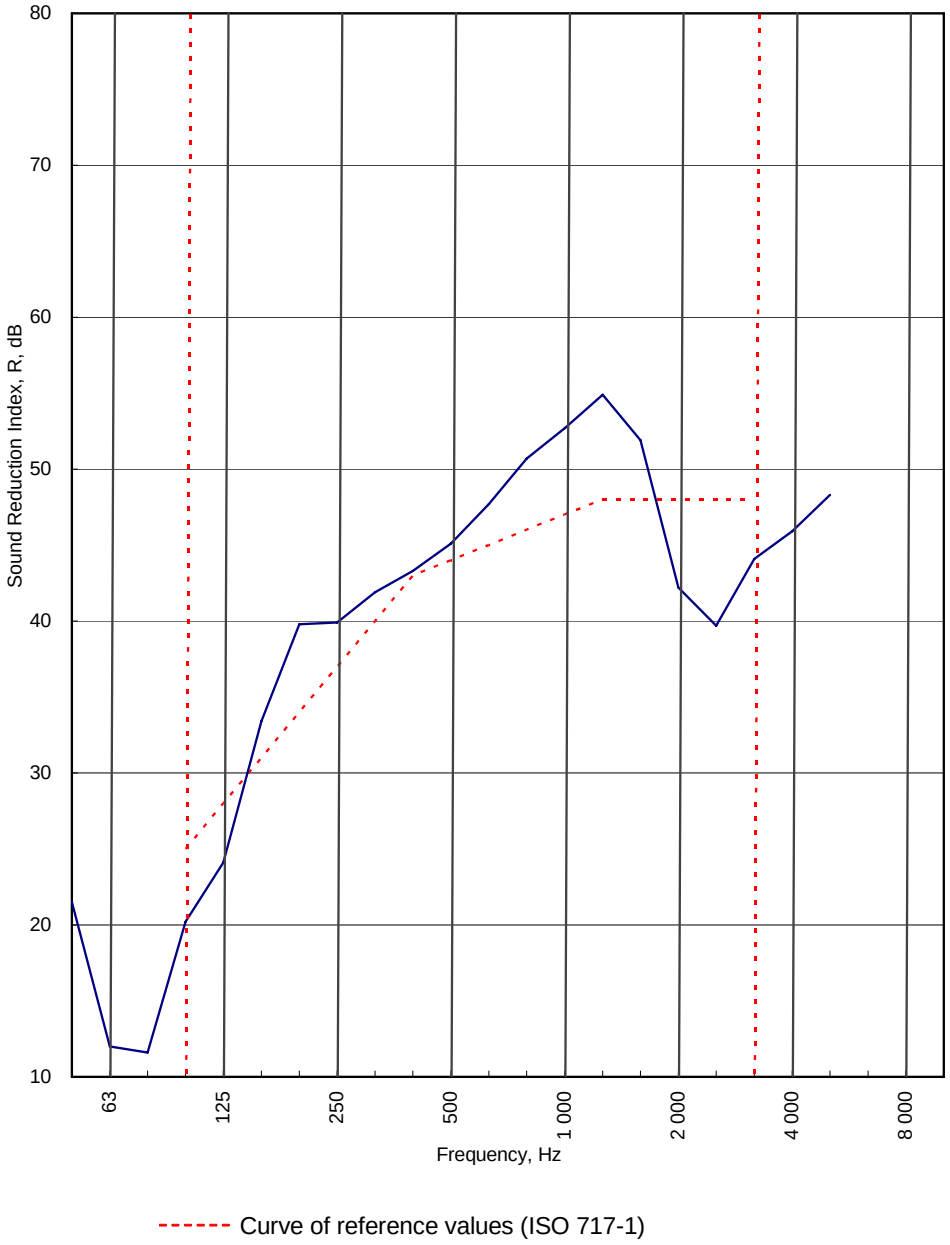
Test Code:
H16238BA
Test Date:
02/04/2009

Freq. Hz	R dB
50	21.5
63	12.0
80	11.6
100	20.2
125	24.1
160	33.4
200	39.8
250	39.9
315	41.9
400	43.3
500	45.1
630	47.7
800	50.7
1 000	52.7
1 250	54.9
1 600	51.9
2 000	42.2
2 500	39.7
3 150	44.1
4 000	45.9
5 000	48.3
6 300	
8 000	
10 000	



Rating according to BS EN ISO 717-1:1997

Rw (C;Ctr) = 44 (-2;-6) dB

Max dev. 8.3 dB at 2 500 Hz

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

$C_{50\text{-}3150}$= **-4 dB** $C_{50\text{-}5000}$= **-4 dB** $C_{100\text{-}5000}$= **-1 dB**

$C_{tr,50\text{-}3150}$= **-14 dB** $C_{tr,50\text{-}5000}$= **-14 dB** $C_{tr,100\text{-}5000}$: **-6 dB**

Customer: **British Gypsum**

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

Test Code: **H16238BA** Test Date: **02/04/2009**

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

	Room T2	Room T1
Room Volume, m^3:	**98**	**59.93**
Temperature, deg.C:	**16.2**	**16.4**
Rel. Humidity, %RH:	**49.7**	**48.9**

	Test Room T2 to Test Room T1								
Freq Hz	Source dB	Rec. (uc) dB	Bgrnd dB	Rec. (corr) dB	Rev.time Sec	Corr. dB	**R dB**	U.Dev. dB	R 1/1Oct dB
50	65.7	41.9	12.1	41.9	0.65	-2.3	**21.5**		
63	65.7	52.7	8.0	52.7	0.88	-1.0	**12.0**		13.3
80	71.5	58.8	9.3	58.8	0.86	-1.1	**11.6**		
100	83.6	62.4	26.4	62.4	0.89	-1.0	**20.2**	4.8	
125	82.7	58.4	10.2	58.4	1.05	-0.2	**24.1**	3.9	23.3
160	114.6	81.9	7.1	81.9	1.30	0.7	**33.4**		
200	95.0	56.3	15.1	56.3	1.43	1.1	**39.8**		
250	96.3	58.0	4.0	58.0	1.61	1.6	**39.9**		40.4
315	96.2	55.6	6.5	55.6	1.49	1.3	**41.9**		
400	94.8	52.7	6.6	52.7	1.45	1.2	**43.3**		
500	92.8	48.7	1.8	48.7	1.41	1.0	**45.1**		45.0
630	91.8	45.3	2.2	45.3	1.47	1.2	**47.7**		
800	92.6	43.4	4.2	43.4	1.55	1.5	**50.7**		
1 000	91.9	40.4	13.4	40.4	1.46	1.2	**52.7**		52.4
1 250	92.9	39.3	4.8	39.3	1.48	1.3	**54.9**		
1 600	95.5	44.9	4.9	44.9	1.49	1.3	**51.9**		
2 000	97.4	56.3	5.4	56.3	1.44	1.1	**42.2**	5.8	42.4
2 500	95.9	56.9	5.7	56.9	1.30	0.7	**39.7**	8.3	
3 150	95.3	51.7	7.1	51.7	1.24	0.5	**44.1**	3.9	
4 000	97.0	51.5	10.0	51.5	1.22	0.4	**45.9**		45.8
5 000	101.1	52.9	10.1	52.9	1.14	0.1	**48.3**		
6 300									
8 000									
10 000									

Single Figure Ratings	**Rw**	**C**	**Ctr**	**Total U. Dev., dB**	**26.7**
BS EN ISO 717-1: 1997	**dB**	**dB**	**dB**		
	44	**-2**	**-6**		
	(100-5000)	**-1**	**-6**		
	(50-3150)	**-4**	**-14**		
	(50-5000)	**-4**	**-14**		

Procedure: ISO140/3/B - issue 2

Worksheet: 140_3_1.XLS

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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.

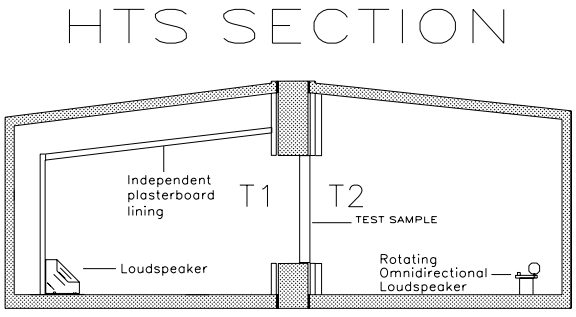
The equivalent absorption area of the receiving room is determined by producing the arithmetic average of twelve reverberation times and applying this to the Sabine formula.

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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