The Building Test Centre
Fire Acoustics Structures

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com
web site www.btconline.co.uk

Report Number **BTC 13565A**

AN ACOUSTIC TEST REPORT COVERING A LABORATORY SOUND INSULATION TEST TO BS EN ISO 140-3:1995 ON A 600mm WIDE BRITISH GYPSUM GYPWALL AUDIO CLAD WITH A TRIPLE LAYER OF 15mm GYPROC SOUNDBLOC.

Test Date: 13th September 2004

www.btconline.co.uk

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

UKAS TESTING
0296

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FOREWORD

This test report details a sound insulation test conducted on a sheet and stud partition system. The test sponsor was British Gypsum Limited.

The test specimen was installed by British Gypsum Limited. The construction of the specimen took place on the 13th September 2004. British Gypsum Limited designed the partition system and selected the materials for the test specimen.

The test was carried out on the 13th September 2004.

REPORT AUTHORISATION

Report Author	Authorised by
Robert Evans MEng. (Hons), AMIMechE, AIFireE *Project Leader*	p.p. **Eur Ing. Paul Howard** BSc. (Hons.), CEng., MIOA ***Head of Laboratory***

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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 94C70 Standard Floor & Ceiling Channels were fixed to the head and base of the aperture (a minimum of 65mm away from the T2 room edge of the aperture) using two rows of staggered 25mm Gyproc drywall screw fixings, spaced at 600mm centres in each row.

Gypframe 92S10 C Studs were positioned between the head and base channels at each end of the aperture and fixed using two rows of staggered 25mm Gyproc drywall screw fixings, spaced at 600mm centres in each row. Gypframe 92S10 C Studs were positioned between the head and base channels at 600mm centres.

A second framework was erected 322mm adjacent to the first frame using the same method and components (see figure. 1).

A double layer of 100mm thick Rockwool RW3 was inserted into the cavity between the studs.

A triple layer of 100mm thick Isowool General Purpose Roll was positioned into the cavity between the frames.

A triple layer of 15mm Gyproc SoundBloc was fixed on both sides of the metal framework as follows:

The inner layer was screw fixed around the perimeter of the boards at 300mm centres, using 35mm Gyproc Jack-Point Screws.

The middle layer was screw fixed around the perimeter of the boards at 300mm centres, using 41mm Gyproc Jack-Point Screws.

The outer layer was screw fixed around the perimeter and with in the field of the boards at 300mm centres, using 60mm Gyproc Jack-Point Screws.

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

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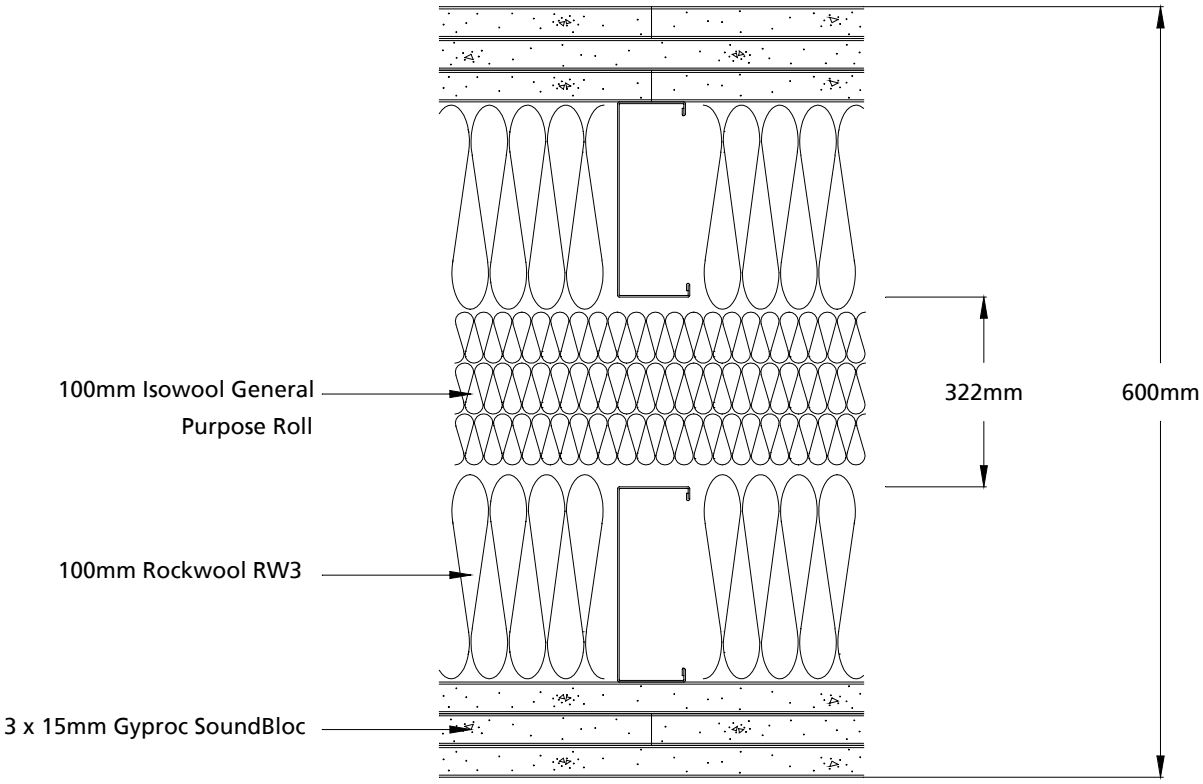

Figure 1. Cross sectional view through partition.

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

Gyproc SoundBloc

Nominally, 2400mm (long) x 1200mm (wide) x 15mm (thick) Gyproc SoundBloc manufactured by British Gypsum Limited, ex Kirkby Thore.

Average surface density:	12.96 kg/m^2
Average thickness:	15.163 mm
Board identification numbers:	27 240 4 08:37

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

Insulation Components

Nominally, 100mm thick Isowool General Purpose Roll supplied by British Gypsum-Isover Limited.

Actual surface density:	1.035kg/m^2.
Actual density:	10.35 kg/m^3.

Nominally, 100mm thick Rockwool RW3 supplied by Sheffield Insulations Limited.

Actual surface density:	6.208kg/m^2.
Actual density:	62.08 kg/m^3.

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

Metal Components

i) 1.0mm thick Gypframe 92S10 'C' Studs manufactured from galvanised mild steel using the 'UltraSTEEL' process.
ii) 0.7mm thick Gypframe 94C70 Standard Flange Floor & Ceiling Channels manufactured from galvanised mild steel using the 'UltraSTEEL' process.

All metal components supplied by British Gypsum Limited.

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Fasteners

i) 25mm Gyproc drywall screws supplied by British Gypsum Limited.
ii) 35mm Gyproc Jack-Point Screws supplied by British Gypsum Limited.
iii) 41mm Gyproc Jack-Point Screws supplied by British Gypsum Limited.
iv) 60mm Gyproc Jack-Point Screws supplied by British Gypsum Limited.

Miscellaneous Components

i) Gyproc Sealant supplied by British Gypsum Limited.
ii) Joint tape.

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 PROCEDURE

The test specimen (3.6 m x 2.4 m) was constructed in an aperture in a wall dividing two reverberant rooms with volumes of approximately 98m^3 and 62m^3.

The accuracy of the test method conforms to BS EN 20140-2:1993.

The test procedure used was 140/3 issue 5.

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. Where serial measurements were taken band-pass noise was used. See appendix B for further information.

TEST RESULTS

Weighted Airborne Sound Reduction Index	**R_w (C; Ctr) = 77 (-2; -8) dB**

For full data see pages 9 - 10.

Test conducted in accordance with BS EN ISO 140-3: 1995

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

LIMITATIONS

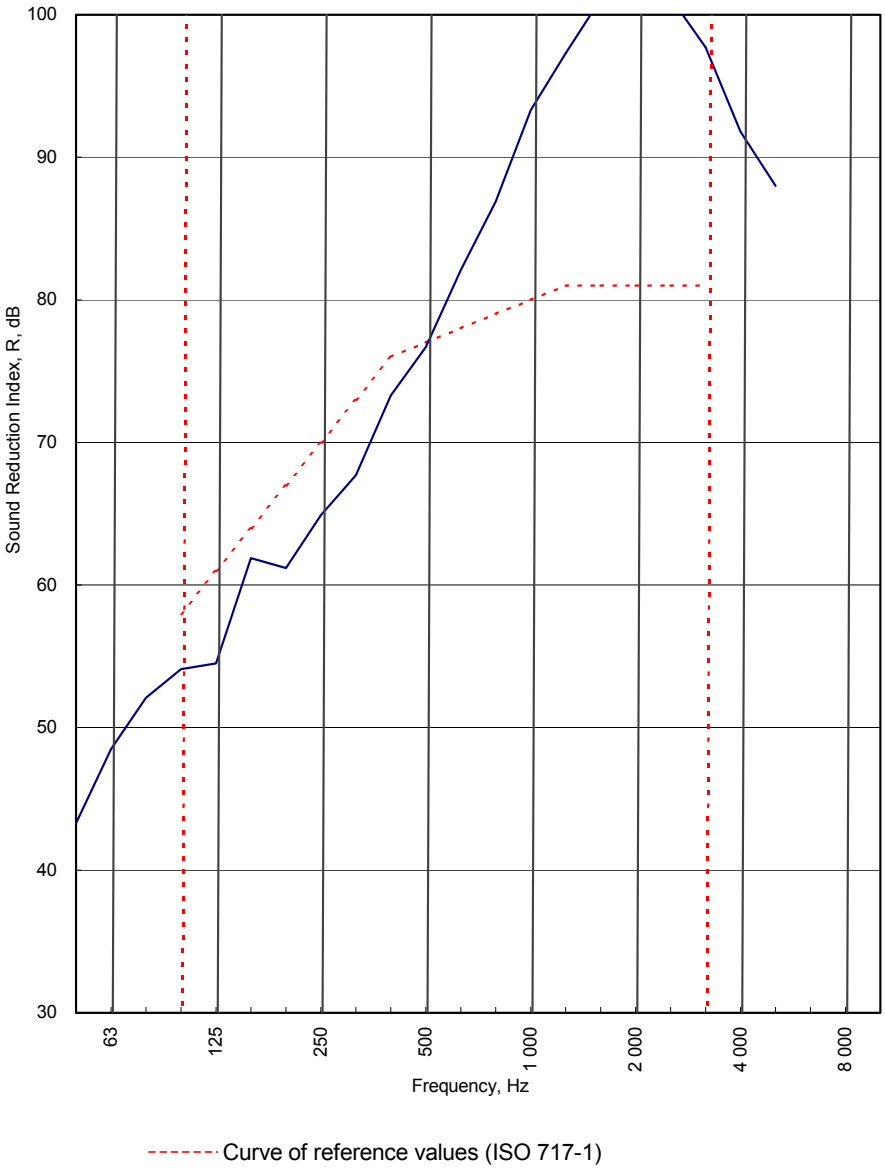
The results only relate to the behaviour of the element of construction under the particular conditions of test; they are not intended to be the sole criteria for assessing the potential acoustic performance of the element in use nor do they reflect the actual behaviour.

The specification and interpretation of test methods are the subject of 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.

APPENDIX A- TEST DATA

Test Code:
H13565A
Test Date:
13/09/04

Freq. Hz	R dB
50	43.3
63	48.5
80	52.1
100	54.1
125	54.5
160	61.9
200	61.2
250	64.9
315	67.7
400	73.3
500	76.7
630	82.1
800	86.9
1 000	93.3
1 250	97.3
1 600	101.1
2 000	102.0
2 500	101.2
3 150	97.7
4 000	91.8
5 000	88.0
6 300	
8 000	
10 000	



Rating according to BS EN ISO 717-1:1997	**Rw (C;Ctr) = 77 (-2;-8) dB**		
	Max dev. 6.5 dB at 125 Hz		
Evaluation based on laboratory measurement results obtained by an engineering method:	$C_{50\text{-}3150}$= **-4 dB**	$C_{50\text{-}5000}$= **-3 dB**	$C_{100\text{-}5000}$= **-1 dB**
	$C_{tr,50\text{-}3150}$= **-13 dB**	$C_{tr,50\text{-}5000}$= **-13 dB**	$C_{tr,100\text{-}5000}$: **-8 dB**

Customer: **British Gypsum Limited**

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

Test Code: **H13565A** Test Date: **13/09/04**

	Room T2	Room T1
Specimen Area, S = **8.64** m^2		
Room Volume, m^3:	**98**	**55.82**
Temperature, deg.C:	**19.1**	**18.8**
Rel. Humidity, %RH:	**52**	**53.8**

Freq	Test Room T2 to Test Room T1						R	U.Dev.	R 1/1Oct
	Source	Rec. (uc)	Bgrnd	Rec. (corr)	Rev.time	Corr.			
Hz	dB	dB	dB	dB	Sec	dB	**dB**	dB	dB
50	86.2	39.8	10.5	39.8	0.51	-3.1	**43.3**		
63	90.7	40.9	9.6	40.9	0.76	-1.3	**48.5**		46.5
80	96.2	42.8	8.6	42.8	0.77	-1.3	**52.1**		
100	98.0	43.3	7.2	43.3	0.90	-0.6	**54.1**	3.9	
125	102.0	47.9	7.2	47.9	1.13	0.4	**54.5**	6.5	55.7
160	108.9	47.8	5.9	47.8	1.25	0.8	**61.9**	2.1	
200	113.5	53.2	10.8	53.2	1.27	0.9	**61.2**	5.8	
250	114.5	51.2	7.1	51.2	1.50	1.6	**64.9**	5.1	63.8
315	113.1	47.0	8.7	47.0	1.50	1.6	**67.7**	5.3	
400	111.1	38.6	14.8	38.6	1.24	0.8	**73.3**	2.7	
500	107.6	32.2	9.8	32.2	1.40	1.3	**76.7**	0.3	76.1
630	105.4	24.5	8.6	24.5	1.35	1.2	**82.1**		
800	104.9	19.7	6.9	**19.5**	1.47	1.5	**86.9**		
1 000	103.5	13.8	10.4	**12.5**	1.75	2.3	**93.3**		90.5
1 250	102.5	9.3	6.5	**8.0**	1.98	2.8	**97.3**		
1 600	105.3	8.5	6.3	**7.2**	2.05	3.0	**101.1**		
2 000	105.8	7.8	7.2	**6.5**	1.93	2.7	**102.0**		101.4
2 500	103.8	5.9	7.2	**4.6**	1.63	2.0	**101.2**		
3 150	102.0	7.3	8.3	**6.0**	1.54	1.7	**97.7**		
4 000	99.7	11.0	10.9	**9.7**	1.58	1.8	**91.8**		90.9
5 000	96.6	11.2	11.0	**9.9**	1.39	1.3	**88.0**		
6 300									
8 000									
10 000									

Single Figure Ratings	**Rw**	**C**	**Ctr**	**Total U. Dev., dB**	**31.7**
BS EN ISO 717-1: 1997	**dB**	**dB**	**dB**		
	77	**-2**	**-8**		
	(100-5000)	**-1**	**-8**		
	(50-3150)	**-4**	**-13**		
	(50-5000)	**-3**	**-13**		

Test Procedure: 140/3/issue 5

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 six 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 (BTC 11709A)

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	56.3	61.8	58.5	60.6	62.5	66.3	74.1	79.5	85.0	90.4	93.8	95.0	95.3	98.3	100.4	98.5	96.3	93.9	91.1

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

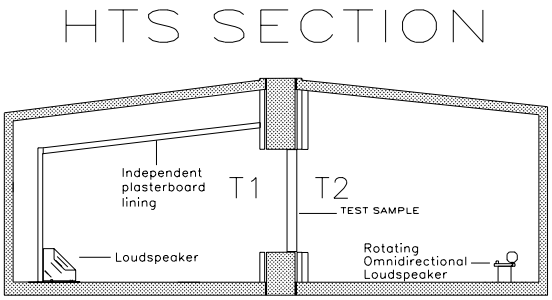

Figure 2. Cross sectional view of the horizontal transmission suite.