The Building Test Centre
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Report Number **BTC 14018A**

AN ACOUSTIC TEST REPORT COVERING A LABORATORY SOUND INSULATION TEST TO BS EN ISO 140-3:1995 ON A BRITISH GYPSUM GYPWALL QUIET $_{SF}$ PARTITION FITTED ON ONE SIDE WITH A TWO GANG CAVITY WALLBOX WITH A PUTTY PAD INSERTED AND SOCKET ON TOP.

Test Date: 13th July 2005

www.btconline.co.uk

Customer: **Hilti (Gt. Britain) Limited**
1 Trafford Wharf Road
Manchester
M17 1BY

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FOREWORD

This test report details a sound insulation test conducted on a partition system incorporating 70mm Gypframe 70S50 studs at 600mm centres, RB1 resilient bar and a double layer of 15mm Gyproc SoundBloc, with a single layer of 50mm Isowool APR within the cavity. One side was fitted with a 2 gang cavity wallbox, which had a putty pad inserted within. The wall box had a socket fitted on top. The test sponsor was Hilti (Gt. Britain) Limited.

The test specimen was installed by British Gypsum Limited and Hilti (Gt. Britain) Limited between the 11th and 13th July 2005. The Building Test Centre played no role in the design of the test specimen.

REPORT AUTHORISATION

Report Author	Authorised by
Clare Warren B.Sc. (Hons.) *Technologist*	Sarah Wood B.Eng. (Hons.), AMIOA *Section Manager*

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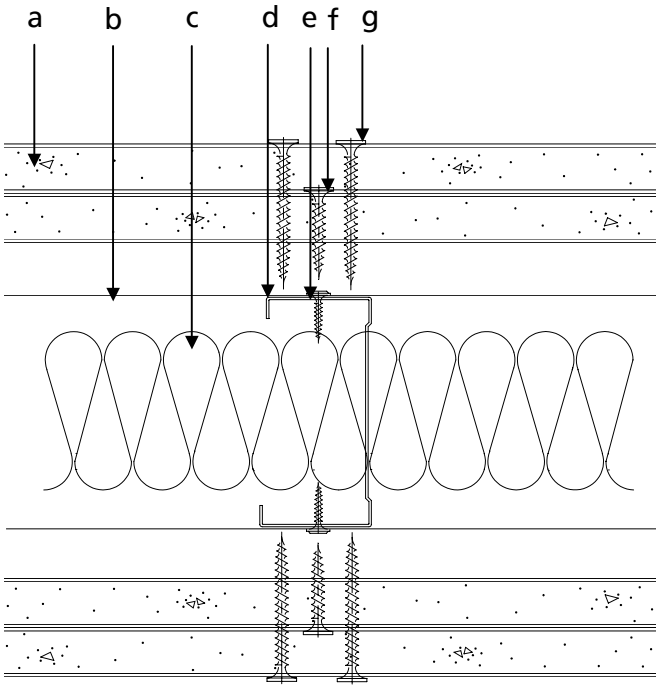
TEST CONSTRUCTION

The partition was a British Gypsum GypWall Quiet$_{SF}$ system. 72mm Gypframe 72C50 floor channel was screw fixed at 600mm to the base of the test aperture. 72mm Gypframe 72DC60 head channel was screw fixed to the head of the test frame at 600mm centres. 70mm Gypframe 70S50 studs were positioned at 600mm centres between the head and base track. Gypframe RB1 Resilient Bar was screw fixed perpendicular to the studs at 600mm centres on each side with Gyproc wafer head drywall screws. A single layer of 50mm Isowool APR 1200 was fitted into the cavity.

The metal framework was clad on both sides with a double layer of 15mm Gyproc SoundBloc. The inner layer boards were fixed with Gyproc 25mm drywall screws at 300mm centres around the perimeter of the boards only. The outer layer boards were fixed each side of the metal framework using Gyproc 42mm drywall screws at 300mm centres and at intermediate stud positions.

The perimeter of the partition was sealed to the test aperture with Gyproc sealant. The board joints and screw heads were covered with adhesive tape. Board joints were staggered.



a. 15mm Gyproc SoundBloc
b. Gypframe RB1 Resilient Bar
c. 50mm Isowool APR
d. Gypframe 70S50 Studs
e. Wafer Head Drywall Screw
f. 25mm Gyproc Drywall Screw
g. 42mm Gyproc Drywall Screw

Figure 1. Cross section plan through the partition.

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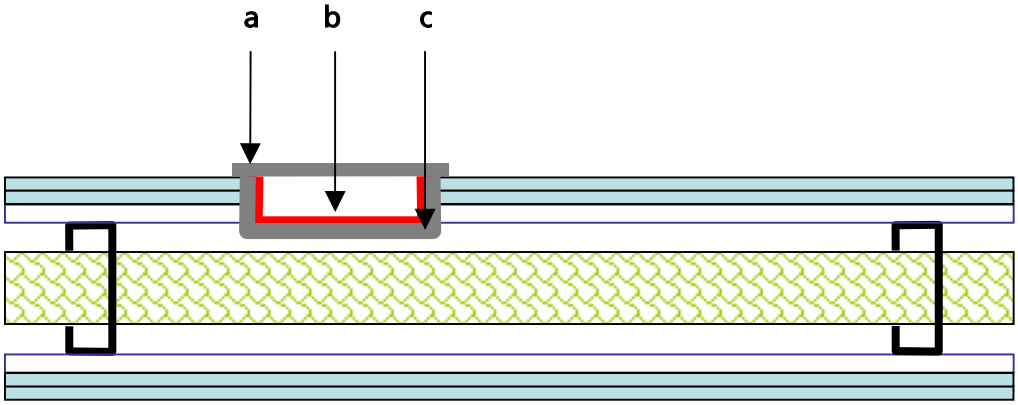
Wall Box and Socket Installation

A cavity fast fix wall box was fitted at height of 885mm and a distance of 1640mm from the left vertical edge of the partition in the source room. A Hilti Putty Pad was fitted inside the wall box and the sockets placed on top.



a. Socket
b. Hilti Putty Pad
c. Wall Box

Figure 2. Cross section through partition with wallbox installation.

Construction Photographs

Photograph 1. Hole created for wall box

Photograph 2. Wallbox fitted into partition

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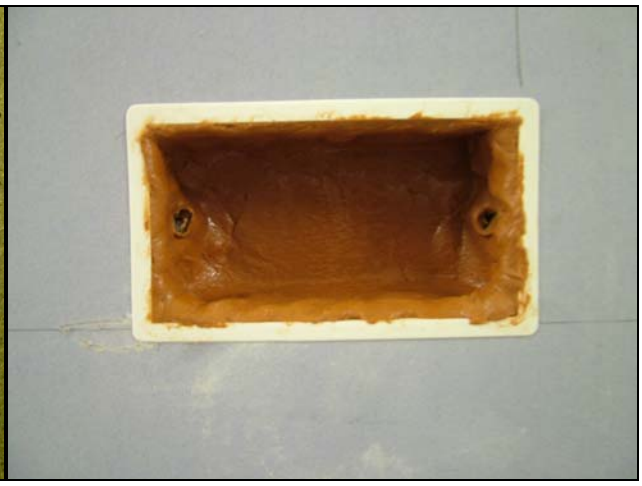
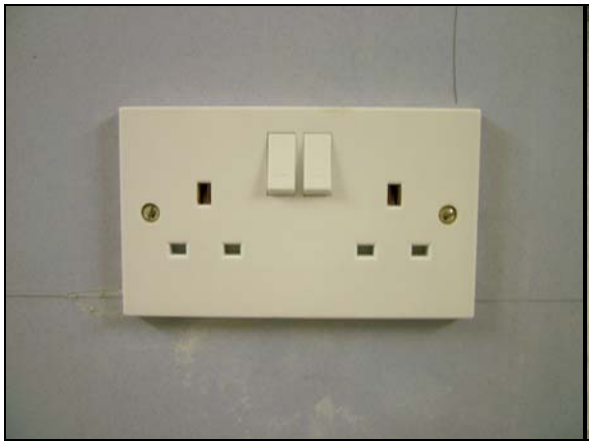
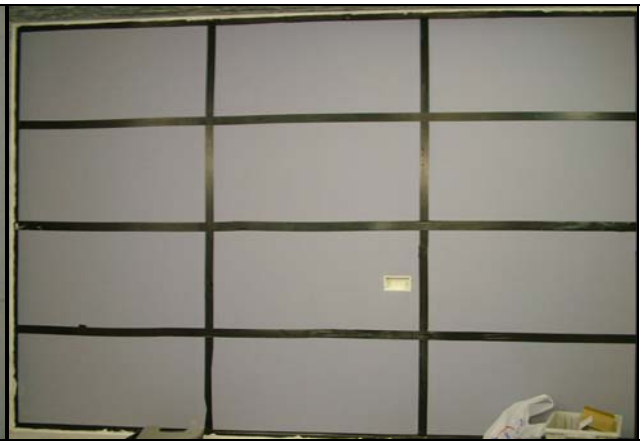
Photograph 3. Hilti Putty Pad cut to locate within wall box



Photograph 4. Hilti Putty Pad fitted into wall box



Photograph 5. Socket fitted to wall box



Photograph 6. Completed test specimen

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TEST MATERIALS

Gyproc SoundBloc

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

Average surface density:	13.2 kg/m^2
Average thickness:	15.06 mm
Board code:	27 076 5 02:17

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

Metal components

i) 70mm Gypframe 70S50 studs, nominally 0.5mm thick, manufactured from galvanised mild steel using the 'Ultrasteel' process.

ii) 72mm Gypframe 72C50, nominally 0.5mm thick, manufactured from galvanised mild steel using the 'Ultrasteel' process.

iii) Nominally 72mm Gypframe 72DC50, nominally 0.5mm thick, manufactured from galvanised mild steel using the 'Ultrasteel' process.

iv) Gypframe RB1 resilient bar, manufactured from galvanised mild steel using the 'Ultrasteel' process.

All metal components supplied by British Gypsum Limited.

Insulation

Nominally 50mm thick Isowool APR glass mineral wool insulation supplied by British Gypsum Limited.

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Fixings

i) 25mm Gyproc drywall screws.
ii) 42mm Gyproc drywall screws
iii) Gyproc wafer head drywall screws

Fasteners supplied by British Gypsum Limited.

Wall Box Installation

i) Centaur CDLB - 4 2 gang wall box, outer length 144mm (length) x 82mm (width) x 48mm (depth). Measured weight 90.0g.

ii) 2 pole switched socket, 145mm (length) x 85mm (width). Measured weight 157.54g.

iii) Hilti Putty Pad CP617, 231mm x 236mm. Measured weight 293.22g.

All wall box components supplied by Hilti (Gt. Britain) Limited.

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 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 was 140/3 issue 6. 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.

TEST RESULTS

Weighted Airborne Sound Reduction Index	R_w (C; Ctr) = 64 (-2; -8) dB

For full test data see pages 10 to 11.

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.

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APPENDIX A- TEST DATA

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

Test Code: **H14018CA** Test Date: **13/07/05**

		Room T2	Room T1
Specimen Area, S = **8.64** m^2	Room Volume, m^3:	**98**	**59.58**
	Temperature, deg.C:	**23**	**24.2**
	Rel. Humidity, %RH:	**66.9**	**60.7**

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	58.7	32.8	11.7	32.8	0.68	-2.1	**23.8**		
63	64.6	41.5	10.5	41.5	0.88	-1.0	**22.1**		23.1
80	68.6	43.9	8.6	43.9	0.85	-1.1	**23.6**		
100	75.2	35.3	20.1	35.3	1.10	0.0	**39.9**	5.1	
125	79.0	37.1	6.1	37.1	1.31	0.7	**42.6**	5.4	42.2
160	86.2	40.3	2.3	40.3	1.26	0.6	**46.5**	4.5	
200	92.5	40.5	9.8	40.5	1.49	1.3	**53.3**	0.7	
250	95.2	40.2	6.9	40.2	1.48	1.3	**56.3**	0.7	55.4
315	94.6	37.2	8.7	37.2	1.30	0.7	**58.1**	1.9	
400	93.1	31.1	11.0	31.1	1.18	0.3	**62.3**	0.7	
500	91.0	25.7	7.1	25.7	1.14	0.1	**65.4**		64.6
630	89.6	22.2	7.3	**22.1**	1.28	0.6	**68.1**		
800	90.5	22.2	9.7	**21.9**	1.39	1.0	**69.6**		
1 000	90.3	21.6	5.3	21.6	1.54	1.4	**70.1**		70.2
1 250	90.7	21.4	4.2	21.4	1.65	1.7	**71.0**		
1 600	93.7	23.9	8.0	23.9	1.66	1.8	**71.6**		
2 000	95.2	26.0	5.9	26.0	1.69	1.9	**71.1**		67.4
2 500	94.2	31.6	7.3	31.6	1.54	1.4	**64.0**	4.0	
3 150	93.4	32.6	8.1	32.6	1.40	1.0	**61.8**	6.2	
4 000	92.4	28.8	10.4	28.8	1.47	1.2	**64.8**		64.3
5 000	89.6	22.2	11.1	**21.8**	1.41	1.1	**68.9**		
6 300									
8 000									
10 000									

Single Figure Ratings	**Rw**	**C**	**Ctr**	**Total U. Dev., dB**	**29.2**
BS EN ISO 717-1: 1997	**dB**	**dB**	**dB**		
	64	**-2**	**-8**		
	(100-5000)	**-2**	**-8**		
Background Corrected					
	(50-3150)	**-11**	**-23**		
	(50-5000)	**-10**	**-23**		

Test Procedure: 140/3/issue 6

Worksheet: 140_3_1.XLS

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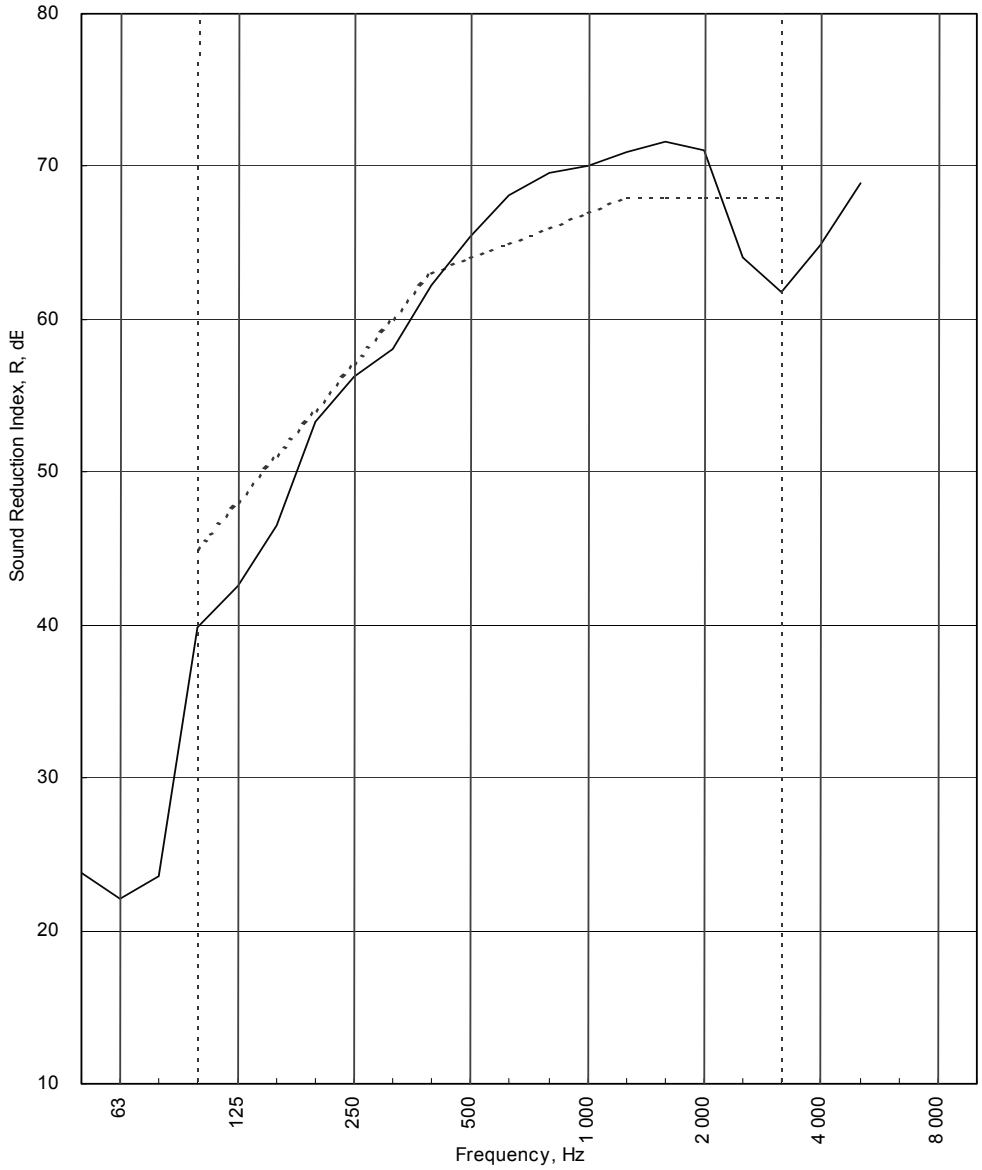
Test Code:
H14018CA
Test Date:
13/07/05

Freq. Hz	R dB
50	23.8
63	22.1
80	23.6
100	39.9
125	42.6
160	46.5
200	53.3
250	56.3
315	58.1
400	62.3
500	65.4
630	68.1
800	69.6
1 000	70.1
1 250	71.0
1 600	71.6
2 000	71.1
2 500	64.0
3 150	61.8
4 000	64.8
5 000	68.9
6 300	
8 000	
10 000	



Rating according to
BS EN ISO 717-1:1997

Rw (C;Ctr) = 64 (-2;-8) dB

Max dev. 6.2 dB at 3 150 Hz

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

$C_{50\text{-}3150}$= **-11 dB** $C_{50\text{-}5000}$= **-10 dB** $C_{100\text{-}5000}$= **-2 dB**

$C_{tr,50\text{-}3150}$= **-23 dB** $C_{tr,50\text{-}5000}$= **-23 dB** $C_{tr,100\text{-}5000}$: **-8 dB**

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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 (combined BTC 11709A and BTC13562EA)

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	93.9	91.1

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

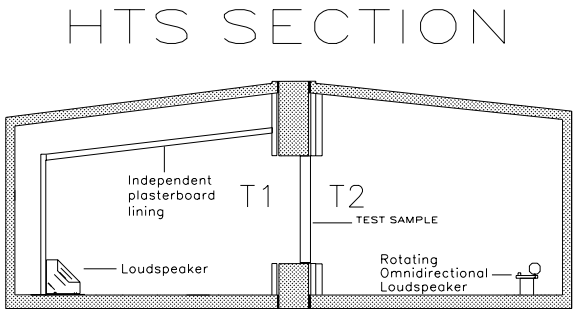

Figure 3. Chamber layout

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