

# **The Building Test Centre**

## **Fire Acoustics Structures**

**The Building Test Centre**  
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Report Number **BTC 20741A**

An acoustic test report covering laboratory sound insulation testing to BS EN ISO 10140-2:2010 on a British Gypsum GypWall Quiet IWL Twin Frame partition clad with an outer layer of 12.5mm Gyproc Habito and inner layer of 15mm Gyproc SoundBloc F each side with 50mm Isover APR 1200 insulation in the cavity.

Test date: 12<sup>th</sup> November 2018

Report issued date: 13<sup>th</sup> November 2018

[www.btconline.co.uk](http://www.btconline.co.uk)

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

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### **FOREWORD**

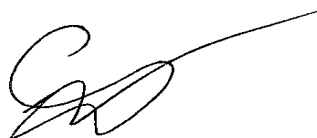
The test sponsor was British Gypsum.

The test specimen was installed by Karl Negus, Tony Clark and Cameron Whitaker on the 12<sup>th</sup> November 2018.

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

### **REPORT AUTHORISATION**

Report Author



**Eric Chee**  
BSc (Hons)  
*Scientist*

Authorised by



**Yasmin Latif**  
BSc (Hons) MSc  
*Section Manager*

The Building Test Centre will not discuss the content of this report without written permission from the test sponsor. The Building Test Centre retains ownership of the test report content but authorises the test sponsor to reproduce the report as necessary in its entirety only.

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### TEST REPORT AMENDMENTS

Page	Amendments	Date

Report Amendments Author

**Name**  
*Role*

Amendments Authorised by

**Name**  
*Role*

Customer: **British Gypsum**

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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 62FEC50 Folded Edge Standard Floor and Ceiling Channels were fixed to the head and base of the test aperture at 600mm centres using 25mm British Gypsum Drywall Screws.

Gypframe 60S50'C' Studs were positioned between the head and base channels at each end of the aperture and fixed using 25mm British Gypsum Drywall Screws spaced at 600mm centres.

Gypframe 60I50 'I' Studs were positioned between the head and base channels at 600mm centres.

A second framework using the same components and fixing details was located to create the twin frame and a final partition thickness of 225mm. The Gypframe 60I50 'I' Studs were located at 600mm centres parallel with the first set of framework studs.

50mm Isover Acoustic Partition Roll 1200 insulation was placed within the cavity between the frameworks and hung from the top of the partition using two 25mm British Gypsum Drywall Screws.

The framework was clad with an inner layer of 15mm Gyproc SoundBloc F and an outer layer of 12.5mm Gyproc Habito on each side.

The inner layer of boards was screw fixed around the perimeter of the board at 300mm centres using 25mm British Gypsum Drywall Screws.

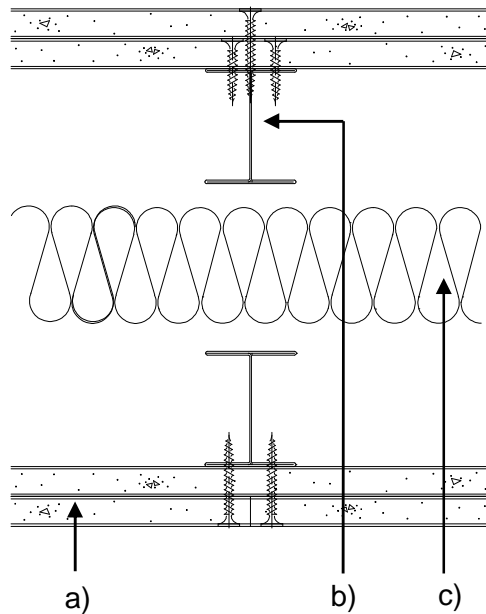
The outer layer of boards was screw fixed around the perimeter of the board and intermediate stud positions at 300mm centres using 40mm British Gypsum High Performance Screws.

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

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a) Inner layer of 15mm Gyproc SoundBloc F and an outer layer of 12.5mm Gyproc Habito

b) Gypframe 60I50 'I' Stud @ 600mm c/c.

c) 50mm Isover Acoustic Partition Roll insulation

**Figure 1.** Horizontal cross section view

*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 SoundBloc F manufactured by British Gypsum, ex Kirkby Thore.

Surface density:	13.6kg/m <sup>2</sup>
Average thickness:	15.4mm
Board Code:	26 176 18 09:47
	26 176 18 09:47
	26 176 18 09:47

- ii) Nominally 2400mm (long) x 1200mm (wide) x 12.5mm (thick) Gyproc Habito manufactured by British Gypsum, ex Sherburn.

Surface density:	12.2kg/m <sup>2</sup>
Average thickness:	12.9mm
Board Code:	31 276 18 10:51
	31 276 18 10:52
	31 276 18 10:51

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

Material dimensions were supplied by the customer.

#### Insulation

- i) Nominally 50mm thick Isover APR 1200 insulation supplied by British Gypsum.

Average area	15.60m <sup>2</sup>
Average weight	11.35kg
Density	14.55kg/m <sup>3</sup>

The density was calculated using the actual weight and size of the insulation used in the test specimen.

Material dimensions were supplied by the customer.

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### Metal Components

- i) 0.5mm thick Gypframe 60I50 'I' Studs.
- ii) 0.5mm thick Gypframe 62FEC50 Folded Edge Standard Floor and Ceiling Channels

All metal components are manufactured from galvanised mild steel using the UltraSTEEL™ process and supplied by British Gypsum

### Fasteners

- i) 25mm British Gypsum Drywall Screws.
- ii) 40mm British Gypsum High Performance Screws.

All fasteners supplied by British Gypsum.

### 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 AP070 vs 1.1.

Customer: **British Gypsum**

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### TEST RESULTS

Test Code	Description	Weighted Airborne Sound Reduction Index $R_w$ (C; Ctr)
H20741AA	British Gypsum GypWall Quiet IWL Twin Frame partition clad with an outer layer of 12.5mm Gyproc Habito and inner layer of 15mm Gyproc SoundBloc F each side with 50mm Isover APR 1200 insulation in the cavity	67 (-3;-8) dB

For full data see Appendix A of this report.

Test conducted in accordance with BS EN ISO 10140-2:2010 except for Clause A.2 in BS EN ISO 10140-4:2010 where minimum distances for measurements at frequencies under 100Hz cannot be met.

Rated in accordance with BS EN ISO 717-1: 2013.

No visible damage of the test specimen occurred during test.

Testing to BS EN ISO 10140-2:2010 conforms to the requirements of BS EN ISO 140-3:1995 (withdrawn).

Where the uncertainty of measured values is stated, (e.g. temperature, relative humidity and static pressure) the reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor  $k=2$ , providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

### 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.

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### **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.

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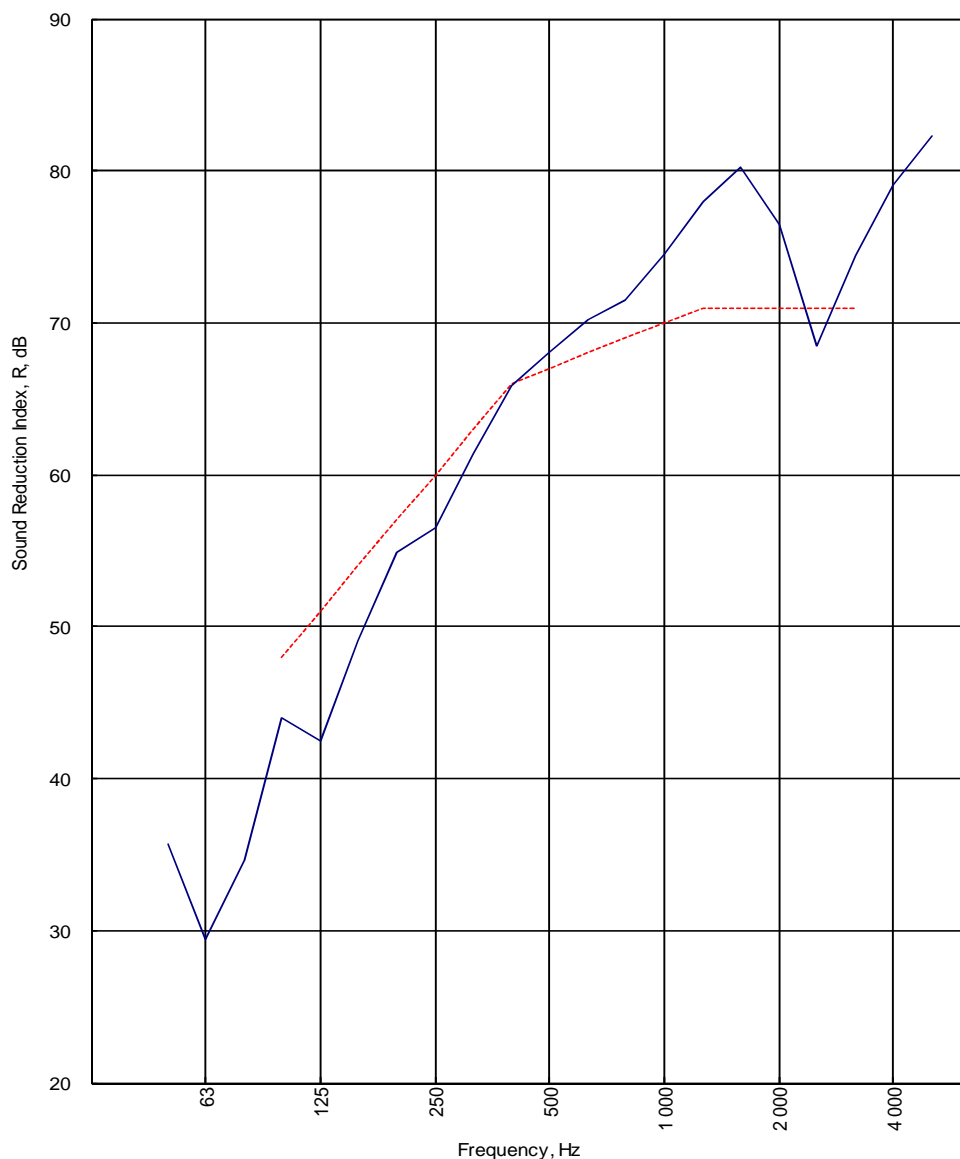


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## APPENDIX A - TEST DATA

Test Code:
H20741AA
Test Date:
12/11/2018

Freq. Hz	R dB
50	35.7
63	29.4
80	34.6
100	44.0
125	42.5
160	49.1
200	54.9
250	56.5
315	61.4
400	65.9
500	68.1
630	70.2
800	71.5
1 000	74.5
1 250	78.0
1 600	80.2
2 000	76.5
2 500	68.5
3 150	74.4
4 000	79.1
5 000	82.3



Rating according to  
BS EN ISO 717-1:2013

**R<sub>w</sub> (C;C<sub>tr</sub>) = 67 (-3;-8) dB**

Max dev. 8.5 dB at 125 Hz

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

C<sub>50-3150</sub> = **-6 dB**

C<sub>50-5000</sub> = **-5 dB**

C<sub>100-5000</sub> = **-2 dB**

C<sub>tr,50-3150</sub> = **-17 dB**

C<sub>tr,50-5000</sub> = **-17 dB**

C<sub>tr,100-5000</sub> = **-8 dB**

Customer: **British Gypsum**

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# LABORATORY AIRBORNE SOUND INSULATION TEST - BS EN ISO 10140-2:2010

Test Code: **H20741AA**

Test Date: **12/11/2018**

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

	Room T2	Room T1	
Room Volume, m <sup>3</sup> :	<b>98</b>	<b>59.06</b>	
Temperature, deg.C:	<b>16.7</b>	<b>17.1</b>	<b>± 0.3</b>
Rel. Humidity, %RH:	<b>59.3</b>	<b>57.2</b>	<b>± 1.6</b>
Static Pressure, Pa:	<b>100000</b>	<b>100000</b>	<b>± 65</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	90.2	52.5	22.4	52.5	0.69	-2.0	35.7	4.0	32.3
63	92.5	61.7	20.9	61.7	0.79	-1.4	29.4		
80	102.5	66.4	10.2	66.4	0.77	-1.5	34.6		
100	105.6	61.0	4.8	61.0	0.96	-0.6	44.0		
125	104.4	61.9	3.9	61.9	1.09	0.0	42.5	8.5	44.4
160	110.0	61.8	2.8	61.8	1.34	0.9	49.1	4.9	56.8
200	113.3	59.9	13.4	59.9	1.53	1.5	54.9	2.1	
250	114.5	59.8	3.3	59.8	1.66	1.8	56.5	3.5	
315	113.3	53.9	4.2	53.9	1.73	2.0	61.4	1.6	
400	111.3	46.7	16.7	46.7	1.48	1.3	65.9	0.1	67.7
500	109.2	42.4	5.0	42.4	1.46	1.3	68.1		
630	106.9	38.0	3.3	38.0	1.46	1.3	70.2		
800	106.4	36.4	2.8	36.4	1.53	1.5	71.5		
1 000	105.2	32.2	12.3	32.2	1.56	1.5	74.5	2.5	73.9
1 250	104.3	27.7	3.2	27.7	1.51	1.4	78.0		
1 600	106.6	28.1	2.6	28.1	1.62	1.7	80.2		
2 000	107.8	32.8	3.1	32.8	1.55	1.5	76.5		
2 500	105.2	37.8	3.3	37.8	1.42	1.1	68.5	77.4	72.4
3 150	103.4	30.0	4.0	30.0	1.37	1.0	74.4		
4 000	102.4	24.3	9.4	24.2	1.34	0.9	79.1		
5 000	104.8	23.4	9.8	23.2	1.28	0.7	82.3		
6 300									
8 000									
10 000									
Single Figure Ratings		Rw	C	Ctr	Total U. Dev., dB			27.2	
BS EN ISO 717-1: 2013		dB	dB	dB					
		67	-3	-8					
		(100-5000)	-2	-8					
Background Corrected		(50-3150)	-6	-17					
		(50-5000)	-5	-17					
					Procedure: AP 046 vs 5.2				
					Worksheet: 140_3_1.XLS				

## **APPENDIX B - TEST METHOD AND CONDITIONS**

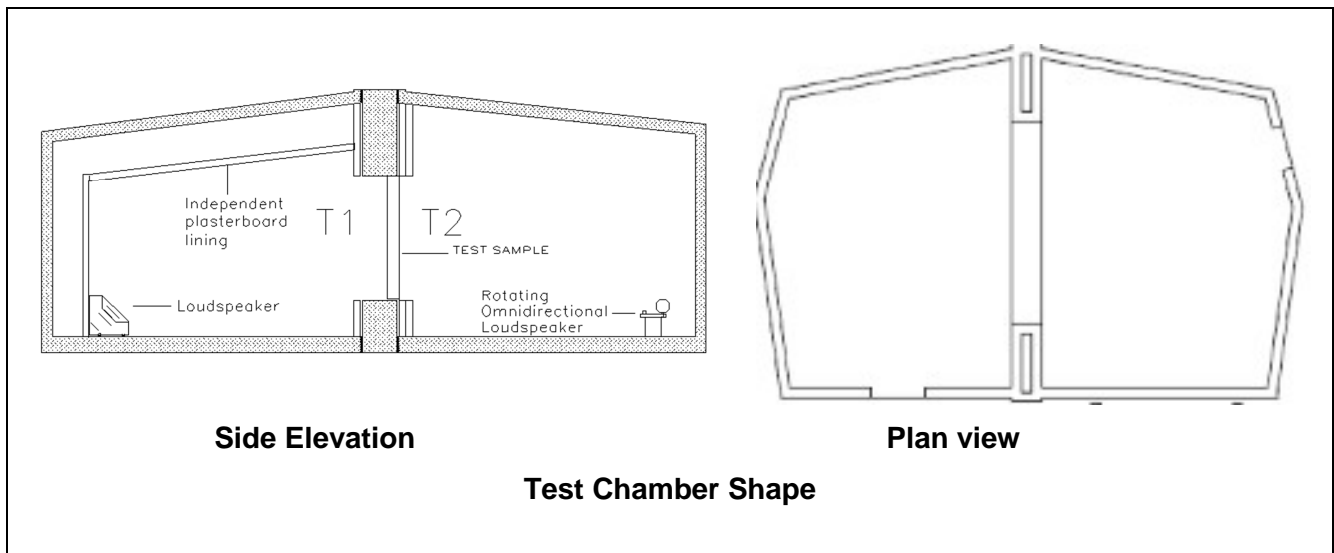
### **Method**

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.

### **Test Chamber Layout**

The test suite is constructed to be as independent from the surround building as is physically possible in order to minimise flanking transmission paths.

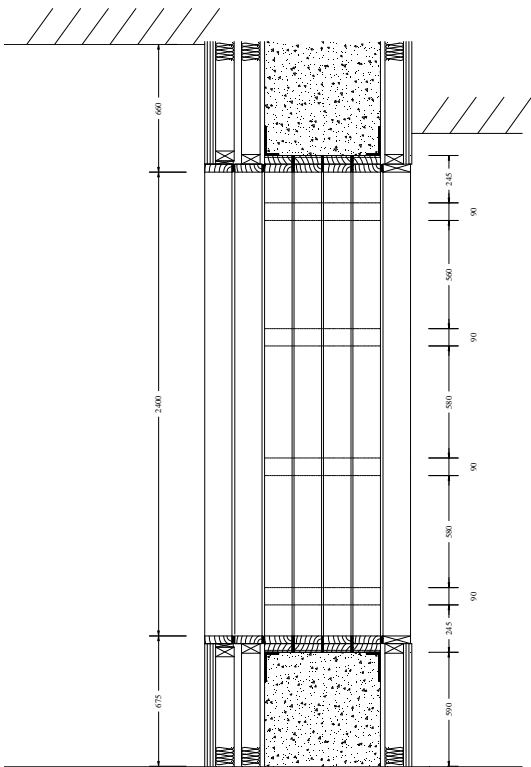


The source room (T2) contains two perspex diffusers of approximately 900mm x 1220mm. Panel absorbers are used to ensure reverberation times in source room (T2) are between one and two seconds at all frequencies at and above 100 Hz. An omni-directional loudspeaker sound source is placed near a back corner of the source room (T2), rotating at 1 rpm and at least 0.7m from any room boundary. A stationary loudspeaker sound source is placed in the corner of the receiving room (T1) opposite the test specimen.

**Mounting**

The BTC has a solid concrete frame which has been additionally lined to give improved reduction of flanking transmission. This is in order to ensure that, as far as possible, lab limits will not restrict the real performance measurement of just the test specimen.

Recommendations for installation position within the niche are given in our Installation Guidance Document. Details of actual installation position are held by the BTC in the Test Report folder.



**Cross section of test aperture**

**Lab Limits**

The laboratory limit for measurement due to flanking is (combined BTC 11709A, BTC13562EA, BTC 15829A and BTC 19792A).

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	96.3

**Uncertainties for test**

The uncertainties values for test are taken from ISO 12999-1 situation B situ standard deviation.

Freq Hz	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
Standard Uncertainty	4.0	3.6	3.2	2.8	2.4	2.0	1.8	1.6	1.4	1.2	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.3	1.6	1.9	2.2

Descriptor	Rw	Rw + C (100-3150)	Rw + Ctr (100-3150)	Rw + C (100-5000)	Rw + Ctr (100-5000)	Rw + C (50-3150)	Rw + Ctr (50-3150)	Rw + C (50-5000)	Rw + Ctr (50-5000)
Standard Uncertainty	0.9	0.9	1.1	1.1	1.1	1.0	1.3	1.1	1.0

Customer: **British Gypsum**

