The Building Test Centre

Fire Acoustics Structures

The Building Test Centre
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Report Number **BTC 20200A**

An acoustic test report covering laboratory sound insulation testing to BS EN ISO 10140-2:2010 on a British Gypsum GypWall Quiet twin frame partition clad with a inner layer of 12.5mm Gyproc Habito and an outer layer 12.5mm Gyproc SoundBloc each side with 25mm Isover APR 1200 insulation in the cavity and braced at mid-height with Gypframe 99FC50 fixing channel.

Test date: 22nd August 2017

Report issued date: 23rd August 2017

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Customer: **British Gypsum**
East Leake
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TABLE OF CONTENTS

FOREWORD *3*
REPORT AUTHORISATION *3*
TEST REPORT AMENDMENTS *4*
TEST CONSTRUCTION *5*
TEST MATERIALS *7*
Plasterboard *7*
Insulation *7*
Metal Components *8*
Fasteners *8*
Miscellaneous Components *8*
TEST RESULTS *9*
TEST PROCEDURE *9*
LIMITATIONS *10*
APPENDIX A - TEST DATA *11*
APPENDIX B - TEST METHOD AND CONDITIONS *13*

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FOREWORD

The test sponsor was British Gypsum.

The test specimen was installed by Karl Negus and Tony Clark on the 22nd August 2017.

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

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TEST REPORT AMENDMENTS

Page	Amendments	Date

Report Amendments Author	Amendments Authorised by
Name *Role*	**Name** *Role*

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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 50FEC50 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 48S50 '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 48S50 'C' 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 200mm. The Gypframe 48S50 ‘C’ Studs were located at 600mm centres parallel with the first set of framework studs.

Gypframe 99FC50 Fixing Channel braces were installed between opposing studs at mid height and fixed to each stud using two British Gypsum Wafer Head Screws. (4 per brace in total).

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

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

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

The outer layer of boards was screw fixed around the perimeter of the board and intermediate stud positions at 300mm centres using 35mm British Gypsum Drywall Screws.

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

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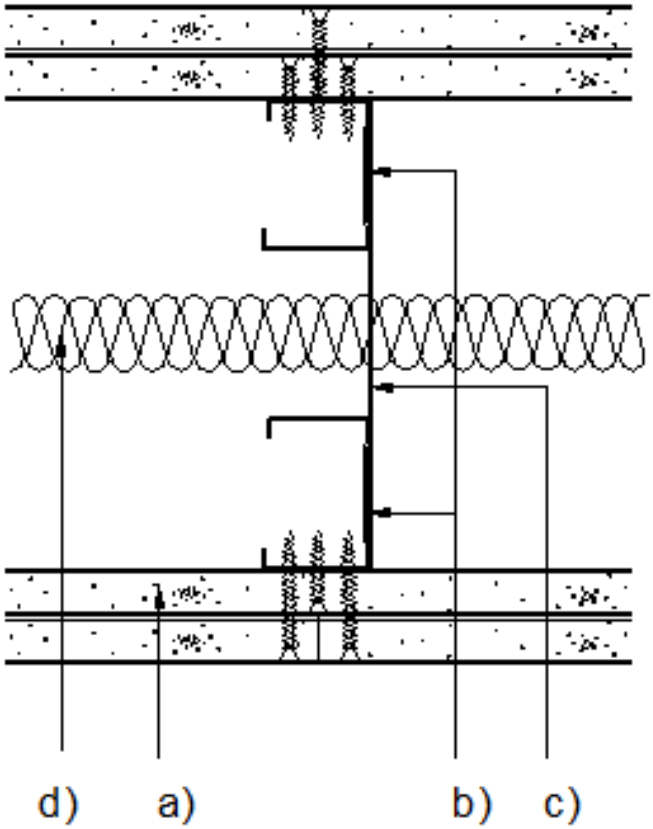

a) Inner layer of 12.5mm Gyproc Habito / Outer layer of 12.5mm Gyproc SoundBloc.

b) Gypframe 48S50 'C' Studs @ 600mm c/c.

c) 25mm Isover APR 1200 Insulation

d) Gypframe 99FC50 Fixing Channel brace

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.

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TEST MATERIALS

Plasterboard

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

Surface density:	12.5kg/m^2
Average thickness:	12.8mm
Board Code:	31 199 17 13:20
	31 199 17 13:22
	31 199 17 13:21

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

Surface density:	11.4kg/m^2
Average thickness:	12.4mm
Board Code:	16 155 17 13:18
	16 155 17 13:17
	16 155 17 13:17

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 25mm thick Isover APR 1200 insulation supplied by British Gypsum.

Average area	24.00m^2
Average weight	10.42kg
Density	17.4kg/m^3

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 48S50 'C' Studs.
ii) 0.5mm thick Gypframe 50FEC50 Folded Edge Standard Floor and Ceiling Channels
iii) 0.5mm thick Gypframe 99FC50 Fixing Channel

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) 25mm British Gypsum High Performance Fixings.
iii) 35mm British Gypsum Drywall 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 1.0.

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TEST RESULTS

Test Code	Description	Weighted Airborne Sound Reduction Index R_w (C; Ctr)
H20200AA	Twin frame partition clad with double layer of 12.5mm Gyproc Habito (inner) and 12.5mm Gyproc SoundBloc (outer) each side on Gypframe 48S50 'C' Studs with 25mm Isover APR 1200 insulation in the cavity and braced at mid-height with Gypframe 99CF50 fixing channel.	62 (-3-9) 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^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.

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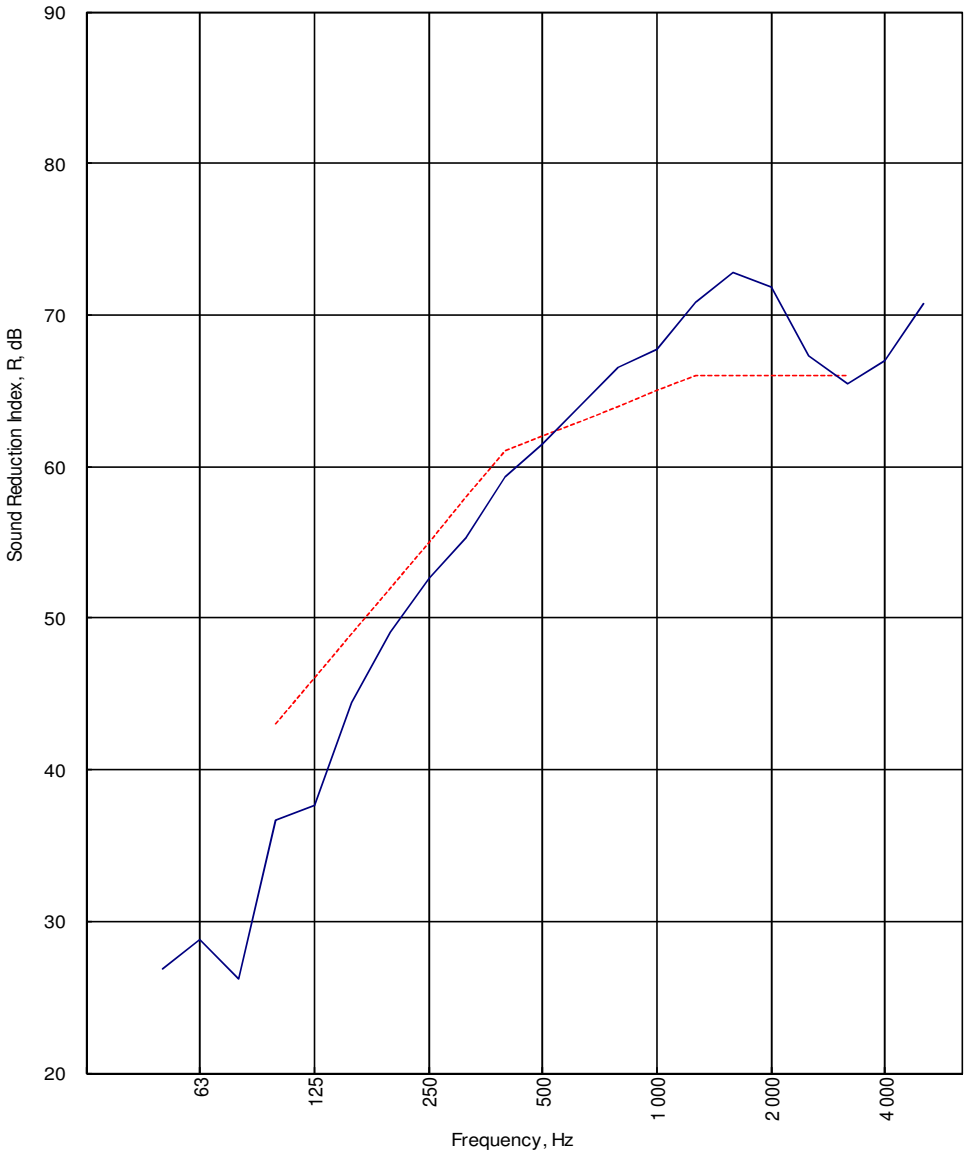
LIMITATIONS

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.

APPENDIX A - TEST DATA

Test Code:
H20200AA
Test Date:
22/08/2017

Freq. Hz	R dB
50	26.9
63	28.8
80	26.2
100	36.7
125	37.6
160	44.4
200	49.1
250	52.6
315	55.3
400	59.3
500	61.5
630	64.1
800	66.5
1 000	67.7
1 250	70.9
1 600	72.8
2 000	71.8
2 500	67.3
3 150	65.5
4 000	67.0
5 000	70.8



Rating according to BS EN ISO 717-1:2013	**Rw (C;Ctr) = 62 (-3;-9) dB**		
	Max dev. 8.4 dB at 125 Hz		
Evaluation based on laboratory measurement results obtained by an engineering method:	$C_{50\text{-}3150}$= **-7 dB**	$C_{50\text{-}5000}$= **-6 dB**	$C_{100\text{-}5000}$= **-2 dB**
	$C_{tr,50\text{-}3150}$= **-18 dB**	$C_{tr,50\text{-}5000}$= **-18 dB**	$C_{tr,100\text{-}5000}$: **-9 dB**

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

Test Code: **H20200AA** Test Date: **22/08/2017**

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

	Room T2	Room T1	
Room Volume, m^3:	**98**	**59.27**	
Temperature, deg.C:	**20.1**	**20**	**± 0.3**
Rel. Humidity, %RH:	**68.7**	**69.5**	**± 1.6**
Static Pressure, Pa:	**101200**	**101200**	**± 65**

	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	89.9	61.2	27.6	61.2	0.73	-1.8	**26.9**		
63	92.1	62.3	12.9	62.3	0.87	-1.0	**28.8**		27.2
80	102.2	74.3	9.4	74.3	0.74	-1.7	**26.2**		
100	105.2	68.2	5.2	68.2	1.03	-0.3	**36.7**	6.3	
125	103.1	64.7	1.4	64.7	0.92	-0.8	**37.6**	8.4	38.5
160	109.5	65.6	5.7	65.6	1.23	0.5	**44.4**	4.6	
200	113.5	65.8	17.4	65.8	1.51	1.4	**49.1**	2.9	
250	113.6	62.6	1.4	62.6	1.60	1.6	**52.6**	2.4	51.6
315	113.0	59.8	4.0	59.8	1.78	2.1	**55.3**	2.7	
400	110.9	53.1	9.7	53.1	1.54	1.5	**59.3**	1.7	
500	108.5	48.3	1.1	48.3	1.49	1.3	**61.5**	0.5	61.2
630	106.6	43.9	1.7	43.9	1.52	1.4	**64.1**		
800	106.1	41.0	2.5	41.0	1.50	1.4	**66.5**		
1 000	104.9	38.6	12.9	38.6	1.53	1.4	**67.7**		68.0
1 250	103.6	34.3	1.6	34.3	1.59	1.6	**70.9**		
1 600	106.0	34.9	2.2	34.9	1.63	1.7	**72.8**		
2 000	107.2	37.0	2.3	37.0	1.60	1.6	**71.8**		69.9
2 500	105.2	39.2	2.7	39.2	1.48	1.3	**67.3**		
3 150	103.3	38.8	3.4	38.8	1.39	1.0	**65.5**	0.5	
4 000	102.3	36.3	7.4	36.3	1.39	1.0	**67.0**		67.3
5 000	105.3	35.5	10.1	35.5	1.38	1.0	**70.8**		
6 300									
8 000									
10 000									

Total U. Dev., dB **30**

Single Figure Ratings	**Rw**	**C**	**Ctr**
BS EN ISO 717-1: 2013	**dB**	**dB**	**dB**
	62	**-3**	**-9**
	(100-5000)	**-2**	**-9**
	(50-3150)	**-7**	**-18**
	(50-5000)	**-6**	**-18**

Procedure: AP 046 vs 5.2

Worksheet: 140_3_1.XLS

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Customer**: British Gypsum**

APPENDIX B - TEST METHOD AND CONDITIONS

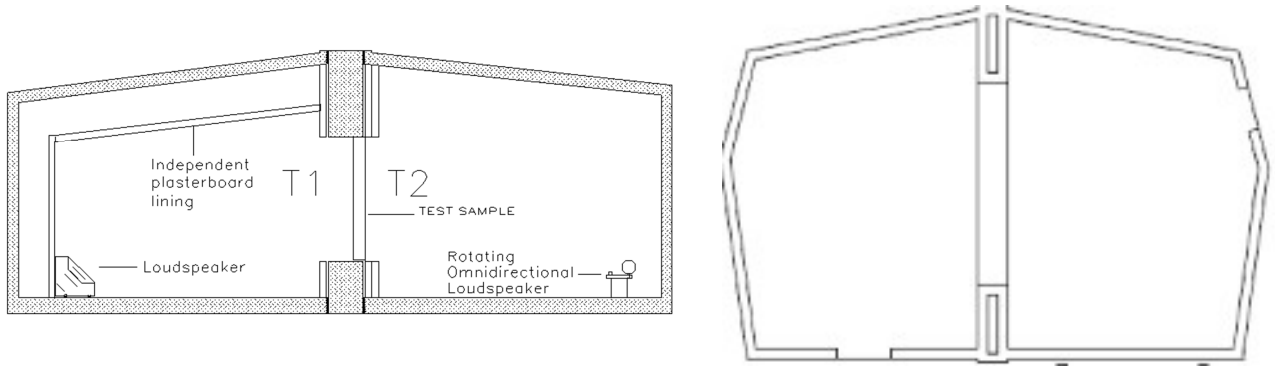
Method

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^{o} 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 possibly in order to minimise flanking transmission paths.



Side Elevation **Plan view**

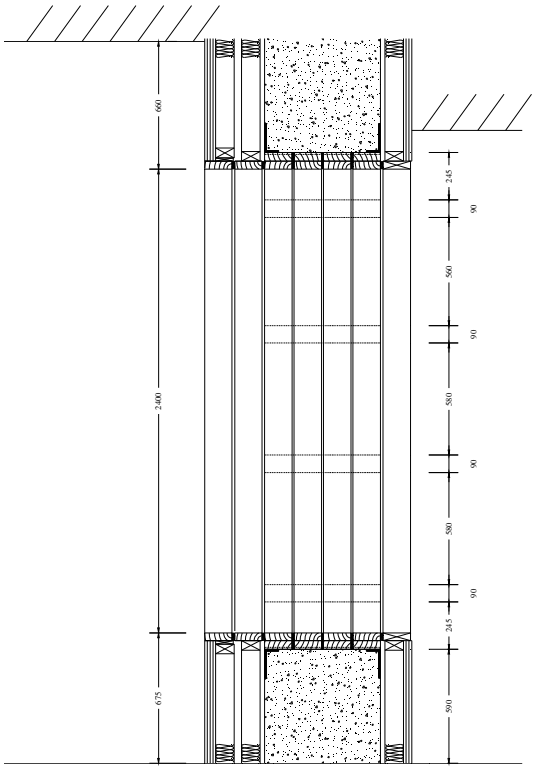
Test Chamber Shape

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