

Technical Report

24730-SRL-RP-XT-001-P1

Project

The Laboratory Measurement of Airborne
Sound Insulation of Various Plasterboard
Partitions

Prepared for

Hadley Group

By

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Summary

Tests have been done in SRL's Laboratory at Holbrook House, Sudbury, Suffolk, to determine the sound reduction index of various plasterboard partitions in accordance with BS EN ISO 10140-2:2010.

From these measurements the required results have been derived and are presented in both tabular and graphic form in Data Sheets 1 to 8.

The results are given in 1/3rd octave bands over the frequency range 50Hz to 10kHz, which is beyond that required by the test standard. Measurements outside the standard frequency range are not UKAS accredited.



Kieron Farrow

Tester

For and on behalf of

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1.0 Details of Measurements

1.1 Location

Sound Research Laboratories
Holbrook House
Little Waldingfield
Sudbury
Suffolk
CO10 0TF

1.2 Test Dates

7 and 8 October 2020

1.3 Tester

Kieron Farrow of SRL Technical Services Limited

1.4 Instrumentation and Apparatus Used

Make	Description	Type
Abtronix	Microphone Multiplexer	
EDI	Microphone Power Supply Unit	
Norwegian Electronics	Real Time Analyser	830
	Rotating Microphone Boom	265

Brüel & Kjaer	Windshields	UA0237
	Pre Amplifiers	2669C
	Microphone Calibrator	4231
	Omnipower Sound Source	4296
Larson Davis	12mm Condenser Microphone	377A60
Oregon Scientific	Temperature & Humidity & Probe	THGR810
TOA	Graphic Equalizer	E-1231
QSC Audio	Power Amplifier	RMX 1450
G.R.A.S	Pre Amplifier	26AK
	Microphone	40AR

1.5 References

BS EN ISO 10140-2:2010 Laboratory measurement of sound insulation for building elements – Part 2: Measurement of airborne sound insulation.

2.0 Description of Test

2.1 Description of Sample

Various plasterboard partitions were tested. See Data Sheets 1 to 8 and Drawing 1 and 2 for details of constructions tested.

Sampling plan:	Selected at random
Sample condition:	New
Details supplied by:	CMH Design and Consultancy Services Ltd
Sample installed by:	SRL

2.2 Sample Delivery date

6 October 2020

2.3 Test Procedures

The sample was mounted/located and tested in accordance with the relevant standard. The method and procedure is described in Appendix A. The measurement uncertainty is given in Appendix B.

3.0 Results

The results of the measurements and subsequent analysis are given in Data Sheets 1 to 8.

Results relate only to the items received and tested.

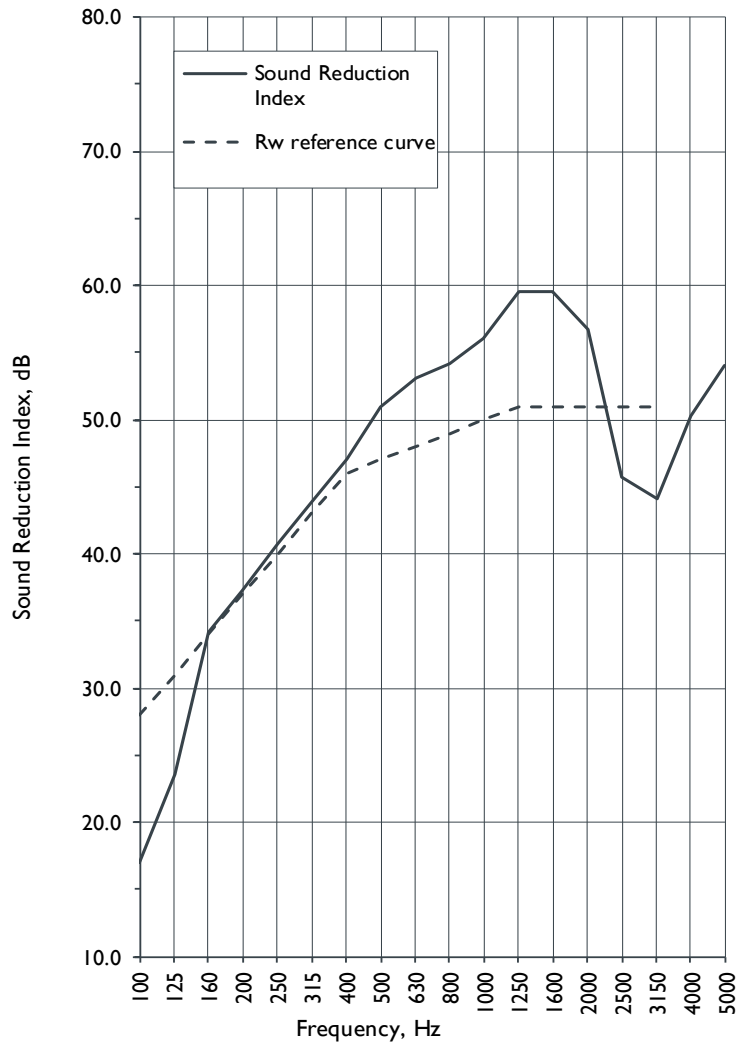
SRL Test No.	Description in Brief	R _w (C; C _{tr}) dB
2	1x15mm Gyproc Soundbloc, Hadley Group 50mm C Studs at 600mm centres, 50mm Isover APR Insulation, 1x15mm Gyproc Soundbloc	47 (-4 ; -11)
3	2x15mm Gyproc Soundbloc, Hadley Group 50mm C Stud at 600mm centres, 50mm Isover APR Insulation, 2x15mm Gyproc Soundbloc	54 (-2 ; -8)
4	2x15mm Gyproc Soundbloc, Twin stud wall of Hadley Group 50mm C Stud at 600mm centres, 40mm Cavity between walls, Braced with Track at 1200mm centres, 50mm Isover APR Insulation, 2x15mm Gyproc Soundbloc	60 (-2 ; -9)
6	2x15mm Gyproc Soundbloc, Twin stud wall of Hadley Group 50mm C Stud at 600mm centres, 40mm Cavity between walls, Braced with Gyproc Soundbloc at 1200mm centres, 50mm Isover APR Insulation, 2x15mm Gyproc Soundbloc	61 (-3 ; -9)
8	2x12.5mm Gyproc Standard Wallboard, Twin stud wall of Hadley Group 50mm C Stud at 600mm centres, 40mm Cavity between walls, Braced with Track at 1200mm centres, 50mm Isover APR Insulation, 2x12.5mm Gyproc Standard Wallboard	56 (-4 ; -11)
9	2x12.5mm Gyproc Fireline, Twin stud wall of Hadley Group 50mm C Stud at 600mm centres, 40mm Cavity between walls, Braced with Track at 1200mm centres, 50mm Isover APR Insulation, 2x12.5mm Gyproc Fireline	59 (-4 ; -10)
10	2x12.5mm Gyproc Fireline, Hadley Group 50mm C Stud at 600mm Centres, 25mm Isover APR Insulation, 2x12.5mm Gyproc Fireline	52 (-3 ; -10)
11	1x12.5mm Gyproc Fireline, Hadley Group 50mm C Stud at 600mm Centres, 25mm Isover APR Insulation, 1x12.5mm Gyproc Fireline	42 (-3 ; -10)

Data Sheet I

Test Number:	2	Test Room:	Source	Receiving
Client:	Hadley Group	Air Temperature:	14.6 °C	14.3 °C
Test Date:	07/10/2020	Air Humidity:	69 %	68 %
Sample Height:	2.92 m	Volume:	55 m ³	50 m ³
Sample Width:	3.845 m			
Sample Weight:	29.19 kg/m ²	Air Pressure:	1003 mbar	

Product Identification: 1x15mm Gyproc Soundbloc, Hadley Group 50mm C Studs at 600mm centres, 50mm Isover APR Insulation, 1x15mm Gyproc Soundbloc

Freq, f Hz	Sound Reduction Index, dB	
	1/3 Oct	Octave
50+	18.5	17.6
63+	18.7	
80+	16.0	
100	17.0	20.9
125	23.6	
160	34.2	
200	37.3	39.8
250	40.7	
315	43.9	
400	47.1	49.6
500	51.0	
630	53.1	
800	54.2	56.1
1000	56.0	
1250	59.5	
1600	59.6	50.0
2000	56.7	
2500	45.7	
3150	44.1	47.6
4000	50.3	
5000	54.0	
6300+	59.4	58.7
8000+	60.5	
10000+	56.9	
Average 100-3150	45.2	Version v3.1



Rating according to BS EN ISO 717-1:2013

R_w(C;C_{tr})= 47 (-4 ; -11) dB

* shows measurement corrected for background

> shows measurement limited by background

+ shows Frequency beyond standard and not UKAS accredited

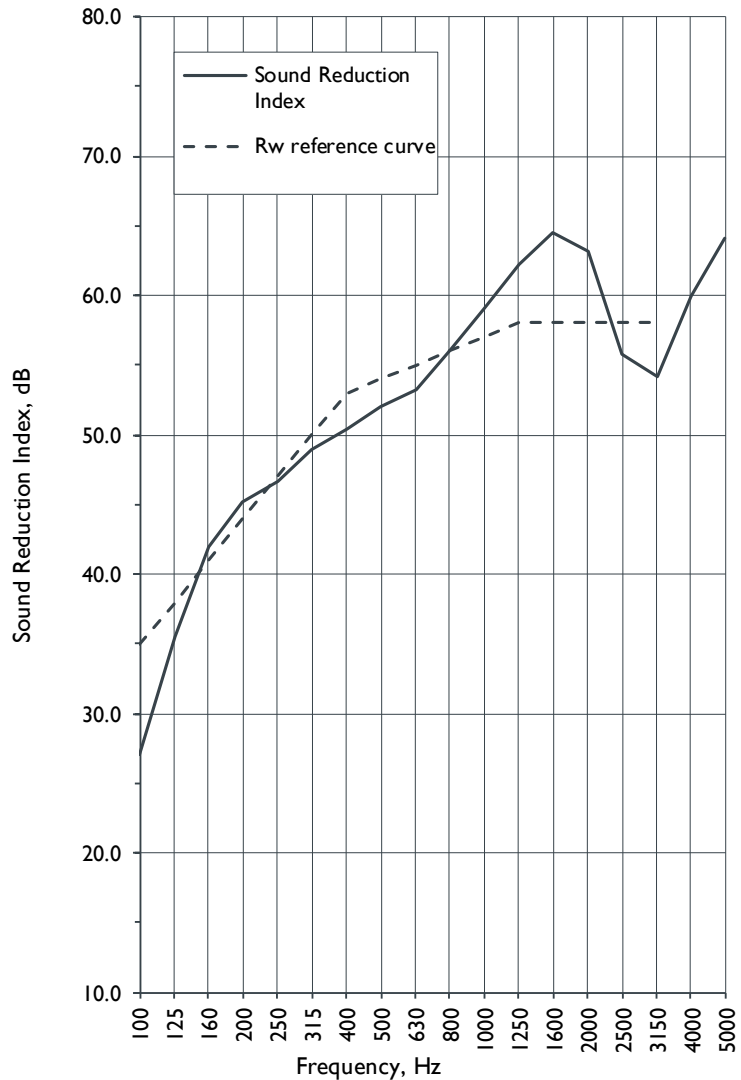
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Data Sheet 2

Test Number:	3	Test Room:	Source	Receiving
Client:	Hadley Group	Air Temperature:	14.6 °C	14.3 °C
Test Date:	07/10/2020	Air Humidity:	69 %	68 %
Sample Height:	2.92 m	Volume:	55 m ³	50 m ³
Sample Width:	3.845 m			
Sample Weight:	57.73 kg/m ²	Air Pressure:	1003 mbar	

Product Identification: 2x15mm Gyproc Soundbloc, Hadley Group 50mm C Stud at 600mm centres, 50mm Isover APR Insulation, 2x15mm Gyproc Soundbloc

Freq, f Hz	Sound Reduction Index, dB	
	1/3 Oct	Octave
50+	21.8	19.1
63+	18.0	
80+	18.4	
100	27.1	31.2
125	35.5	
160	42.0	
200	45.2	46.7
250	46.6	
315	49.0	
400	50.4	51.8
500	52.0	
630	53.3	
800	56.1	58.4
1000	59.0	
1250	62.2	
1600	64.5	59.4
2000	63.2	
2500	55.8	
3150	54.2	57.6
4000	60.0	
5000	64.1	
6300+	68.6	60.1
8000+	63.5	
10000+	56.4	
Average 100-3150	51.0	Version v3.1



Rating according to BS EN ISO 717-1:2013

R_w(C;C_{tr})= 54 (-2 ; -8) dB

* shows measurement corrected for background

> shows measurement limited by background

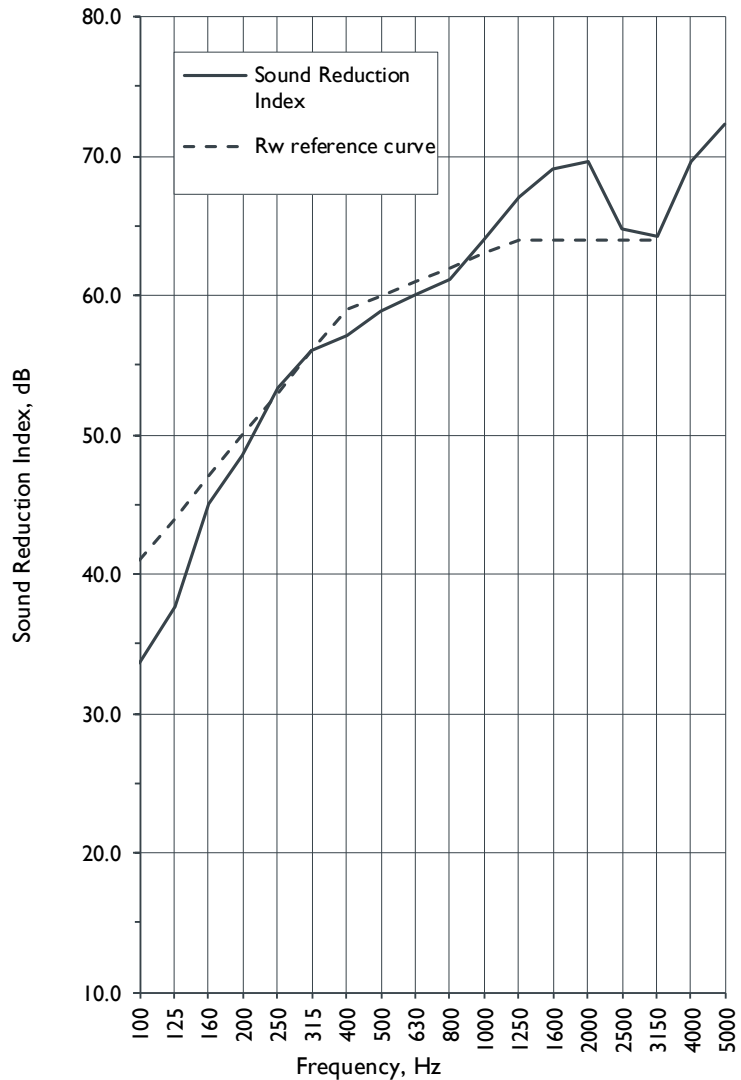
+ shows Frequency beyond standard and not UKAS accredited

Data Sheet 3

Test Number:	4	Test Room:	Source	Receiving
Client:	Hadley Group	Air Temperature:	14.7 °C	14.4 °C
Test Date:	07/10/2020	Air Humidity:	67 %	67 %
Sample Height:	2.92 m	Volume:	55 m ³	50 m ³
Sample Width:	3.845 m			
Sample Weight:	57.73 kg/m ²	Air Pressure:	1005 mbar	

Product Identification: 2x15mm Gyproc Soundbloc, Twin stud wall of Hadley Group 50mm C Stud at 600mm centres, 40mm Cavity between walls, Braced with Track at 1200mm centres, 50mm Isover APR Insulation, 2x15mm Gyproc Soundbloc

Freq, f Hz	Sound Reduction Index, dB	
	1/3 Oct	Octave
50+	21.6	24.4
63+	25.0	
80+	30.8	
100	33.7	36.8
125	37.7	
160	45.1	
200	48.5	51.5
250	53.4	
315	56.1	
400	57.1	58.5
500	58.9	
630	60.1	
800	61.2	63.4
1000	64.0	
1250	67.1	
1600	69.0	67.3
2000	69.6	
2500	64.8	
3150	64.3	67.4
4000	69.6	
5000	72.3	
6300+	74.3 *	60.1
8000+	63.7	
10000+	56.1	
Average 100-3150	56.9	Version v3.1



Rating according to BS EN ISO 717-1:2013

R_w(C;C_{tr})= 60 (-2 ; -9) dB

* shows measurement corrected for background

> shows measurement limited by background

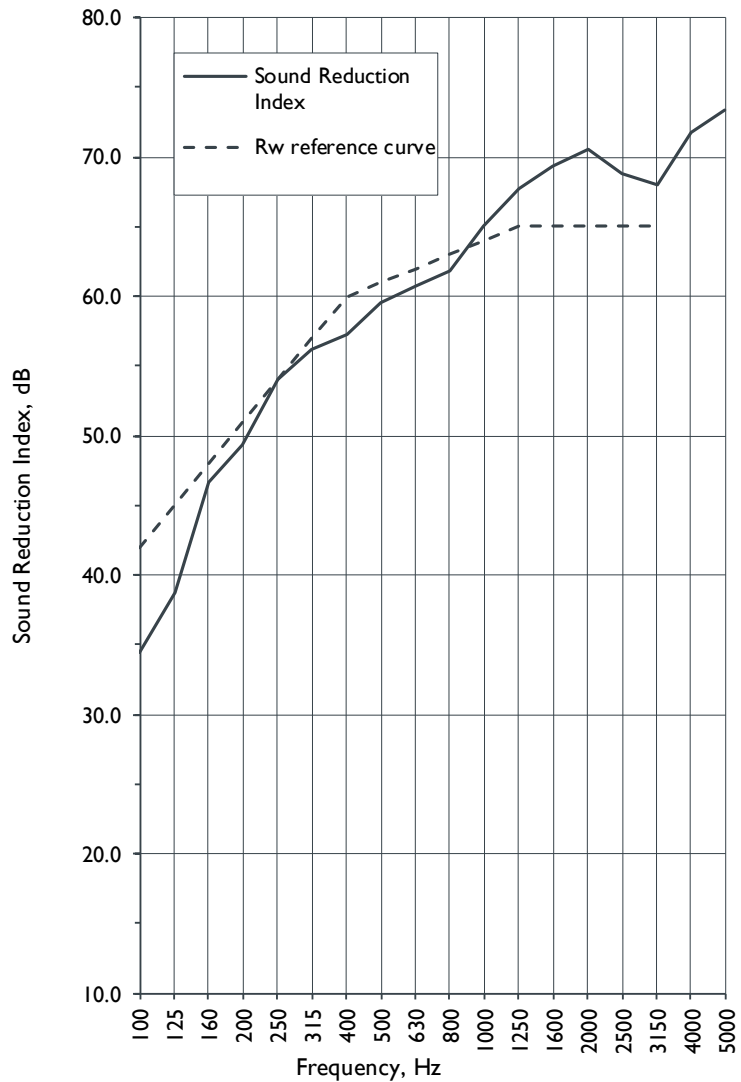
+ shows Frequency beyond standard and not UKAS accredited

Data Sheet 4

Test Number:	6	Test Room:	Source	Receiving
Client:	Hadley Group	Air Temperature:	14.7 °C	14.3 °C
Test Date:	07/10/2020	Air Humidity:	66 %	66 %
Sample Height:	2.92 m	Volume:	55 m ³	50 m ³
Sample Width:	3.845 m			
Sample Weight:	57.73 kg/m ²	Air Pressure:	1005 mbar	

Product Identification: 2x15mm Gyproc Soundbloc, Twin stud wall of Hadley Group 50mm C Stud at 600mm centres, 40mm Cavity between walls, Braced with Track at 1200mm centres, 50mm Isover APR Insulation, 2x15mm Gyproc Soundbloc

Freq, f Hz	Sound Reduction Index, dB	
	1/3 Oct	Octave
50+	19.9	23.7
63+	27.0	
80+	32.7	
100	34.4	37.6
125	38.8	
160	46.7	
200	49.4	52.3
250	54.1	
315	56.2	
400	57.2	58.9
500	59.6	
630	60.8	
800	61.8	64.2
1000	65.0	
1250	67.7	
1600	69.3	69.5
2000	70.5	
2500	68.8	
3150	68.0	70.5
4000	71.8	
5000	73.4	
6300+	74.9 *	60.3
8000+	63.8	
10000+	56.3	
Average 100-3150	58.0	Version v3.1



Rating according to BS EN ISO 717-1:2013

R_w(C;C_{tr})= 61 (-3 ; -9) dB

* shows measurement corrected for background

> shows measurement limited by background

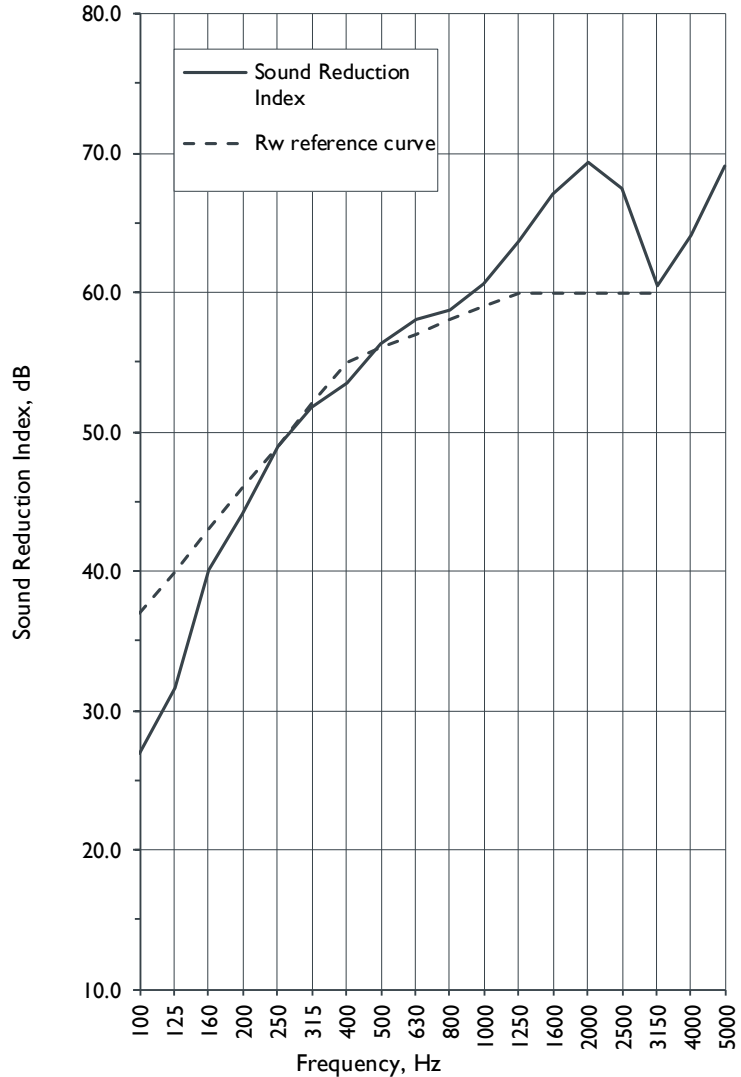
+ shows Frequency beyond standard and not UKAS accredited

Data Sheet 5

Test Number:	8	Test Room:	Source	Receiving
Client:	Hadley Group	Air Temperature:	13.9 °C	14.1 °C
Test Date:	08/10/2020	Air Humidity:	57 %	58 %
Sample Height:	2.92 m	Volume:	55 m ³	50 m ³
Sample Width:	3.845 m			
Sample Weight:	35.45 kg/m ²	Air Pressure:	998 mbar	

Product Identification: 2x12.5mm Gyproc Standard Wallboard, Twin stud wall of Hadley Group 50mm C Stud at 600mm centres, 40mm Cavity between walls, Braced with Track at 1200mm centres, 50mm Isover APR Insulation, 2x12.5mm Gyproc Standard Wallboard

Freq, f Hz	Sound Reduction Index, dB	
	1/3 Oct	Octave
50+	17.1	17.1
63+	14.8	
80+	22.3	
100	27.0	30.3
125	31.6	
160	40.1	
200	44.1	47.1
250	48.9	
315	51.8	
400	53.5	55.5
500	56.3	
630	58.1	
800	58.7	60.6
1000	60.6	
1250	63.7	
1600	67.0	67.8
2000	69.3	
2500	67.4	
3150	60.5	63.3
4000	64.1	
5000	69.0	
6300+	72.0	60.2
8000+	63.7	
10000+	56.2	
Average 100-3150	53.7	Version v3.1



Rating according to BS EN ISO 717-1:2013

R_w(C;C_{tr})= 56 (-4 ; -11) dB

* shows measurement corrected for background

> shows measurement limited by background

+ shows Frequency beyond standard and not UKAS accredited

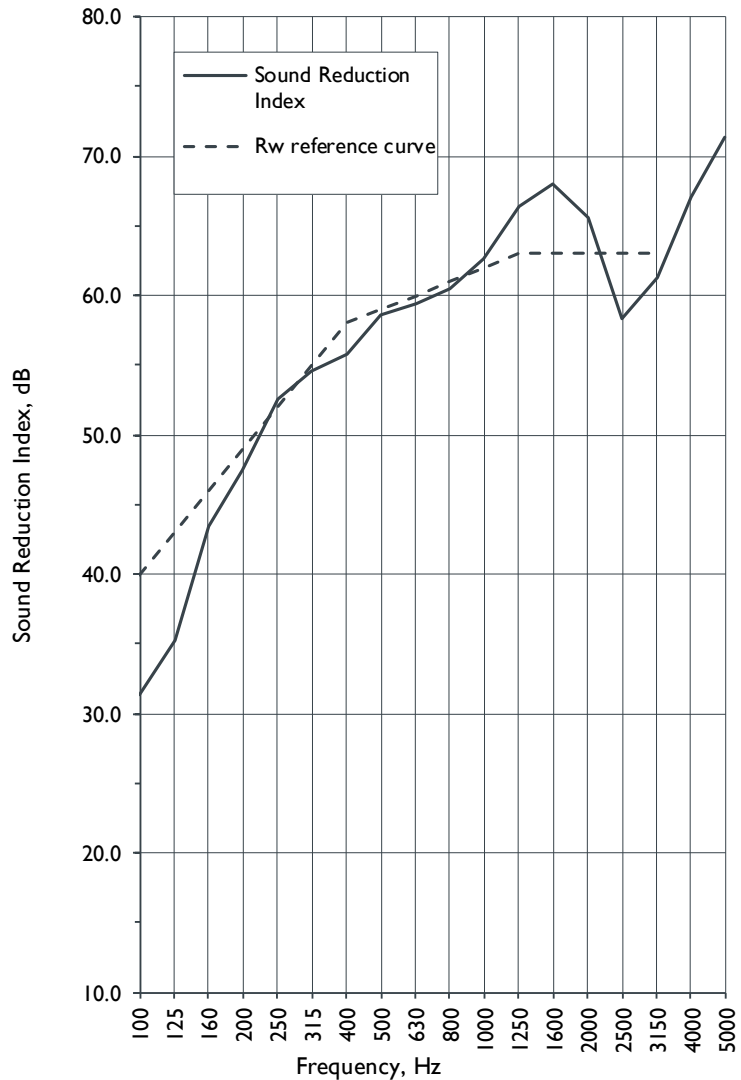
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Data Sheet 6

Test Number:	9	Test Room:	Source	Receiving
Client:	Hadley Group	Air Temperature:	13.9 °C	14.3 °C
Test Date:	08/10/2020	Air Humidity:	57 %	59 %
Sample Height:	2.92 m	Volume:	55 m ³	50 m ³
Sample Width:	3.845 m			
Sample Weight:	45.25 kg/m ²	Air Pressure:	998 mbar	

Product Identification: 2x12.5mm Gyproc Fireline, Twin stud wall of Hadley Group 50mm C Stud at 600mm centres, 40mm Cavity between walls, Braced with Track at 1200mm centres, 50mm Isover APR Insulation, 2x12.5mm Gyproc Fireline

Freq, f Hz	Sound Reduction Index, dB	
	1/3 Oct	Octave
50+	18.9	21.2
63+	20.8	
80+	27.4	
100	31.3	34.4
125	35.2	
160	43.4	
200	47.4	50.4
250	52.5	
315	54.6	
400	55.8	57.6
500	58.6	
630	59.4	
800	60.5	62.6
1000	62.6	
1250	66.4	
1600	68.0	62.0
2000	65.6	
2500	58.3	
3150	61.3	64.7
4000	67.0	
5000	71.4	
6300+	73.6 *	60.6
8000+	63.6	
10000+	56.7	
Average 100-3150	55.1	Version v3.1



Rating according to BS EN ISO 717-1:2013

R_w(C;C_{tr})= 59 (-4 ; -10) dB

* shows measurement corrected for background

> shows measurement limited by background

+ shows Frequency beyond standard and not UKAS accredited

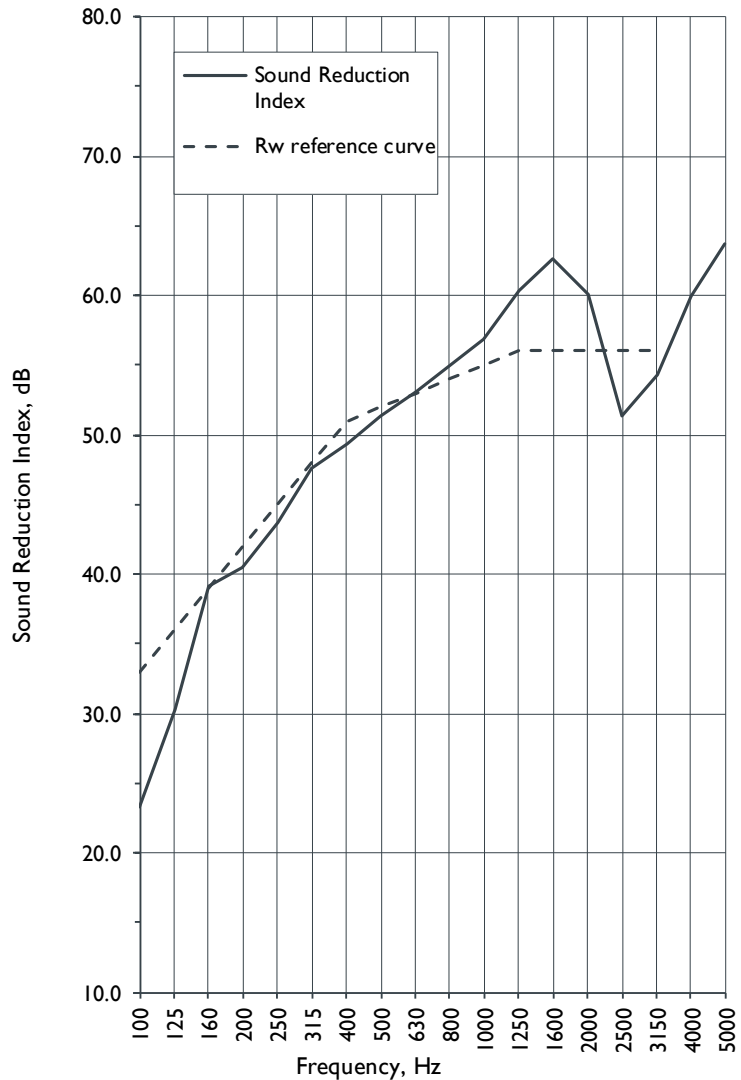
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Data Sheet 7

Test Number:	10	Test Room:	Source	Receiving
Client:	Hadley Group	Air Temperature:	14 °C	14.3 °C
Test Date:	08/10/2020	Air Humidity:	58 %	59 %
Sample Height:	2.92 m	Volume:	55 m ³	50 m ³
Sample Width:	3.845 m			
Sample Weight:	45.03 kg/m ²	Air Pressure:	998 mbar	

Product Identification: 2x12.5mm Gyproc Fireline, Hadley Group 50mm C Stud at 600mm Centres, 25mm Isover APR Insulation, 2x12.5mm Gyproc Fireline

Freq, f Hz	Sound Reduction Index, dB	
	1/3 Oct	Octave
50+	20.1	18.5
63+	18.6	
80+	17.3	
100	23.3	27.1
125	30.3	
160	39.1	
200	40.5	43.0
250	43.7	
315	47.6	
400	49.3	51.0
500	51.3	
630	53.1	
800	55.0	56.9
1000	56.9	
1250	60.3	
1600	62.6	55.3
2000	60.1	
2500	51.3	
3150	54.3	57.7
4000	59.9	
5000	63.7	
6300+	68.2	60.3
8000+	63.2	
10000+	56.6	
Average 100-3150	48.7	Version v3.1



Rating according to BS EN ISO 717-1:2013

R_w(C;C_{tr})= 52 (-3 ; -10) dB

* shows measurement corrected for background

> shows measurement limited by background

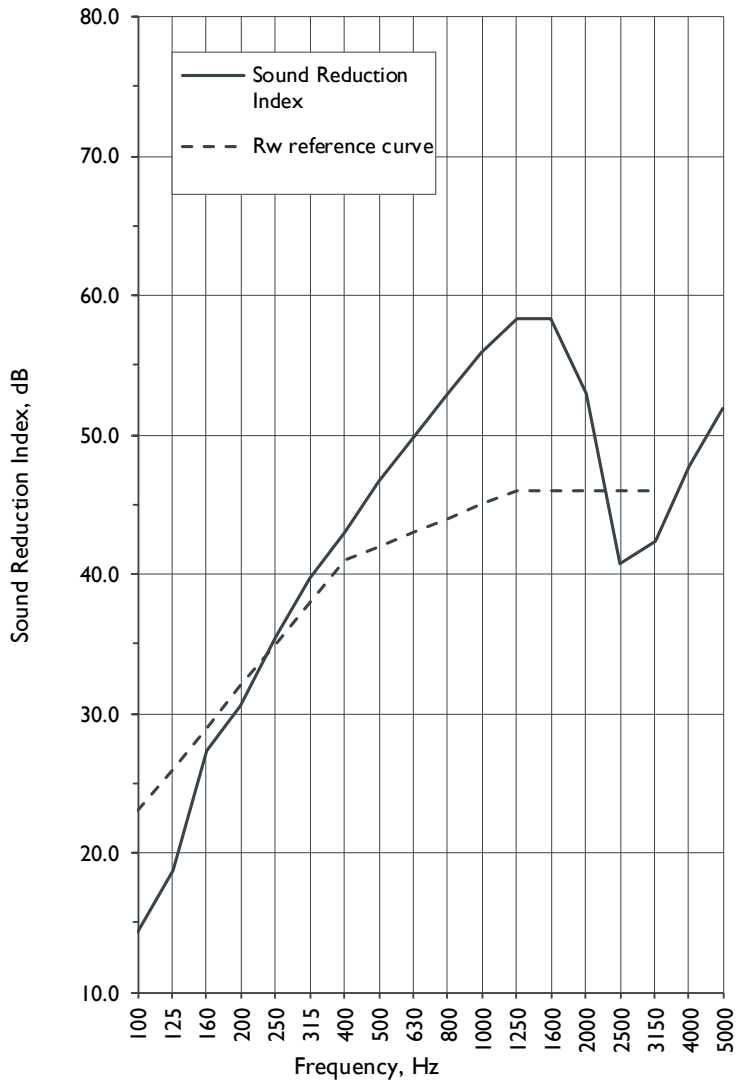
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Data Sheet 8

Test Number:	11	Test Room:	Source	Receiving
Client:	Hadley Group	Air Temperature:	14 °C	14.3 °C
Test Date:	08/10/2020	Air Humidity:	58 %	59 %
Sample Height:	2.92 m	Volume:	55 m ³	50 m ³
Sample Width:	3.845 m			
Sample Weight:	22.73 kg/m ²	Air Pressure:	998 mbar	

Product Identification: 1x12.5mm Gyproc Fireline, Hadley Group 50mm C Stud at 600mm Centres, 25mm Isover APR Insulation, 1x12.5mm Gyproc Fireline

Freq, f Hz	Sound Reduction Index, dB	
	1/3 Oct	Octave
50+	16.6	17.0
63+	17.8	
80+	16.8	
100	14.3	17.6
125	18.7	
160	27.4	
200	30.5	33.7
250	35.5	
315	39.7	
400	43.1	45.7
500	46.7	
630	49.9	
800	53.0	55.2
1000	55.9	
1250	58.3	
1600	58.3	45.2
2000	52.9	
2500	40.8	
3150	42.4	45.7
4000	47.7	
5000	51.9	
6300+	58.0	58.2
8000+	60.1	
10000+	57.1	
Average 100-3150	41.7	Version v3.1



Rating according to BS EN ISO 717-1:2013

R_w(C;C_{tr})= 42 (-3 ; -10) dB

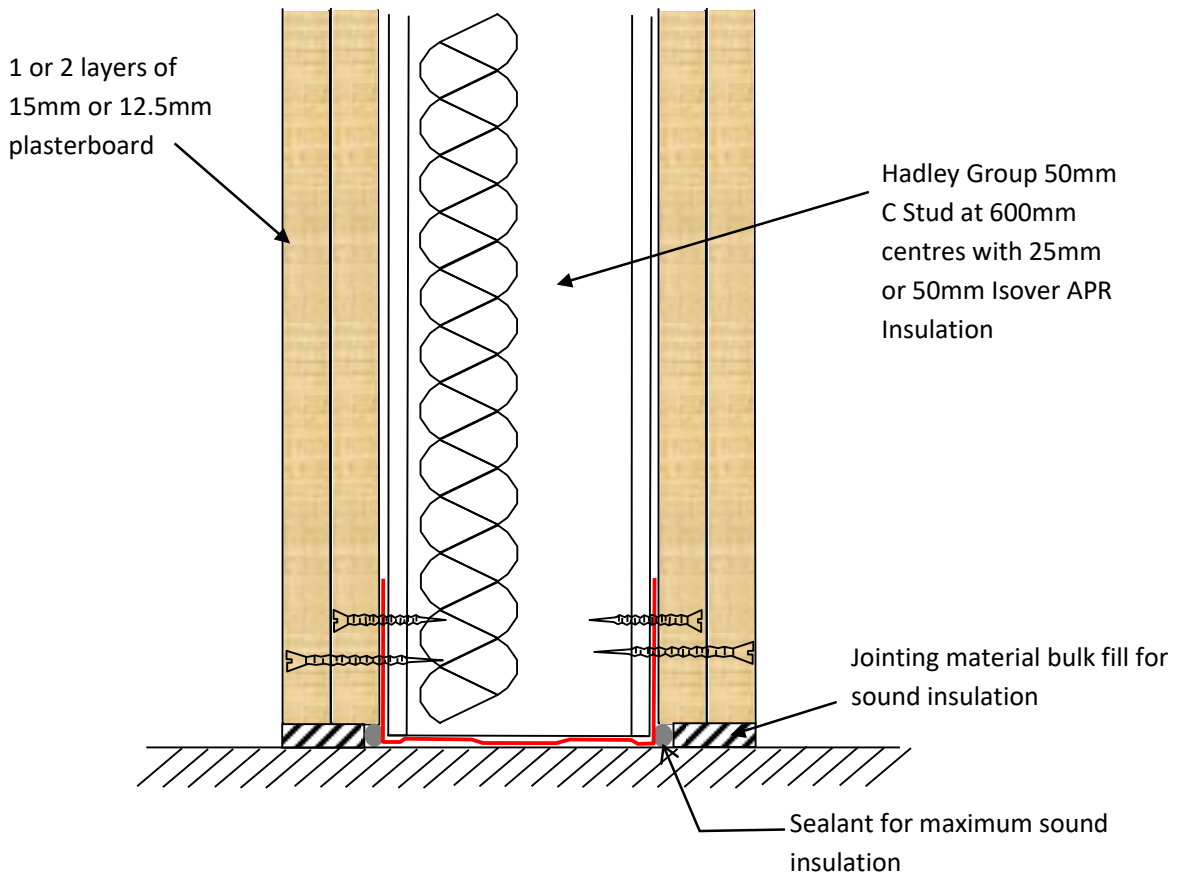
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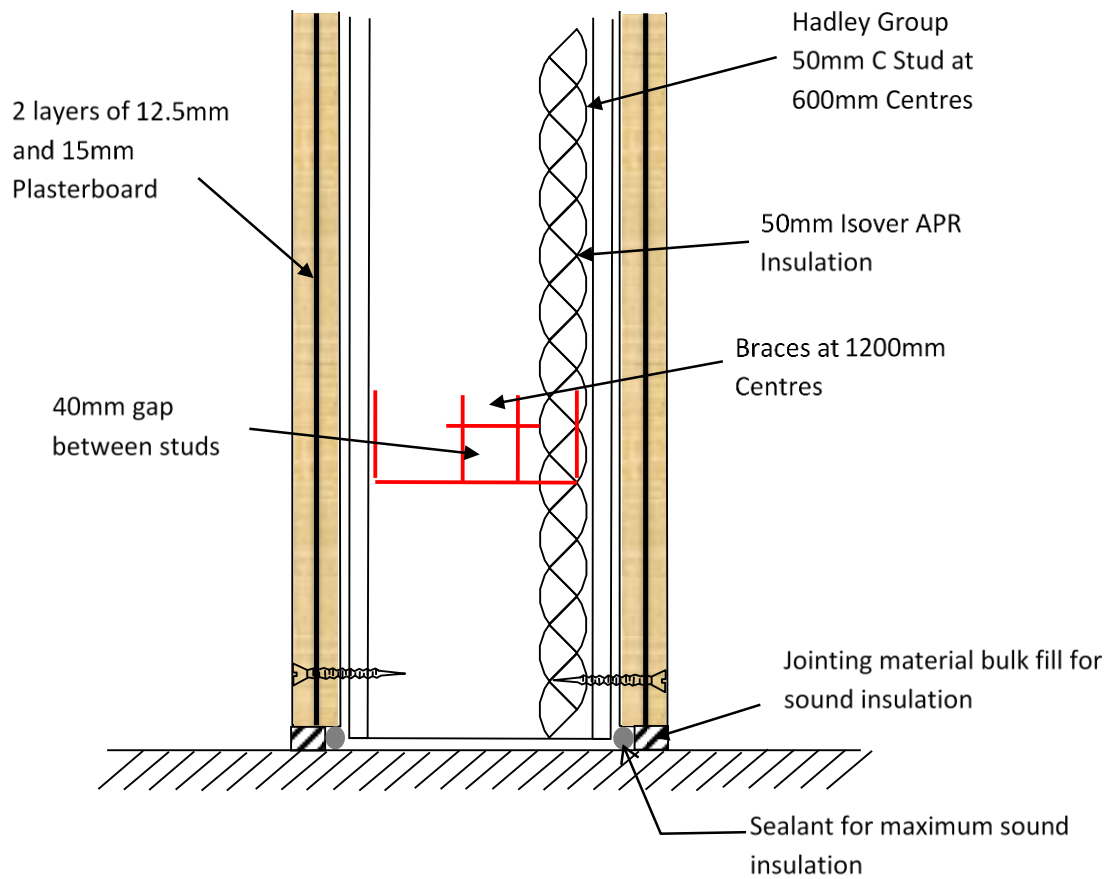
Drawing 1 – General Partition Drawing

Single Stud – Double Layer



Drawing 2 – General (Braced) Partition Drawing

Twin Stud – Double Layer



Appendix A – Test Procedure

Measurement of Sound Transmission in Accordance With BS EN ISO 10140-2: 2010 – TP33

In the laboratory, airborne sound transmission is determined from the difference in sound pressure levels measured across a test sample installed between two reverberant rooms. The difference in measured sound pressure levels is corrected for the amount of absorption in the receiving room. The test is done under conditions which restrict the transmission of sound by paths other than directly through the sample. The source sound field is randomly incident on the sample.

The test sample is located and sealed in an aperture within the brick dividing wall between the two rectangular reverberant or acoustically "live" rooms, both of which are constructed from 215mm brick with reinforced concrete floors and roofs. The brick wall has dimensions of 3.9m wide x 2.9m high and forms the whole of the common area between the two rooms.

One of the rooms termed the source room has a volume of 55 cubic metres and is isolated by the use of resilient mountings and seals, from the surrounding structure and the adjoining room. The adjoining receiving room has a volume of 50 cubic metres.

Broad band noise is produced in the source room from an electronic generator, power amplifier and loudspeaker. The resulting sound pressure levels in both rooms are sampled, filtered into one third octave band widths, integrated and averaged by means of a Real Time Analyser using a microphone on an oscillating microphone boom. The value obtained at any particular frequency is known as the equivalent sound pressure level for either source or receiving rooms. The change in level across the test sample is termed the equivalent sound pressure level difference, i.e.

$$D = L_1 - L_2$$

where

D is the equivalent sound pressure level difference, dB

L₁ is the equivalent sound pressure level in the source room, dB

L₂ is the equivalent sound pressure level in the receiving room, dB

The Sound Reduction Index (R), also known by the American terminology Sound Transmission Loss, is defined as the number of decibels by which sound energy randomly incident on the test sample is reduced in transmitting through it and is given by the formula:

$$R = D + 10 \log_{10} \frac{S}{A} \dots\dots\dots \text{in decibels}$$

where

S is the area of the sample, m²

A is the total absorption in the receiving room, m²

The Sound Reduction Index is an expression of the laboratory sound transmission performance of a particular element or construction. It is a function of the mass, thickness, sealing, method of mounting etc., and is independent of the overall area of the sample.

However, when a sample is installed on site and forms part of an enclosure of building, the sound insulation obtained will be dependent upon its surface area, the larger the area the greater the sound energy transmitted, as well as the absorption in the receiving area. In addition, the overall sound insulation of an enclosure is also determined by the sound transmission through other building elements, some of which may have an inferior performance to the sample. Because of this the potential Sound Reduction Index of a sample is not always fully realised in practice. A further consequence is that the Sound Reduction Index of a particular sample can only successfully be measured in a laboratory because only under such controlled conditions can the sound transmission path be limited to the sample under test.

R_w, C and C_{tr} have been calculated in accordance with the relevant section of BS EN ISO 717-1:2013 from the results of laboratory tests carried out in accordance with BS EN ISO 10140-2:2010.

Appendix B – Measurement Uncertainty

BS EN ISO 10140-2: 2010 – TP33

The following values of uncertainty are based on a standard uncertainty multiplied by a coverage factor of $k = 2$, which provides a level of confidence of approximately 95%.

Frequency, Hz	Uncertainty, \pm dB
100	3.2
125	2.9
160	2.5
200	2.5
250	1.8
315	1.8
400	1.5
500	1.5
630	1.2
800	1.2
1000	1.2
1250	1.2
1600	1.2
2000	1.2
2500	1.2
3150	1.2
Temperature	± 0.8 °C
Humidity	± 10 %RH
Static Pressure	± 1 mbar

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