SRL

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marmox fireboard
acoustic & thermal insulation

Airborne Sound Data Report

Technical Report
81668-SRL-RP-XT-001-P1

Project

The Laboratory Measurement of the Airborne Sound Insulation of Various Marmox Fire Barriers

Prepared for

Marmox (UK) Ltd

Published

16 November 2023

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Quality Assurance		
Project Title	The Laboratory Measurement of the Airborne Sound Insulation of Various Marmox Fire Barriers	
Document Title	Laboratory Test Report	
Client	Marmox (UK) Ltd	
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Version History

Version	Date	Comments
P1	16/11/2023	

Contents

1.0 Description of Test

Tests have been done in SRL's Laboratory at Holbrook House, Sudbury, Suffolk, to determine the sound reduction index of various Marmox Fire Barriers in accordance with BS EN ISO 10140-2: 2021.

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.

1.1 Description of Sample

Various Marmox Fire Barriers were tested. See Section 2.0, Data Sheets 1 to 6 and Drawings 1 to 2 for details.

Sampling plan:	Enough for test only
Sample condition:	New
Details supplied by:	Marmox (UK) Ltd
Sample installed by:	Marmox (UK) Ltd

1.2 Sample Delivery Date

10 November 2023

1.3 Test Procedures

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

2.0 Results

The results of the measurements and subsequent analysis are given in Data Sheets 1 to 6 and summarised below.

Results relate only to the items as received and tested.

SRL Test No.	Description in Brief	R_w (C;C_{tr})
1	100mm SS Marmox Fire Board	26 (-2;-4) dB
2	50mm DS Marmox Fire Board	23 (-2;-3) dB
3	20mm DS Marmox Fire Board	23 (-1;-3) dB
4	20mm DS Marmox Fire Board, 12.5mm DS XPS	23 (-1;-2) dB
5	12.5mm DS XPS	22 (-1;-3) dB
6	20mm DS XPS	22 (-1;-3) dB

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Data Sheet 1

Laboratory Measurement of Sound Reduction Index to BS EN ISO 10140-2:2021

			Test Room:	Source	Receiving
Test Number:	1		**Air Temperature:**	12.2 °C	12.1 °C
Client:	Marmox (UK) Ltd		**Air Humidity:**	68 %	68 %
Test Date:	10/11/2023		**Volume:**	62.3 m³	50.1 m³
Sample Height:	2.12 m		**Air Pressure:**	987 mbar	
Sample Width:	2.00 m				
Sample Weight:	13.5 kg/m²				

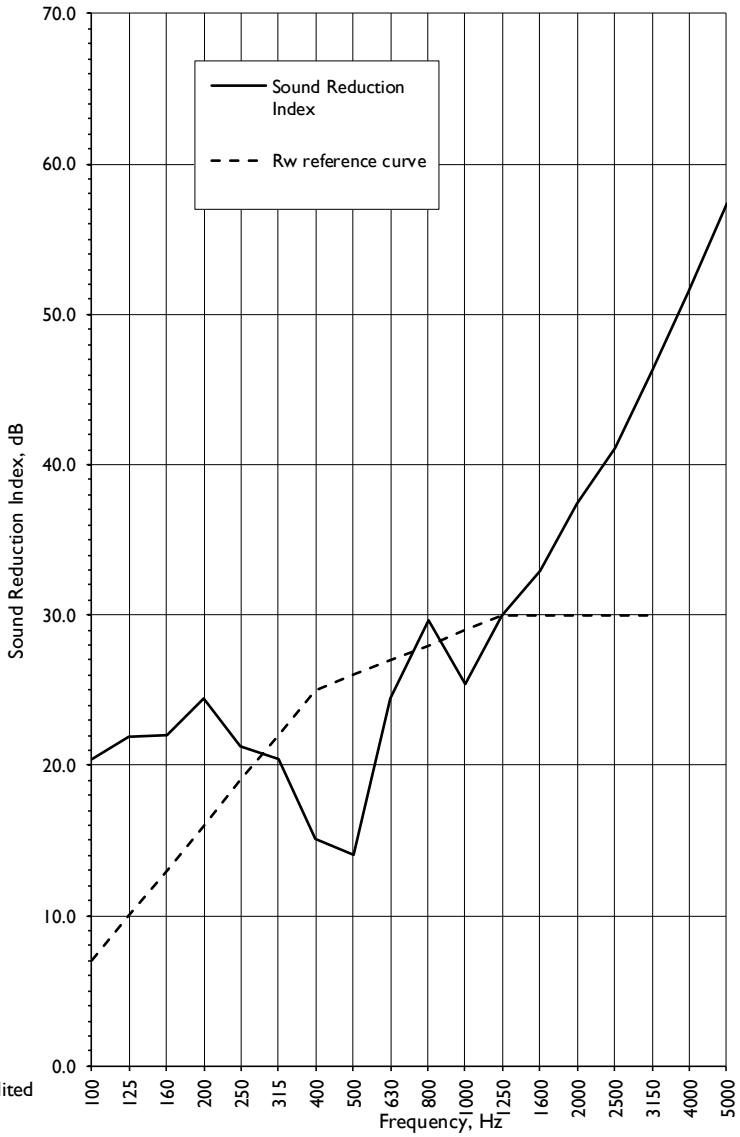
Product Identification: **100mm SS Marmox Fire Board**

Frequency Hz	Sound Reduction Index, dB		
	⅓ Oct		Octave
50+	27.0		20.8
63+	20.4		
80+	18.6		
100	20.4		21.4
125	21.9		
160	22.0		
200	24.4		21.7
250	21.3		
315	20.4		
400	15.1		16.1
500	14.0		
630	24.5		
800	29.7		27.8
1000	25.4		
1250	30.0		
1600	32.9		35.9
2000	37.4		
2500	41.1		
3150	46.2		49.6
4000	51.5		
5000	57.4	*	
6300+	61.7	*	60.9
8000+	62.4	>	
10000+	59.3	>	
Average 100-3150	26.7		SRL Version 3

* shows measurement corrected for background

> shows measurement limited by background

\+ shows Frequency beyond standard and not UKAS accredited



Rating according to BS EN ISO 717-1:2020

$R_w(C;C_{tr})$= 26 (-2;-4) dB

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Data Sheet 2

Laboratory Measurement of Sound Reduction Index to BS EN ISO 10140-2:2021

			Source	Receiving
Test Number:	2	**Test Room:**		
Client:	Marmox (UK) Ltd	**Air Temperature:**	12.2 °C	12.1 °C
Test Date:	10/11/2023	**Air Humidity:**	68 %	68 %
Sample Height:	2.12 m	**Volume:**	62.3 m³	50.1 m³
Sample Width:	2.00 m	**Air Pressure:**	987 mbar	
Sample Weight:	12.0 kg/m²			

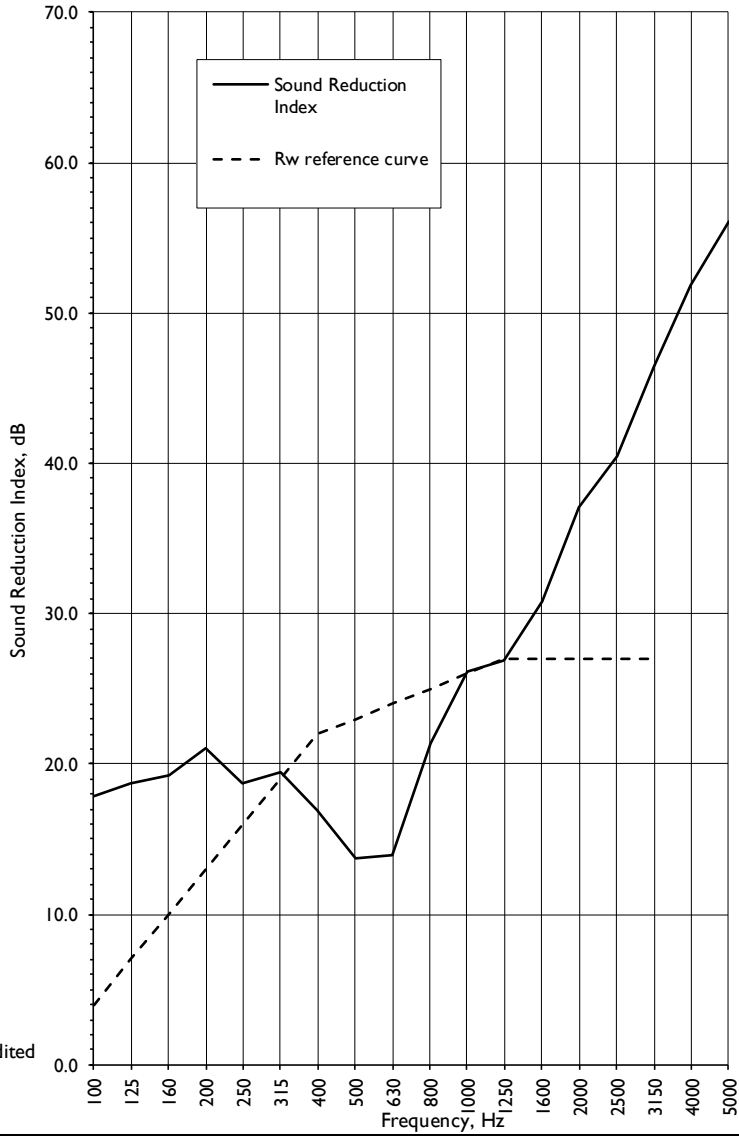
Product Identification: **50mm DS Marmox Fire Board**

Frequency Hz	Sound Reduction Index, dB	
	⅓ Oct	Octave
50+	22.3	17.7
63+	16.6	
80+	16.3	
100	17.9	18.6
125	18.7	
160	19.2	
200	21.1	19.7
250	18.7	
315	19.5	
400	16.9	14.6
500	13.7	
630	13.9	
800	21.4	24.1
1000	26.1	
1250	26.9	
1600	30.8	34.3
2000	37.1	
2500	40.5	
3150	46.4	49.7
4000	51.8	
5000	56.1	
6300+	58.9	60.6
8000+	60.1 *	
10000+	64.6 >	
Average 100-3150	24.3	SRL Version 3

* shows measurement corrected for background

> shows measurement limited by background

\+ shows Frequency beyond standard and not UKAS accredited



Rating according to BS EN ISO 717-1:2020

$R_w(C;C_{tr})$= 23 (-2;-3) dB

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Data Sheet 3

Laboratory Measurement of Sound Reduction Index to BS EN ISO 10140-2:2021

			Source	Receiving
Test Number:	3	**Test Room:**		
Client:	Marmox (UK) Ltd	**Air Temperature:**	12.2 °C	12.1 °C
Test Date:	10/11/2023	**Air Humidity:**	68 %	68 %
Sample Height:	2.12 m	**Volume:**	62.3 m³	50.1 m³
Sample Width:	2.00 m	**Air Pressure:**	987 mbar	
Sample Weight:	6.8 kg/m²			

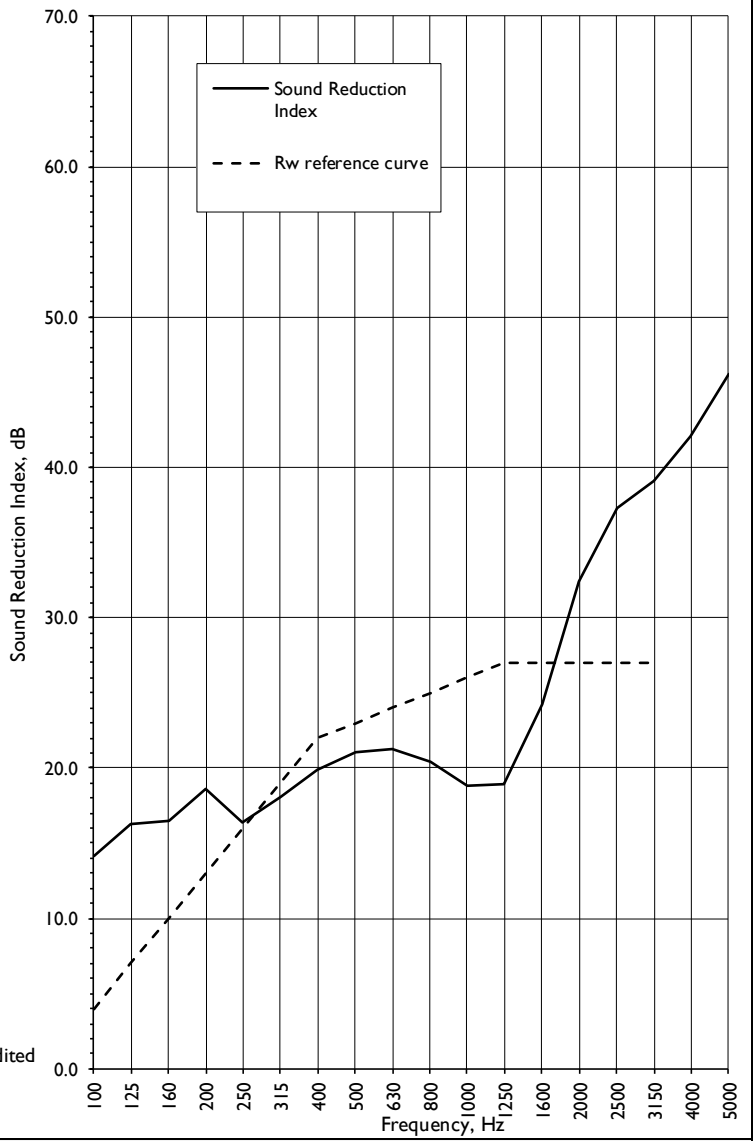
Product Identification: **20mm DS Marmox Fire Board**

Frequency Hz	Sound Reduction Index, dB	
	⅓ Oct	Octave
50+	19.8	15.1
63+	15.2	
80+	12.8	
100	14.2	15.5
125	16.3	
160	16.5	
200	18.6	17.6
250	16.4	
315	18.1	
400	19.9	20.7
500	21.0	
630	21.3	
800	20.4	19.3
1000	18.8	
1250	18.9	
1600	24.2	28.2
2000	32.4	
2500	37.3	
3150	39.1	41.6
4000	42.1	
5000	46.2	
6300+	49.1	51.1
8000+	51.0	
10000+	54.8 *	
Average 100-3150	22.1	SRL Version 3

* shows measurement corrected for background

> shows measurement limited by background

\+ shows Frequency beyond standard and not UKAS accredited



Rating according to BS EN ISO 717-1:2020

$R_w(C;C_{tr})$= 23 (-1;-3) dB

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Data Sheet 4

Laboratory Measurement of Sound Reduction Index to BS EN ISO 10140-2:2021

			Source	Receiving
Test Number:	4	**Test Room:**		
Client:	Marmox (UK) Ltd	**Air Temperature:**	12.2 °C	12.1 °C
Test Date:	10/11/2023	**Air Humidity:**	68 %	68 %
Sample Height:	2.12 m	**Volume:**	62.3 m³	50.1 m³
Sample Width:	2.00 m	**Air Pressure:**	987 mbar	
Sample Weight:	10.8 kg/m²			

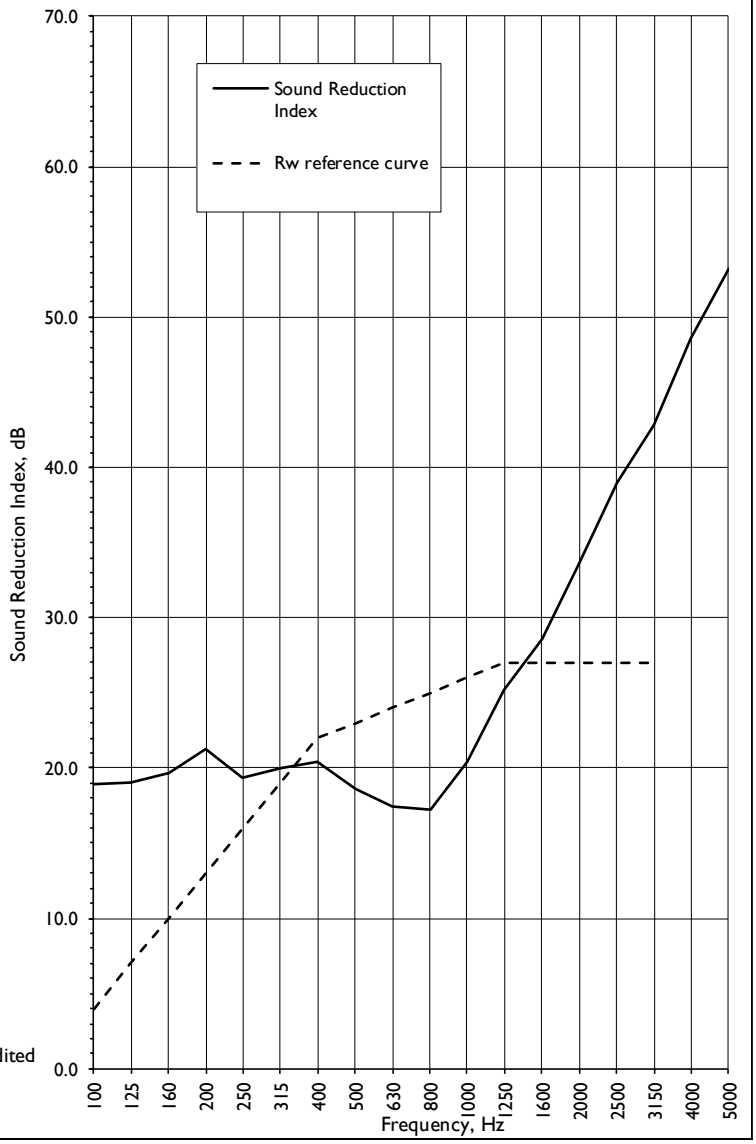
Product Identification: **20mm DS Marmox Fire Board, 12.5mm DS XPS**

Frequency Hz	Sound Reduction Index, dB	
	⅓ Oct	Octave
50+	23.3	18.7
63+	18.8	
80+	16.5	
100	18.9	19.2
125	19.0	
160	19.7	
200	21.3	20.2
250	19.4	
315	20.0	
400	20.4	18.6
500	18.6	
630	17.4	
800	17.2	19.8
1000	20.4	
1250	25.2	
1600	28.6	31.9
2000	33.6	
2500	39.0	
3150	42.8	46.2
4000	48.5	
5000	53.2	
6300+	56.0	58.0
8000+	57.9 *	
10000+	62.2 *	
Average 100-3150	23.8	SRL Version 3

* shows measurement corrected for background

> shows measurement limited by background

\+ shows Frequency beyond standard and not UKAS accredited



Rating according to BS EN ISO 717-1:2020

$R_w(C;C_{tr})$= 23 (-1;-2) dB

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Data Sheet 5

Laboratory Measurement of Sound Reduction Index to BS EN ISO 10140-2:2021

			Source	Receiving
Test Number:	5	**Test Room:**		
Client:	Marmox (UK) Ltd	**Air Temperature:**	12.2 °C	12.1 °C
Test Date:	10/11/2023	**Air Humidity:**	68 %	68 %
Sample Height:	2.12 m	**Volume:**	62.3 m³	50.1 m³
Sample Width:	2.00 m	**Air Pressure:**	987 mbar	
Sample Weight:	4.0 kg/m²			

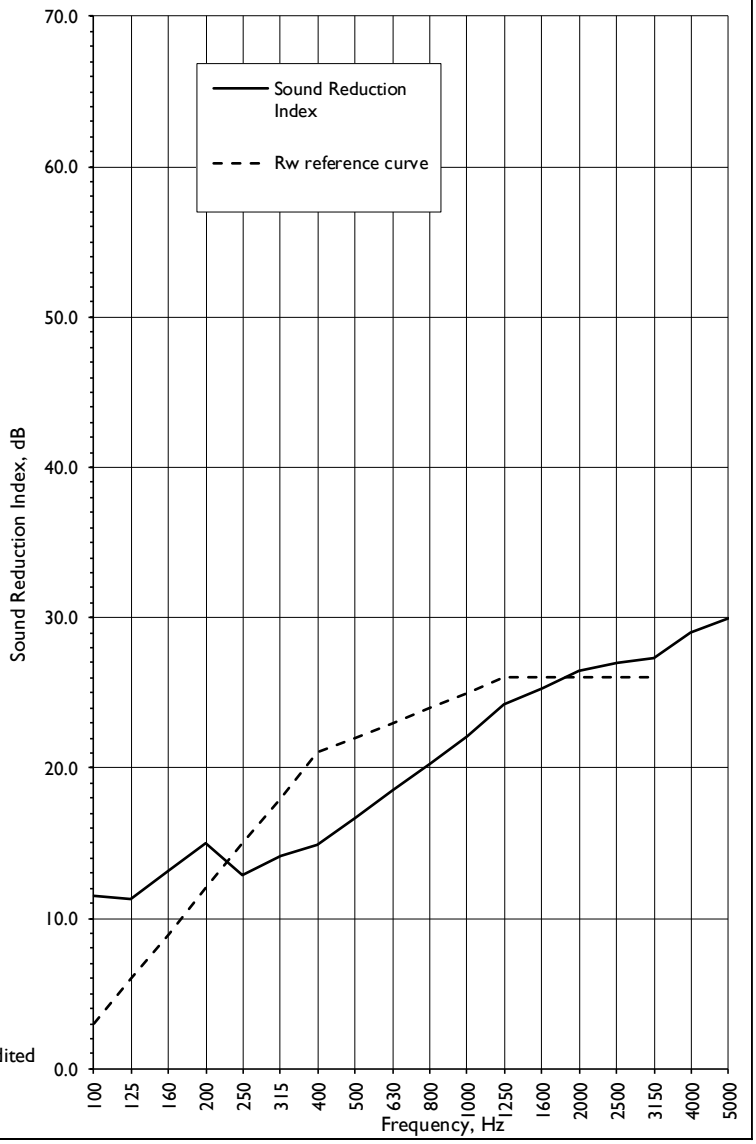
Product Identification: **12.5mm DS XPS**

Frequency Hz	Sound Reduction Index, dB	
	⅓ Oct	Octave
50+	17.3	11.6
63+	11.6	
80+	9.3	
100	11.5	11.9
125	11.3	
160	13.2	
200	15.0	13.9
250	12.9	
315	14.1	
400	14.9	16.5
500	16.7	
630	18.5	
800	20.3	21.9
1000	22.1	
1250	24.2	
1600	25.3	26.2
2000	26.5	
2500	27.0	
3150	27.3	28.6
4000	29.0	
5000	30.0	
6300+	30.4	27.1
8000+	30.0	
10000+	24.1	
Average 100-3150	18.8	SRL Version 3

* shows measurement corrected for background

> shows measurement limited by background

\+ shows Frequency beyond standard and not UKAS accredited



Rating according to BS EN ISO 717-1:2020

$R_w(C;C_{tr})$= 22 (-1;-3) dB

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Data Sheet 6

Laboratory Measurement of Sound Reduction Index to BS EN ISO 10140-2:2021

			Source	Receiving
Test Number:	6	**Test Room:**		
Client:	Marmox (UK) Ltd	**Air Temperature:**	12.2 °C	12.1 °C
Test Date:	10/11/2023	**Air Humidity:**	68 %	68 %
Sample Height:	2.12 m	**Volume:**	62.3 m³	50.1 m³
Sample Width:	2.00 m	**Air Pressure:**	987 mbar	
Sample Weight:	4.3 kg/m²			

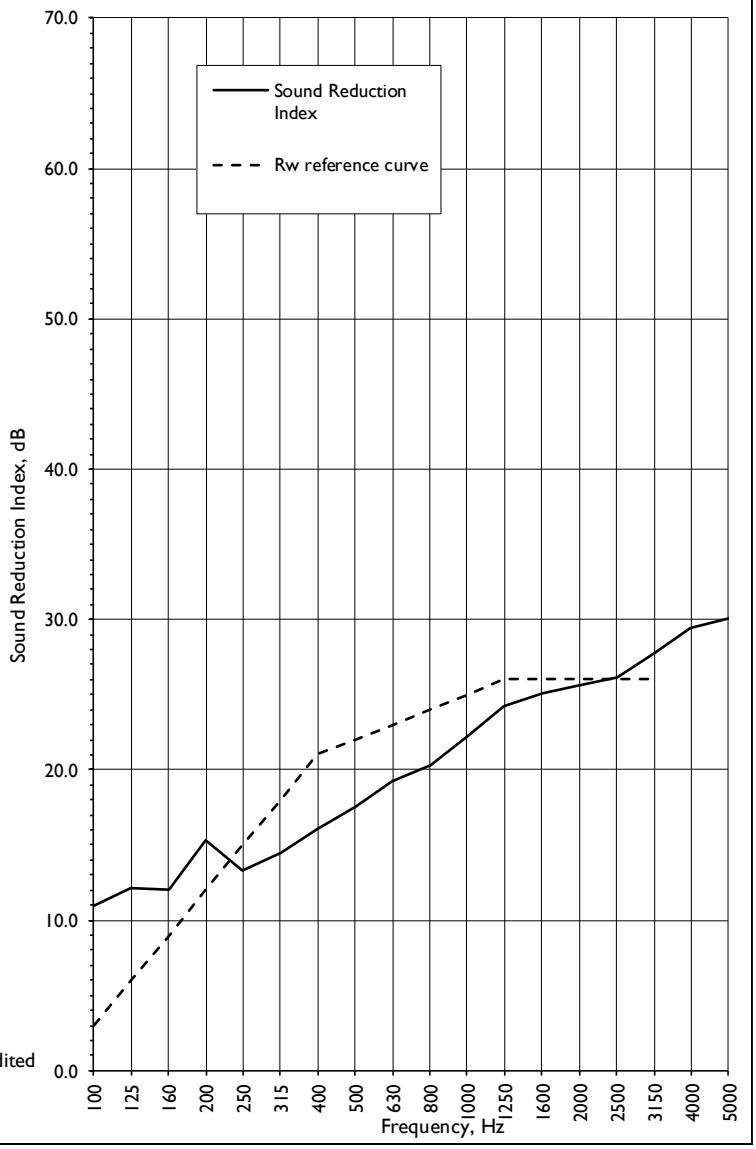
Product Identification: **20mm DS XPS**

Frequency Hz	Sound Reduction Index, dB	
	⅓ Oct	Octave
50+	15.5	11.1
63+	11.5	
80+	8.7	
100	11.0	11.7
125	12.1	
160	12.0	
200	15.3	14.3
250	13.3	
315	14.5	
400	16.1	17.4
500	17.5	
630	19.2	
800	20.3	21.9
1000	22.2	
1250	24.2	
1600	25.1	25.6
2000	25.6	
2500	26.1	
3150	27.7	28.9
4000	29.4	
5000	30.1	
6300+	28.8	23.5
8000+	21.2	
10000+	23.3	
Average 100-3150	18.9	SRL Version 3

* shows measurement corrected for background

> shows measurement limited by background

\+ shows Frequency beyond standard and not UKAS accredited



Rating according to BS EN ISO 717-1:2020

$R_w(C;C_{tr})$= 22 (-1;-3) dB

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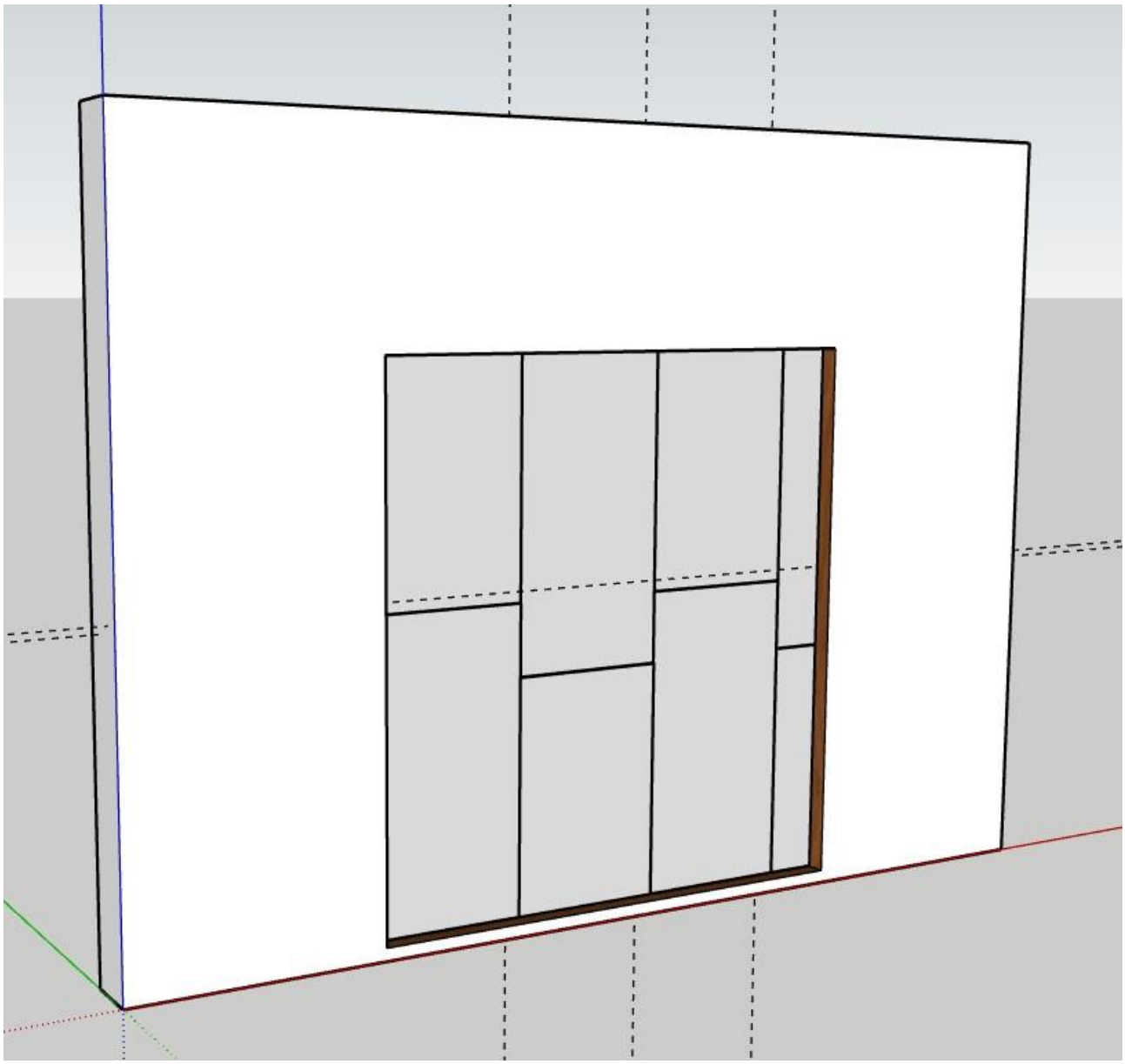
Drawing 1 – Front View



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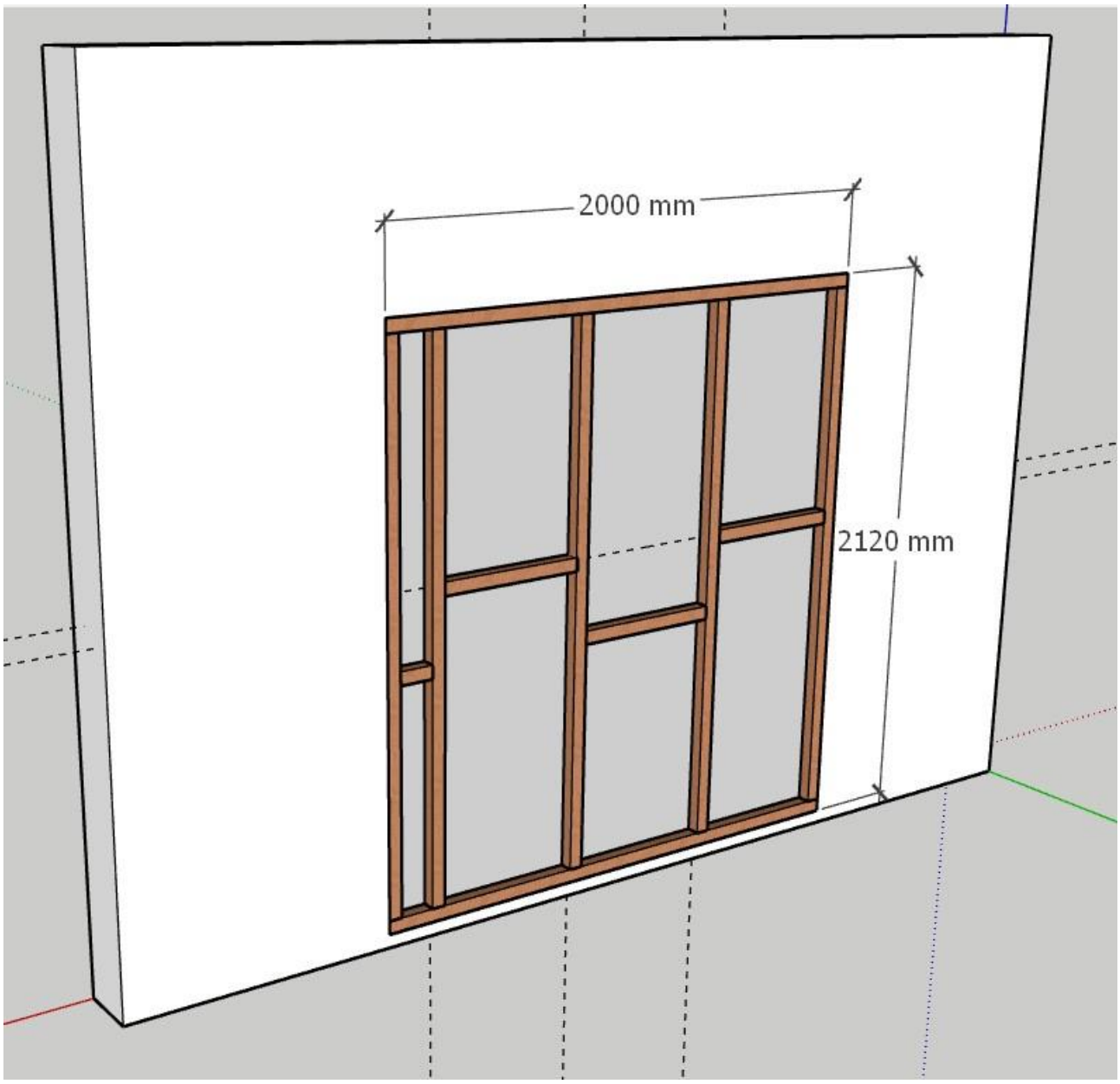
Drawing 2 – Rear View



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Appendix A - Details of Measurements

A1. Location

SRL Technical Services (Sound Research Laboratories)

Holbrook House

Little Waldingfield

Sudbury

Suffolk

CO10 0TF

Tel: 01787 247595

A2. Test Dates

10 November 2023

A3. Tester

Richard Calvert of SRL Technical Services Limited

A4. Instrumentation and Apparatus Used

Make	Description	Type
Norsonic	Multichannel Sound Level Meter	Nor850
Norsonic	Rotating microphone boom	Nor265
G.R.A.S	Microphone Pre-Amp	26AK
G.R.A.S	Calibrator	42AB
G.R.A.S	Microphone	40AR

Make	Description	Type
dbx	Graphic Equaliser	131s
Crown	Class D Amplifier	XLS 1502
Ntek	Rotating microphone boom	MB01
Bruel & Kjaer	Omni directional loud speaker	4296
QSC Audio	Power Amplifier	RMX 1450
National Geographic	Temperature & Humidity & Probe	9070600

A5. References

BS EN ISO 717-1:2020 — Rating of sound insulation in buildings and of building elements. Part 1: Airborne Sound Insulation.

BS EN ISO 10140-2:2021 — Laboratory measurement of sound insulation for building elements. Part 2: Measurement of airborne sound insulation.

Appendix B – Test Procedure

Measurement of Sound Transmission in Accordance With BS EN ISO 10140-2 – 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 block dividing wall between the two rectangular reverberant or acoustically "live" rooms, both of which are constructed from blockwork with reinforced concrete floors and roofs. The block wall has dimensions of 4.18m wide x 2.62m 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 62.3 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 50.1 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

L_1 is the equivalent sound pressure level in the source room, dB

L_2 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:

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

where

S is the area of the sample, m^2

A is the total absorption in the receiving room, m^2

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 from the results of laboratory tests carried out in accordance with BS EN ISO 10140-2.

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Appendix C – Measurement Uncertainty

TP33 - Measurement Uncertainty BS EN ISO 10140-2

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, ± 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

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Lab & Site Testing
Monitoring
Noise & Vibration
Odour & Dust
Sustainability

Acoustics

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Air Quality

We offer a comprehensive service to model, monitor and analyse air quality, delivering assessments for a broad range of projects and purposes, for both private and public sector clients.

Carbon & Net Zero

Top of the agenda is tackling energy and carbon reduction to limit the impact of climate change. Our team of consultants will help you to achieve your sustainability objectives.

Lab & Site Testing

Design based on test data will always achieve the best results – and that's why we offer a wide range of acoustic testing at our independently accredited laboratories, as well as on-site testing to support live projects.

Monitoring

Our specialist services to monitor and assess noise, vibration, dust, air quality and odour employ the latest technology to provide remote access to data, helping to address issues quickly and to protect our clients.

Noise & Vibration

Ensuring noise and vibration does not exceed agreed levels is an important part of our environmental management services, using state-of-the-art technology to access real-time data remotely, to enable swift remedial action if required.

Odour & Dust

As part of our portfolio of environmental monitoring services, we offer specialist advice on the adverse impact of dust and odour across a range of projects including construction, waste handling and mineral extraction.

Sustainability

Minimising the impact on the environment is at the centre of today's business objectives. Our specialist services help our clients to fulfil their obligations, whether it's a BREEAM assessment, Energy Carbon Reduction or Net Zero.