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CANTERBURY ACOUSTIC TESTING SERVICES

Sound Insulation Test Report

Report number: 2024-274

ISO 15186-1 Acoustics — Measurement of sound insulation in buildings and of building elements using sound intensity — Part 1: Laboratory measurements

Client:	XFrame Pty Limited
Address:	XFrame Pty Limited 1 Tonsley Blvd, Tonsley, South Australia 5024
Test Date:	**T1:** 25/07/2024, **T2:** 26/07/2024
Issue Date:	31/07/2024
Test specimen trade name:	XFrame Wall Panel
Sample description:	**Test 1:** **Receiving side:** 12mm MDF facing screw fixed to 18 mm MDF (720 kg/m^3) on XF Clips – Flush, 92 mm insulated XFrame Wall Panel. **Source side:** 12mm MDF facing screw fixed to 18 mm MDF (720 kg/m^3) on XF010 Clips and rubber clip, mounted to XFrame Wall Panel. **Test 2:** **Receiving side:** 18 mm MDF (720 kg/m^3) on XF Clips – Flush, 92 mm insulated XFrame Wall Panel. **Source side:** 12mm MDF facing screw fixed to 18 mm MDF (720 kg/m^3) on XF010 Clips and rubber clip, mounted to XFrame Wall Panel.
Sample size:	11.52m^2
Sample mass:	Test 1 leaf panels: 45 kg/m^2 (calculated) Test 2 leaf panels: 36 kg/m^2 (calculated)
Test facility:	Canterbury Acoustic Testing Services Ltd, 176 Hazeldean Road, Addington, Christchurch 8024, New Zealand
Test room description:	Described in Appendix: 1, and depicted in Appendix: 2 Figure 1
Sample mounting:	Described in Appendix: 1 and depicted in Appendix: 2 Figure 2

Test Conditions:

Air Temperature (deg ^{0}C)	15.9
Relative Humidity (R/H) %	44.6
Barometric pressure (atm) kPa	102

Comments:

1. The test results presented refer only to the test specimens and prevailing conditions on the day of the measurements and may or may not be representative of a different batch of material.
2. All measurements have been carried out in accordance with the relevant ISO standards.
3. The sound transmission class (STC) has been calculated to ASTM E413-16, although not part of the ISO group of standards.

Standards used and referred to in this report is as follows:

- ISO 15186-1: 2000
- ISO 9614-1: 1993
- ISO 10140-1: 2016
- ISO 10140-2: 2010
- ISO 10140-5: 2010
- ISO 717-1:2020
- ASTM E413-10

Approval: Mike Latimer

Acoustic Lab Lead
Canterbury Acoustic Testing Services Ltd — 31/07/2024

Reviewed: Sebastion Yeoman

Acoustic Lab assistant
Canterbury Acoustic testing Services Ltd — 31/07/2024

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Measurement Results:

Report number: 2024-274

Sound reduction index, R_i, in accordance with ISO 10140-2

Client: XFrame Pty Limited

Product identification: Test 1, XFRAME – 12mm + 18mm + 92mm + Rubber Clip +18mm + 12mm offset

Manufacturer: XFrame

Test room identification: Sound intensity measurement room

Test element mounted by: Angus Interiors

Date of test: 25/07/2024

Area, *S*, of test element: 11.52 m^2

Mass per unit area (linings only): 45 kg/m^2

Air temp. in the test rooms: 20.2 °C

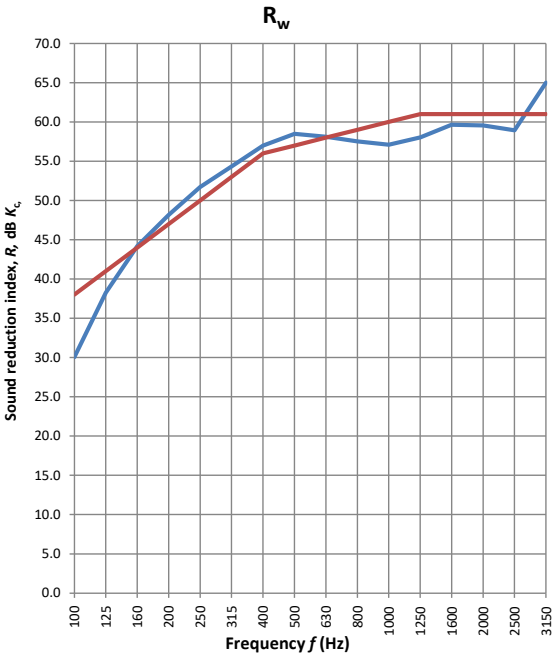
Relative humidity in the test rooms: 25 %

Static pressure: 101.3 kPa

Receiving room volume: 220 m^3

NB: Refer to full test report for detailed sample description

Frequency f (Hz)	*PI index*	*Intensity (dB)*	*R_i one-third octave (dB)*
100	1.85	48.95	30.0
125	4.15	59.10	38.3
160	6.00	64.25	44.2
200	4.30	60.80	48.2
250	4.50	59.30	51.7
315	5.50	59.75	54.3
400	5.10	58.85	57.0
500	4.60	57.75	58.5
630	4.30	53.65	58.1
800	4.50	47.60	57.5
1000	4.35	44.25	57.1
1250	3.65	42.40	58.0
1600	3.50	41.75	59.6
2000	3.70	41.35	59.6
2500	4.05	37.85	58.9
3150	5.05	36.95	65.0
4000	6.45	35.55	73.2
5000	6.05	34.50	83.2



Key

R_i sound reduction, (intensity) index, in dB

f frequency, in Hz

Frequency range for rating in accordance with the curve of reference values ISO 717-1 R_w, ASTM E413-87 STC

Bolded values are used to calculate R_w and STC

Rating in accordance with ISO 717-1:

$R_w\ 57\ (C;\ C_{tr}) = (-2;\ -9)\ R_w + C_{tr} = 48$

Rating according to ASTM E413-87

Sound Transmission Class (STC) 58

No. of test report: 2024-274

Name of test institute: Canterbury Acoustic Testing Services

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ACOUSTIC TESTING SERVICES

Measurement Results:

Report number: 2024-274

Sound reduction index, R_i, in accordance with ISO 10140-2

Client: XFrame Pty Limited

Product identification: Test 2, XFRAME – 18mm + 92mm + Rubber Clip +18mm + 12mm offset

Manufacturer: XFrame

Test room identification: Sound intensity measurement room

Test element mounted by: Angus Interiors

Date of test: 26/07/2024

Area, *S*, of test element: 11.52 m^2

Mass per unit area (linings only): 36 kg/m^2

Air temp. in the test rooms: 20.2 °C

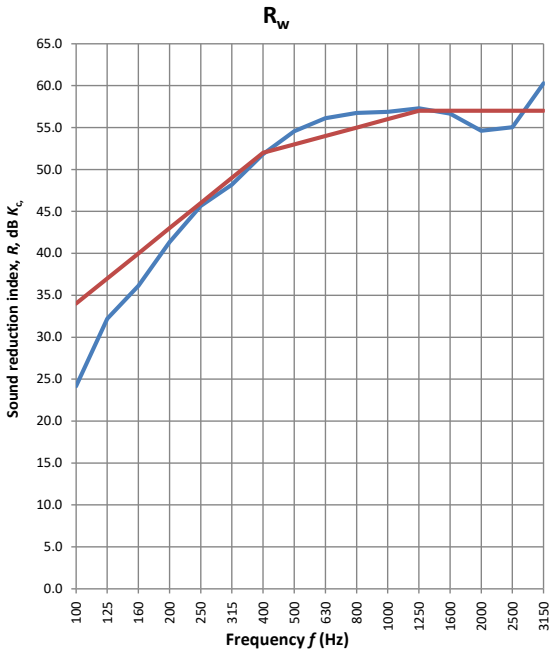
Relative humidity in the test rooms: 25 %

Static pressure: 101.3 kPa

Receiving room volume: 220 m^3

NB: Refer to full test report for detailed sample description

Frequency f (Hz)	*PI index*	*Intensity (dB)*	*R_i one-third octave (dB)*
100	4.00	66.25	24.1
125	4.40	65.25	32.2
160	5.50	67.80	36.1
200	5.00	65.65	41.3
250	4.60	63.75	45.7
315	4.35	59.85	48.2
400	4.55	52.80	51.9
500	5.10	48.20	54.6
630	4.95	44.35	56.1
800	4.70	42.60	56.7
1000	4.80	41.60	56.9
1250	5.30	38.85	57.3
1600	6.15	40.30	56.7
2000	5.70	40.80	54.6
2500	4.35	38.50	55.1
3150	3.90	30.75	60.3
4000	4.35	23.25	66.1
5000	7.45	15.00	71.8



Key

R_i sound reduction, (intensity) index, in dB

f frequency, in Hz

Frequency range for rating in accordance with the curve of reference values ISO 717-1 R_w, ASTM E413-87 STC

Bolded values are used to calculate R_w and STC

Rating in accordance with ISO 717-1:

$$R_w\ 53\ (C;\ C_{tr}) = (-4;\ -10)\ R_w + C_{tr} = 43$$

Rating according to ASTM E413-87

Sound Transmission Class (STC) 54

No. of test report: 2024-274

Name of test institute: Canterbury Acoustic Testing Services

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Appendix 1: Methodology

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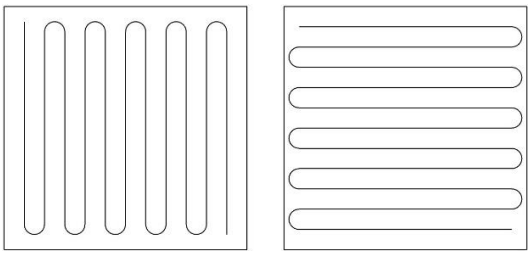
Facility:	**The source room:** Is a reverberation room at the Canterbury Acoustic Testing Lab facility, 180 Hazeldean Road, Christchurch, New Zealand. It is a cuboid shape chamber. Constructed in accordance with AS ISO 354 - 2006. Subsections 6.1.1 Volume of reverberation room, and 6.1.2 Shape of reverberation room, of the following dimensions, 7.7 L x 6.1 W x 4.7 H m. The room has a cubic volume of 220 m^3 and internal surface area of 223.66 $m^{2,}$ as shown in Appendix: 2, Figure 1. **The receiving room:** Consists of an opening of 2.4 x 4.8 m at one end. A semi anechoic room is attached to the front of the reverberation room, which is 5.246 L x 2 W x 3.11 H. The room has a volume of 32.63 m^3 and an internal surface area of 66.06 m^2. The internal surfaces of the room are covered with 100 mm sound absorption material. The sample is mounted into a steel test collar filled with concrete, as shown in Appendix 2: Figure 2.
Sample Mounting:	The sample was mounted in the steel test collar of the reverberation room, as shown in Figure 2. The perimeter of the sample was sealed and flashed to control any flanking leakage. Construction of the wall system is shown in Appendix: 2, Figure 3,Figure 4,Figure 5,Figure 6.
Measurement Method:	**Generation of sound field:** The test signal used was random pink noise, generated by an Apollo six channel analyser system. The signal was fed through a mixer then amplifier to two omnidirectional speakers, placed in opposite corners of the source room, to excite the sound field in the room. **Receipt of Signal:** The direct sound intensity method was used in accordance with ISO 15186-1 Acoustics — Measurement of sound insulation in buildings and of building elements using sound intensity — Part 1: Laboratory measurements. The test sample was measured using the scanning procedure in a horizontal and vertical pattern.  Scan Pattern This was measured, using an Apollo Analyser attached to a Sinus intensity probe, running Samurai sound intensity software. The measurement data was exported to a PC in the form of pressure and intensity levels for further analysis and calculation of the STL. **Source room receipt of signal:** The sound pressure levels in the source (reverberation room) were measured according to ISO 10140-4 using 6 microphones at 6 locations, connected to the Apollo data acquisition unit in the control room.
Measurement Calculation: **Adaption term K_c**	**Adaption term K_c:** It is generally recognised that there is a difference between the sound reduction index determined by the sound intensity method ISO 15186 (all parts) and that measured by traditional methods (ISO 140-3, ISO 140-4, and ISO 140-10) at low frequencies. ISO 140 has now been superseded by the ISO 10140 series. Measurements for this set of samples was carried out in accordance with the new standard. If the intensity results are to be compared to results measured using the traditional method, then the intensity results should be adjusted, giving the modified apparent intensity sound reduction index, refer to Appendix 3: Measurement calculation.

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Appendix 1: Methodology

Report number 2024-274

Instrumentation:

Description	Manufacture	Model	Calibration	Serial number
Analyser (intensity)	Sinus	Apollo Box 2 channel	19/11/2022	7568
Analysers (source room)	Sinus	Apollo Box 2 and 4 channel	04/04/2022	7591, 7569
Intensity probe	Sinus	Microtech Gefell SIS190 Intensity Probe, Microtech Gefell HG90 probe handle	19/11/2022	Nr 0203
Calibrator	Larson Davis	CAL200	15/11/2022	9063
Noise source	Norsonic Bruel& Kjaer	NOR276 OmniPower 4296		2766177 2071500
Amplifier	BETA 3	UA330		
Mixer	Yamaha	MG06X		
Microphones	Microtech Gefell	MK290E K1, K2 (intensity probe) MK255	19/11/22 19/11/22	18114, 18119 10007, 10014
	G.R.A.S	46AE	24/11/23	196169, 184222, 183512, 183079

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Appendix: 2 Figures

Report number 2024-274

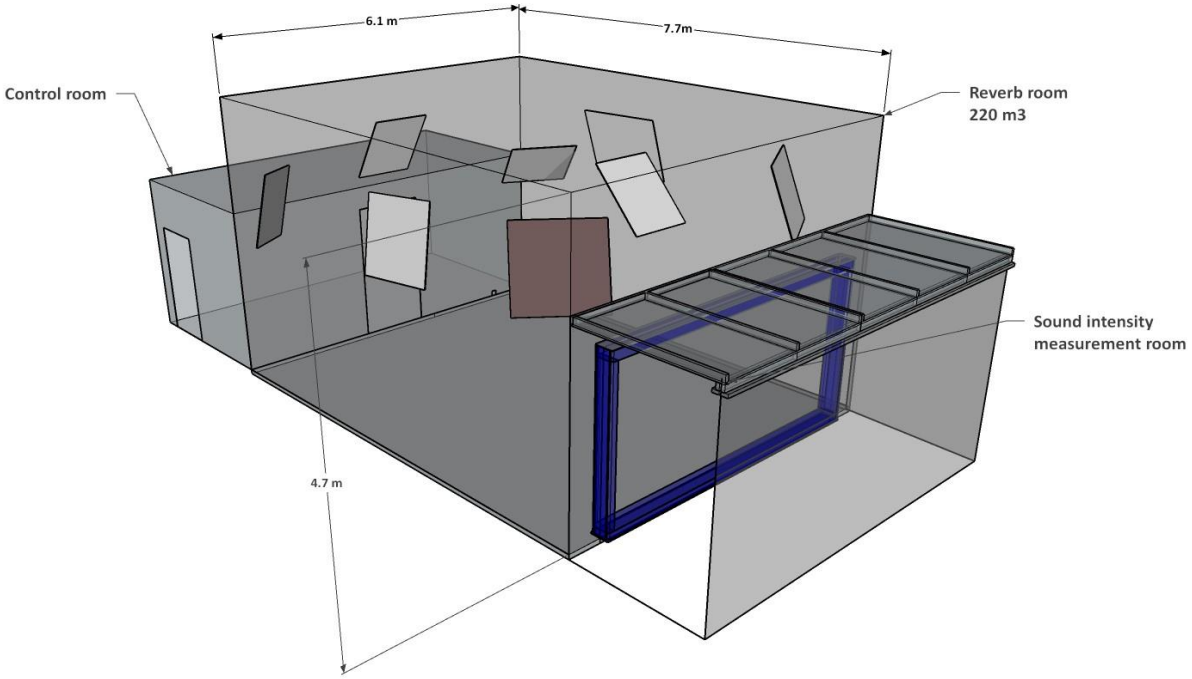

Figure 1 - Test facility layout

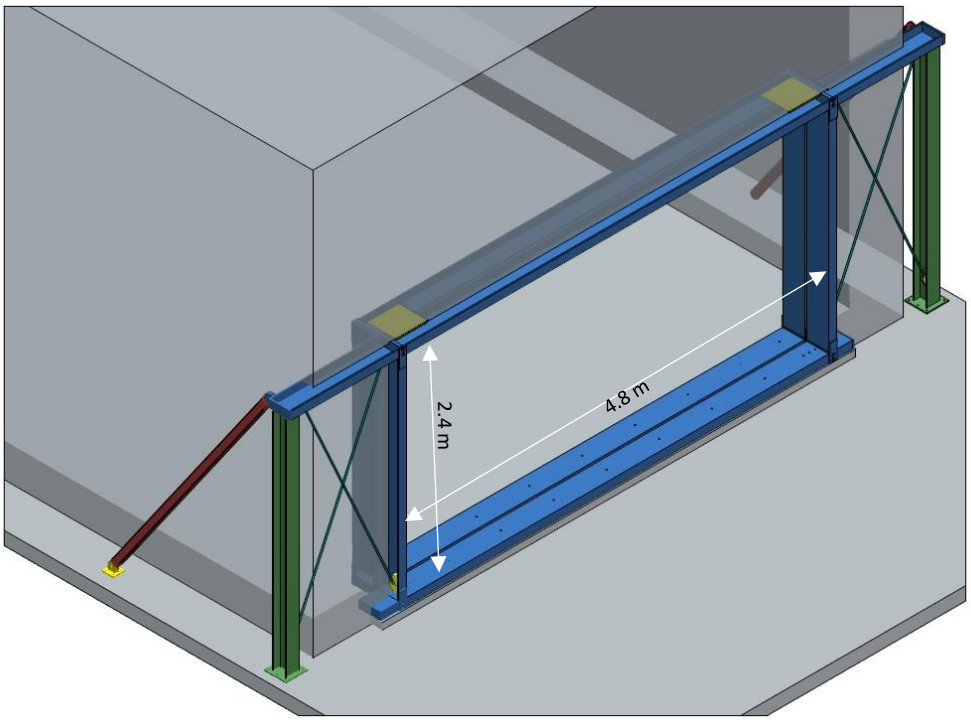

Figure 2 - Test collar

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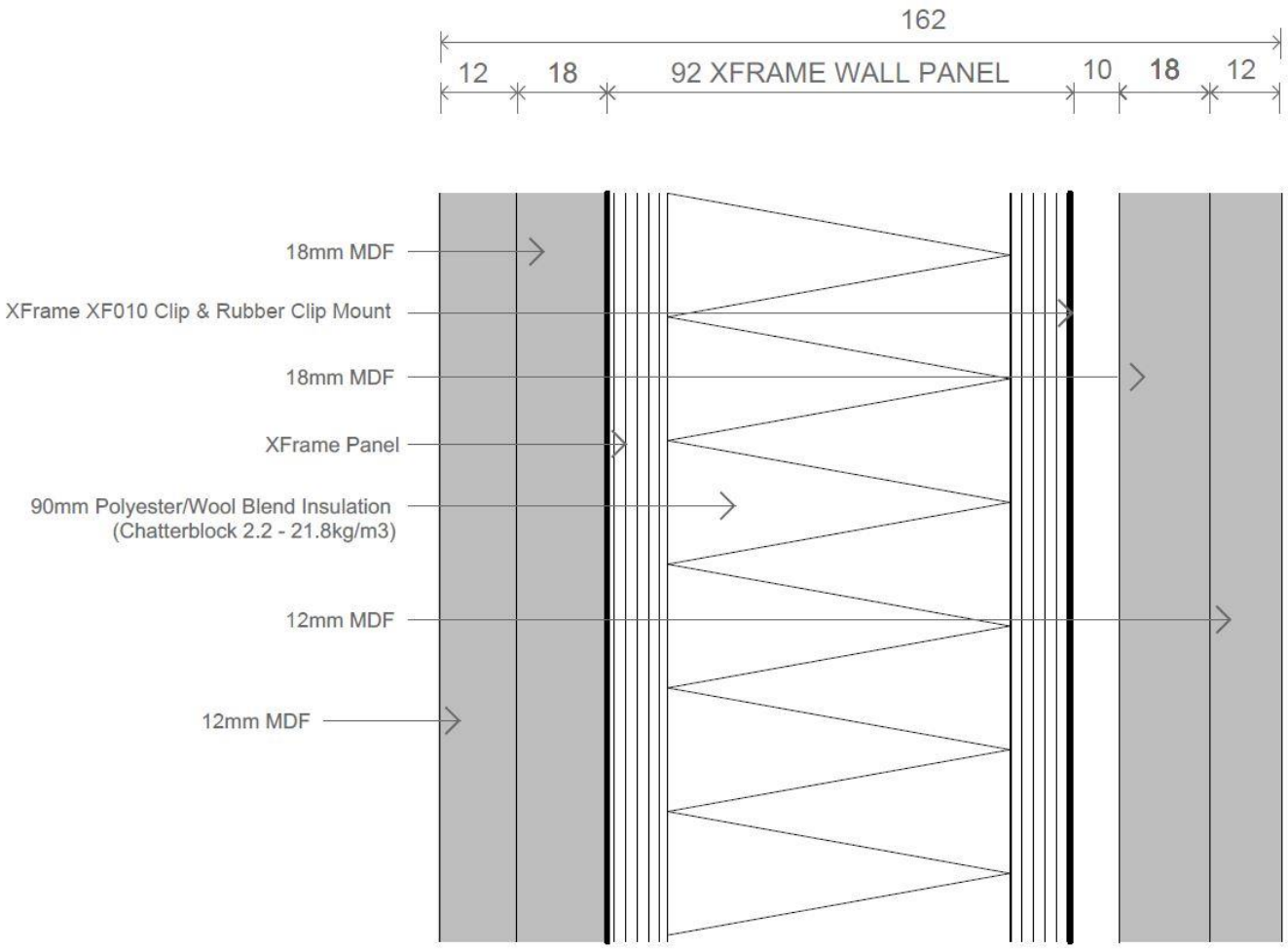

Figure 3 - Test wall 1 construction

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Appendix: 2 Figures

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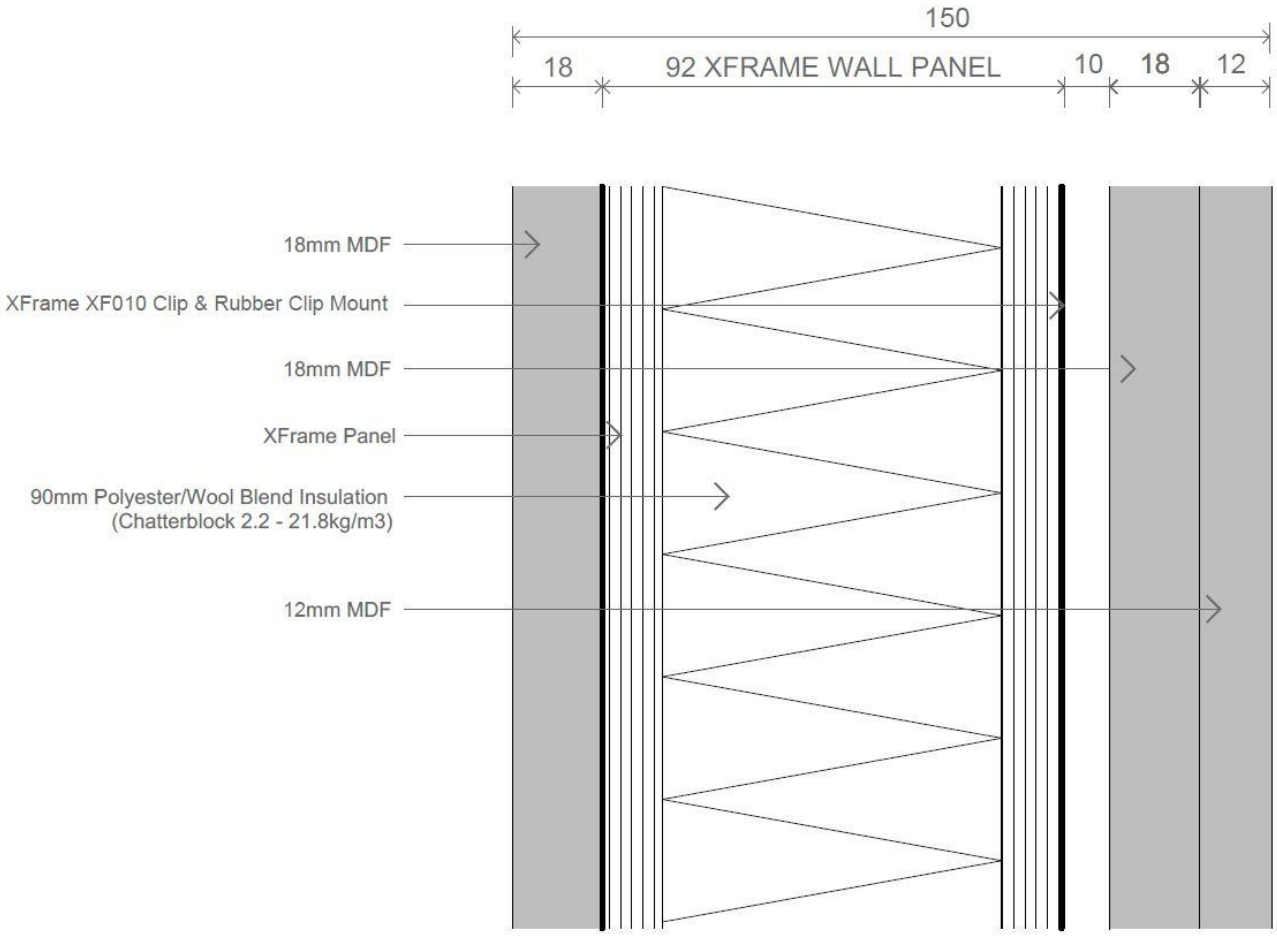

Figure 4 - Test wall construction 2

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Figure 5 - Sample construction source side

Figure 6 - Sample construction receiving side finished

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Adaption term K_c

ISO 15186-1:2000(E) Annex B, states the following adaption correction shall be used.

Adaption term K_c

For the purposes of this part of ISO 15186, the following values of K_c shall be used.

Whenever the traditional measurements according to ISO 140-3 have been taken in a well-defined receiving room:

$$K_c = 10\lg\left(1+\frac{S_{b2}\lambda}{8V_2}\right)\text{dB} \qquad \text{(B.1)}$$

where

S_{b2} is the area of all the boundary surfaces in the receiving room;

V_2 is the volume of the receiving room;

λ is the wavelength of the midband frequency.

Whenever the traditional measurements according to ISO 140-3 have been taken in a room which is not well defined, K_c is given by Table B.1.

K_c can also be calculated from

$$K_c = 10\lg\left(1+\frac{61{,}4}{f}\right) \qquad \text{(B.2)}$$

where f is the the midband frequency of the one-third-octave band.