SRL

UKAS TESTING
0444

Technical Report
C/23410/T01

Project

The Laboratory Measurement of Sound Insulation of Various Windows and a Door-Set

Prepared for

Westbury Windows and Joinery Ltd

By

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Quality Assurance

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Client	Westbury Windows and Joinery Ltd
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Checker	George Thomson
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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 insulation materials 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 5.

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.

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Contents

1.0 Details of Measurements

1.1 Location

Sound Research Laboratories

Holbrook House

Little Waldingfield

Sudbury

Suffolk

CO10 0TF

1.2 Test Dates

1 and 2 February 2017

1.3 Tester

Allen Smalls of SRL Technical Services Limited

1.4 Instrumentation and Apparatus Used

Make	Description	Type
E D I	Microphone Multiplexer	
	Microphone Power Supply Unit	
Norwegian Electronics	Real Time Analyser	830
	Rotating Microphone Boom	231

Brüel & Kjaer	Windshields	UA0237
	Pre Amplifiers	2669C
	Microphone Calibrator	4231
	Omnipower Sound Source	4296
Larson Davis	12mm Condenser Microphone	2560, 377A60
SRL	Loudspeakers	100w
Oregon Scientific	Temperature & Humidity & Probe	THGR810
TOA	Graphic Equalizer	E-1231
QSC Audio	Power Amplifier	RMX 1450

1.5 References

BS EN ISO 717-1:2013	Rating of sound insulation in buildings and of building elements. Airborne Sound Insulation.
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 windows & a French door. See Drawings and Data sheets for more details.

Sampling plan:	Enough for test
Sample condition:	New
Details supplied by:	Westbury Windows and Joinery Ltd
Sample installed by:	Westbury Windows and Joinery Ltd

2.2 Sample Delivery date

30 January 2017

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 5 and summarised below.

Results relate only to the items tested.

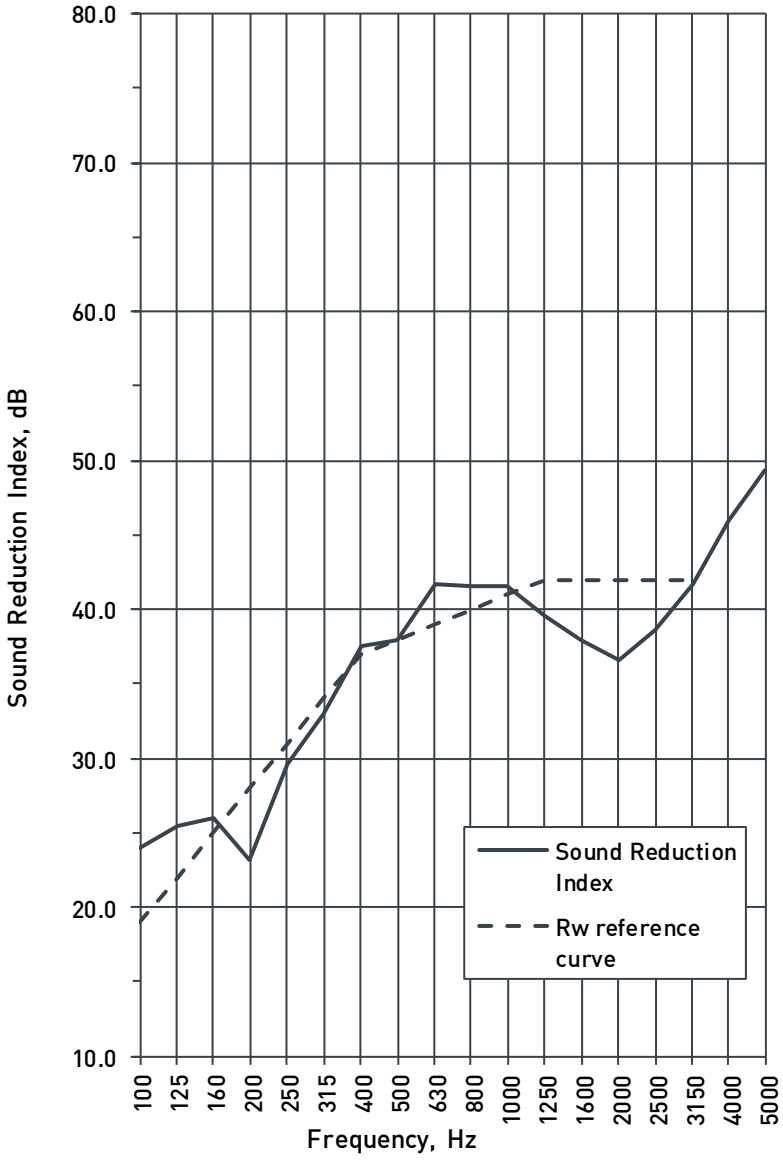
SRL Test No.	Description in Brief	R_w ($C;C_{tr}$)
2	Westbury Casement window. 6mm toughened – 14mm spacer – 8.8mm Laminate	38 (-1;-4)
5	Westbury Sliding box sash with weight. 6mm toughened – 14mm spacer – 8.8mm Laminate	35 (-1;-2)
6	Westbury Sliding box sash with weights. 6mm toughened – 16mm spacer – 6.8mm Laminate	33 (-1;-2)
8	Westbury Solid frame spring balance sliding sash. 6mm toughened – 14mm spacer – 8.8mm Laminate	36 (-1;-3)
9	Westbury French door. 6mm toughened – 14mm spacer – 8.8mm laminate	38 (-1;-4)

Data Sheet 1

Test Number:	2
Client:	Westbury Joinery
Test Date:	01/02/2017
Sample Height:	1.505 m
Sample Width:	1.255 m
Sample Weight:	n/a kg/m²
Product Identification:	Casement window

Test Room:	**Source**	**Receiving**
Air Temperature:	10.9 °C	12 °C
Air Humidity:	75 %	68 %
Volume:	115 m³	300 m³
Air Pressure:	1000 mbar	

Freq, f Hz	Sound Reduction Index, dB	
	⅓ Oct	Octave
50+	25.8	24.7
63+	23.7	
80+	24.8	
100	24.0	25.1
125	25.5	
160	26.0	
200	23.2	26.7
250	29.6	
315	33.0	
400	37.5	38.7
500	38.0	
630	41.7	
800	41.6	40.8
1000	41.6	
1250	39.5	
1600	38.0	37.6
2000	36.6	
2500	38.6	
3150	41.7	44.6
4000	46.0	
5000	49.3	
6300+	52.2	49.2
8000+	51.5	
10000+	46.3	
Average 100-3150	34.8	Version v3.0



Rating according to BS EN ISO 717-1:2013

$R_w(C;C_{tr})$= 38 (-1 ; -4) dB

* shows measurement corrected for background

> shows measurement limited by background

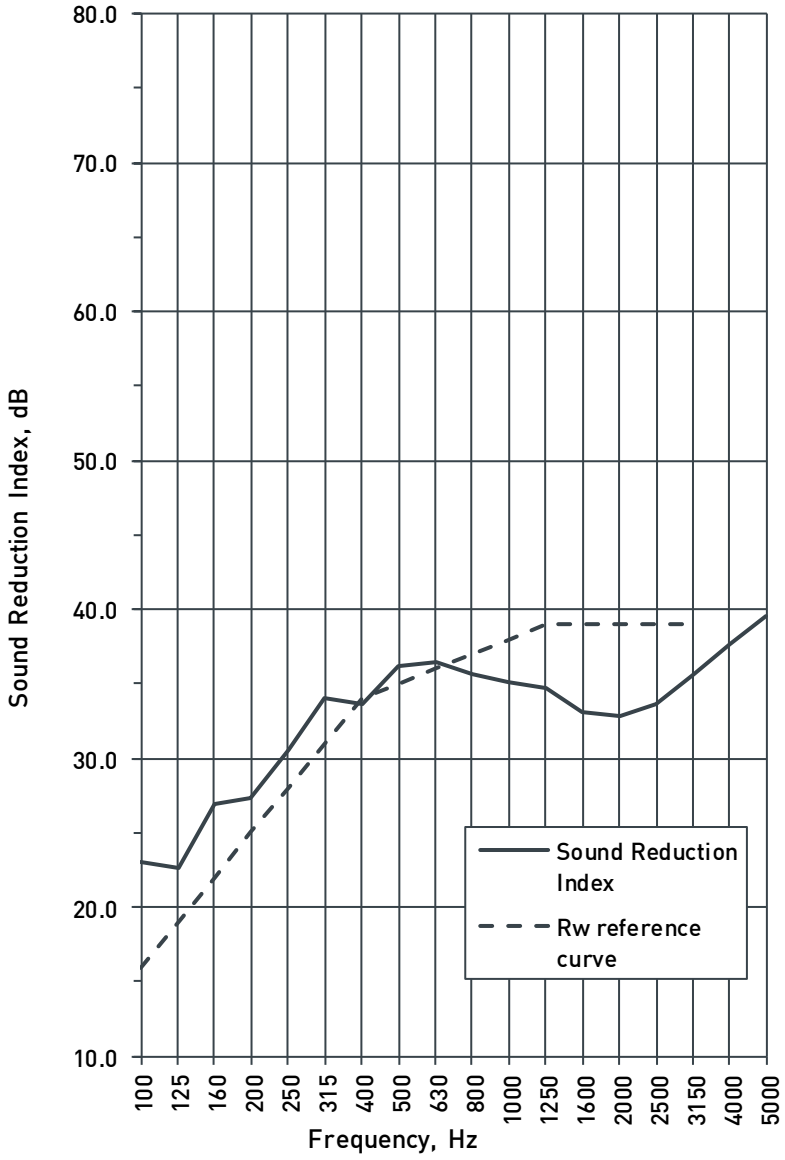
\+ shows Frequency beyond standard and not UKAS accredited

Data Sheet 2

Test Number:	5	**Test Room:**	**Source**	**Receiving**
Client:	Westbury Joinery	**Air Temperature:**	11 °C	12 °C
Test Date:	01/02/2017	**Air Humidity:**	78 %	72 %
Sample Height:	1.505 m	**Volume:**	115 m³	300 m³
Sample Width:	1.255 m			
Sample Weight:	n/a kg/m²	**Air Pressure:**		998 mbar

Product Identification: Sliding box sash with weight / 8.8+6mm glass

Freq, f Hz	Sound Reduction Index, dB	
	⅓ Oct	Octave
50+	27.8	25.5
63+	24.8	
80+	24.6	
100	23.0	23.8
125	22.6	
160	27.0	
200	27.4	29.8
250	30.5	
315	34.0	
400	33.7	35.3
500	36.2	
630	36.5	
800	35.6	35.1
1000	35.1	
1250	34.7	
1600	33.1	33.1
2000	32.8	
2500	33.6	
3150	35.7	37.4
4000	37.7	
5000	39.6	
6300+	44.1	44.5
8000+	44.8	
10000+	44.6	
Average 100-3150	32.0	Version v3.0



Rating according to BS EN ISO 717-1:2013

$R_w(C;C_{tr})$= **35 (-1 ; -2) dB**

* shows measurement corrected for background

> shows measurement limited by background

\+ shows Frequency beyond standard and not UKAS accredited

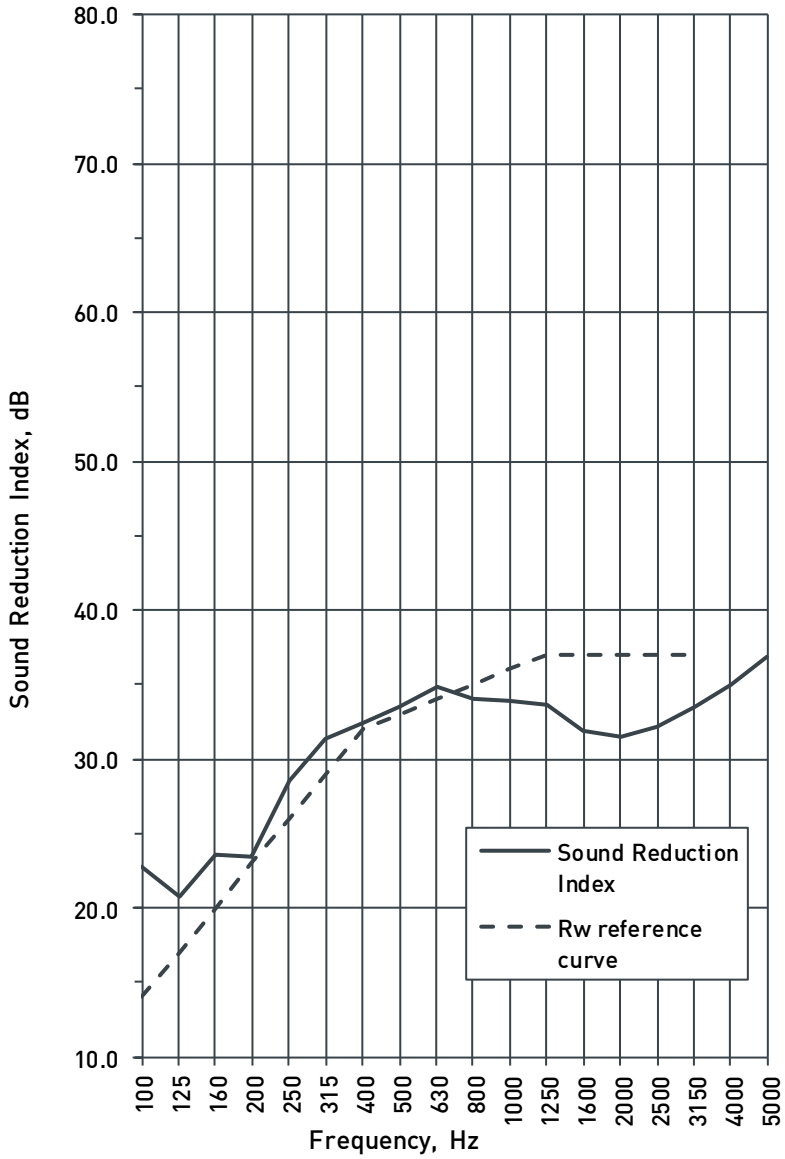
Data Sheet 3

Test Number:	6
Client:	Westbury Joinery
Test Date:	01/02/2017
Sample Height:	1.505 m
Sample Width:	1.255 m
Sample Weight:	n/a kg/m²

	Source	**Receiving**
Test Room:		
Air Temperature:	11 °C	12.1 °C
Air Humidity:	79 %	72 %
Volume:	115 m³	300 m³
Air Pressure:		998 mbar

Product Identification: Sliding box sash with weights / glass 6.8+6mm

Freq, f Hz	Sound Reduction Index, dB	
	⅓ Oct	Octave
50+	25.9	24.4
63+	23.6	
80+	24.1	
100	22.8	22.2
125	20.8	
160	23.6	
200	23.5	26.6
250	28.6	
315	31.4	
400	32.5	33.5
500	33.5	
630	34.8	
800	34.0	33.9
1000	33.9	
1250	33.7	
1600	31.9	31.9
2000	31.5	
2500	32.2	
3150	33.5	34.9
4000	35.0	
5000	36.8	
6300+	42.3	43.2
8000+	43.2	
10000+	44.4	
Average 100-3150	30.1	Version v3.0



Rating according to BS EN ISO 717-1:2013

$R_w(C;C_{tr})$= 33 (-1 ; -2) dB

* shows measurement corrected for background

> shows measurement limited by background

\+ shows Frequency beyond standard and not UKAS accredited

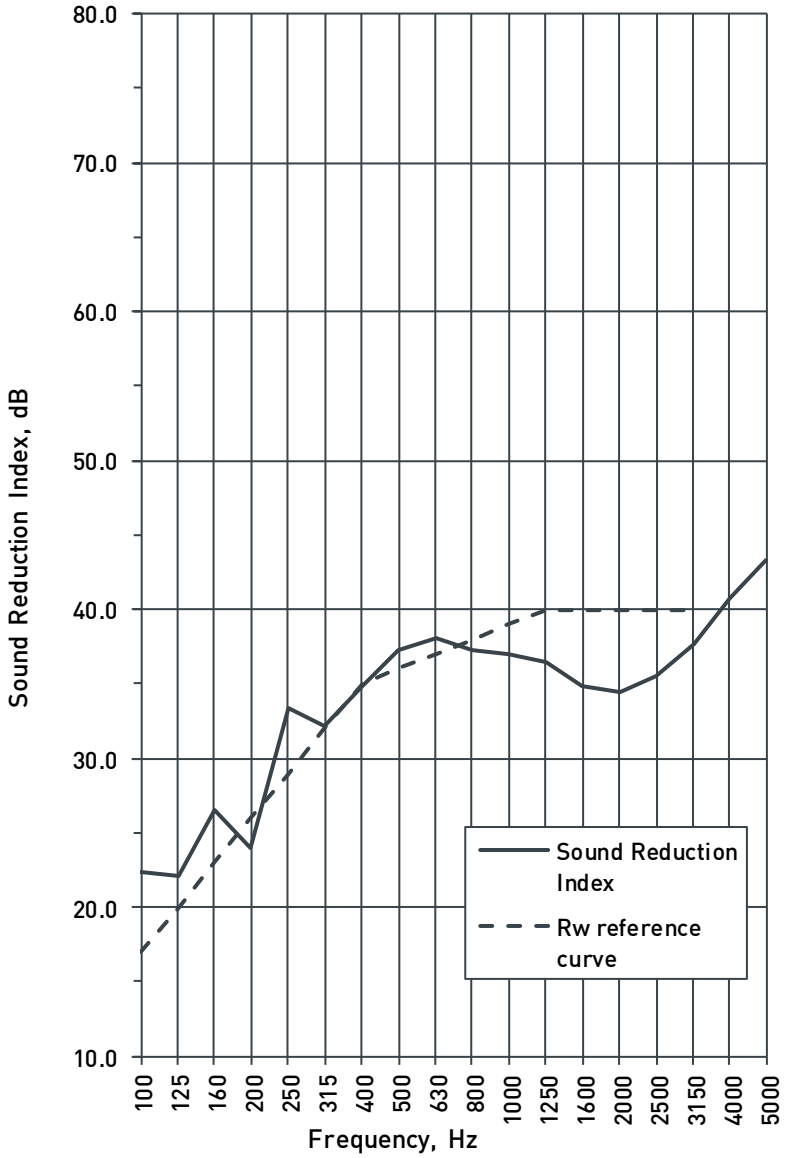
Data Sheet 4

Test Number:	8
Client:	Westbury Joinery
Test Date:	02/02/2017
Sample Height:	1.505 m
Sample Width:	1.255 m
Sample Weight:	n/a kg/m²

	Source	**Receiving**
Test Room:		
Air Temperature:	10.9 °C	11.7 °C
Air Humidity:	75 %	71 %
Volume:	115 m³	300 m³
Air Pressure:		991 mbar

Product Identification: Solid frame spring balance sliding sash

Freq, f Hz	Sound Reduction Index, dB	
	⅓ Oct	Octave
50+	26.8	24.3
63+	25.7	
80+	21.9	
100	22.4	23.3
125	22.1	
160	26.5	
200	24.0	27.8
250	33.4	
315	32.2	
400	34.9	36.5
500	37.3	
630	38.1	
800	37.3	36.9
1000	37.0	
1250	36.5	
1600	34.9	35.0
2000	34.5	
2500	35.5	
3150	37.7	40.0
4000	40.7	
5000	43.3	
6300+	48.1	47.5
8000+	48.8	
10000+	46.0	
Average 100-3150	32.8	Version v3.0



Rating according to BS EN ISO 717-1:2013

$R_w(C;C_{tr})$= 36 (-1 ; -3) dB

* shows measurement corrected for background

> shows measurement limited by background

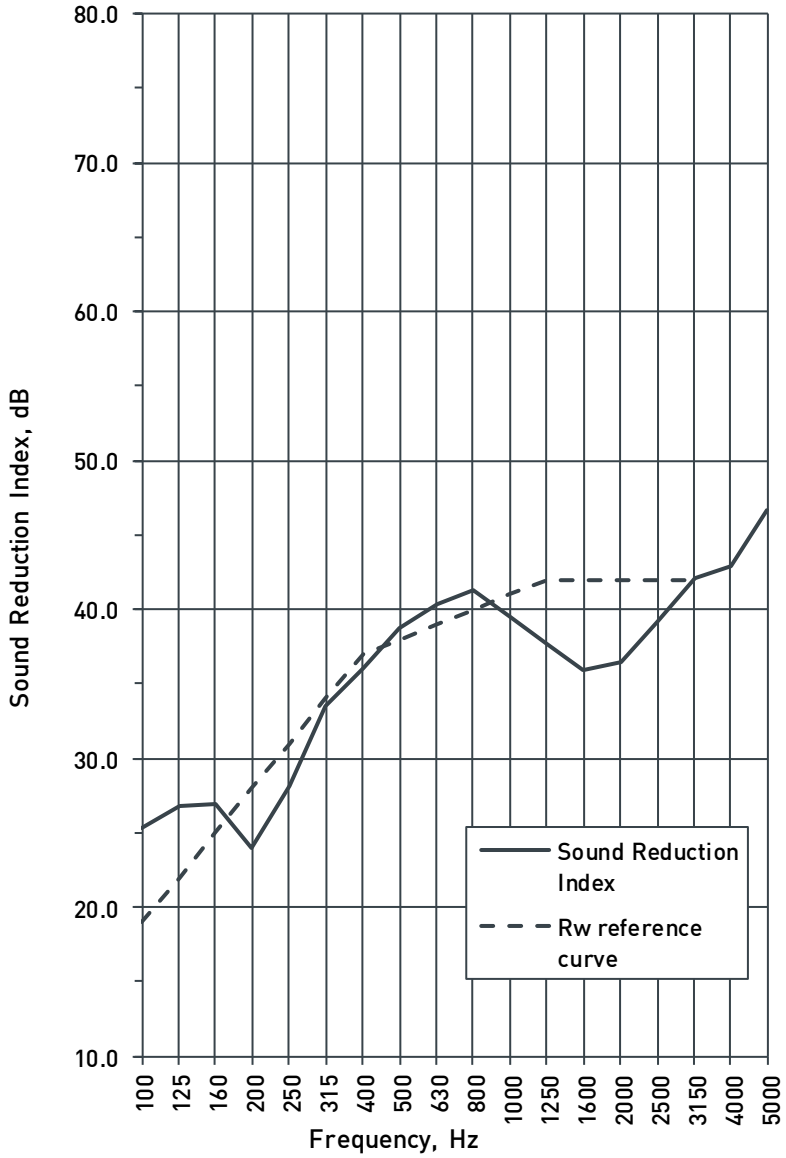
\+ shows Frequency beyond standard and not UKAS accredited

Data Sheet 5

Test Number:	9
Client:	Westbury Joinery
Test Date:	02/02/2017
Sample Height:	2.13 m
Sample Width:	1.255 m
Sample Weight:	n/a kg/m²
Product Identification:	French door

Test Room:	**Source**	**Receiving**
Air Temperature:	11.2 °C	11.7 °C
Air Humidity:	76 %	73 %
Volume:	115 m³	300 m³
Air Pressure:	990 mbar	

Freq, f Hz	Sound Reduction Index, dB	
	⅓ Oct	Octave
50+	30.2	24.3
63+	24.8	
80+	21.6	
100	25.3	26.3
125	26.8	
160	27.0	
200	24.0	27.0
250	28.1	
315	33.5	
400	36.1	38.1
500	38.8	
630	40.4	
800	41.3	39.3
1000	39.6	
1250	37.7	
1600	35.9	36.9
2000	36.4	
2500	39.1	
3150	42.1	43.5
4000	42.9	
5000	46.7	
6300+	49.9	48.9
8000+	49.9	
10000+	47.4	
Average 100-3150	34.5	Version v3.0



Rating according to BS EN ISO 717-1:2013

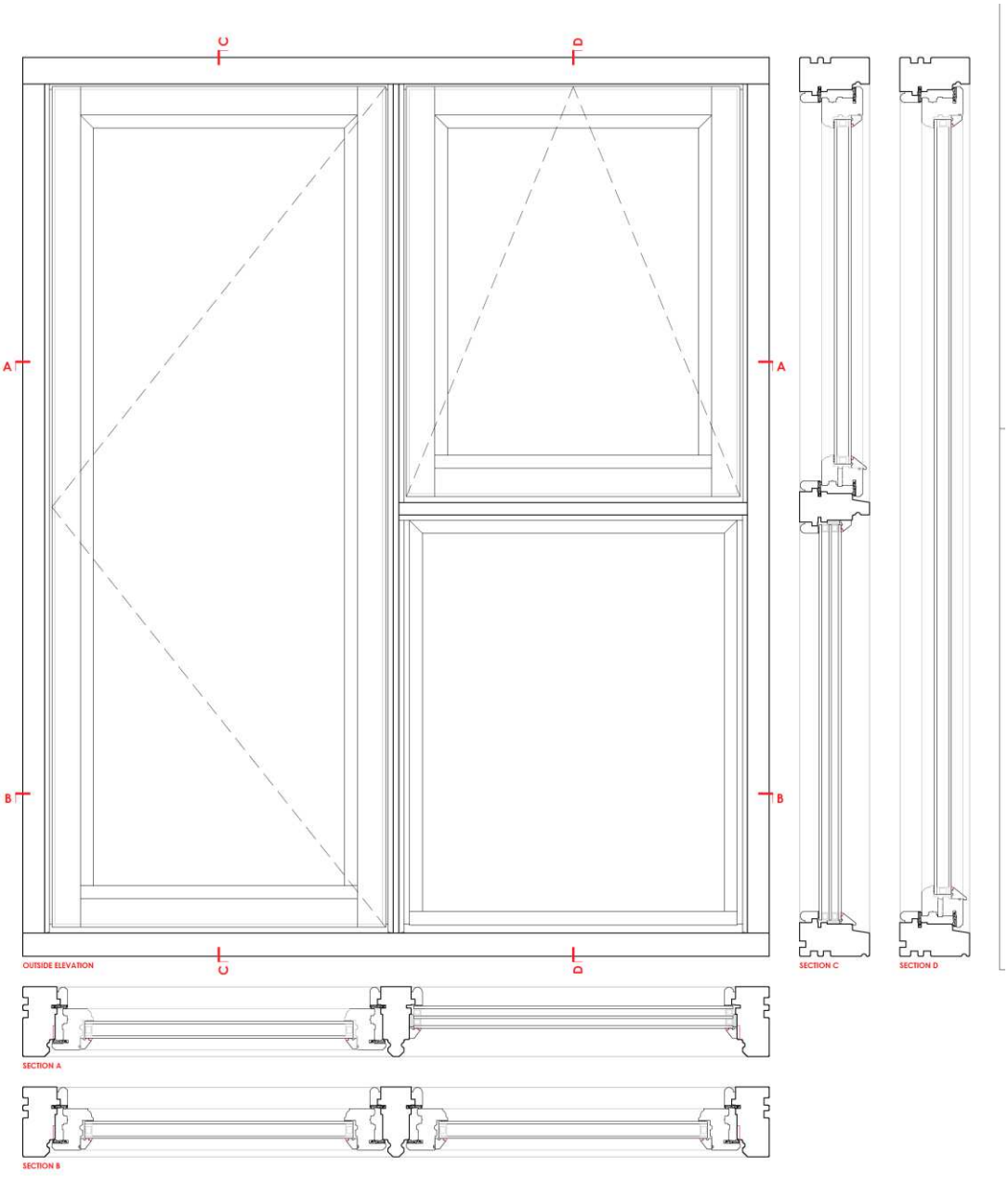
$R_w(C;C_{tr})$= 38 (-1 ; -4) dB

* shows measurement corrected for background

> shows measurement limited by background

\+ shows Frequency beyond standard and not UKAS accredited

Drawing 1 – Westbury Casement



NOTE
DIRECT GLAZE INTO FRAME IS ALWAYS TRIPLE GLAZE TO MAINTAIN BEAD LINE.

WESTBURY WINDOWS&JOINERY

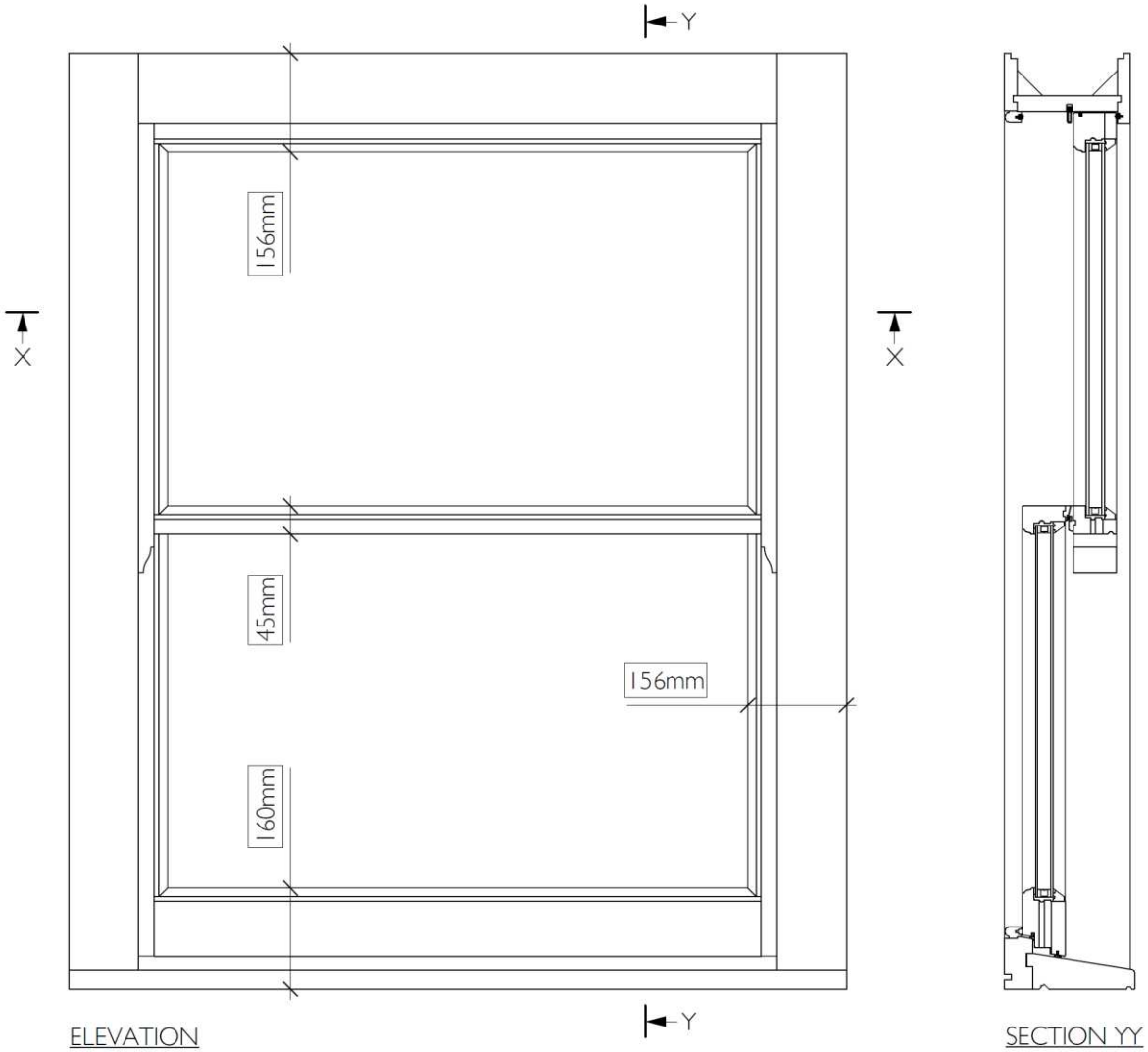
NEW JOINERIES: WINDOWS - HERITAGE SERIES
FRAME 115-174-199 / RAIL&STILES 68-54

WESTBURY
WINDOWS & JOINERY

HOUSE STYLE FRICTION HINGE
(HF115W/HSH68/GL28)

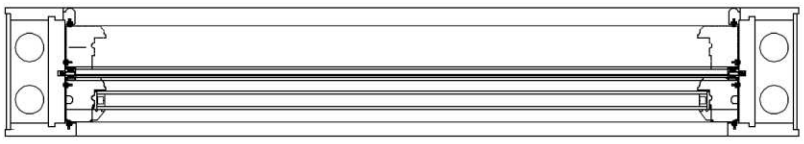
SECTION	FIELD	TYPE	NUMBER	REVISION
B	DEF	EL	HW1	B

Drawing 2 – Westbury Box Sash



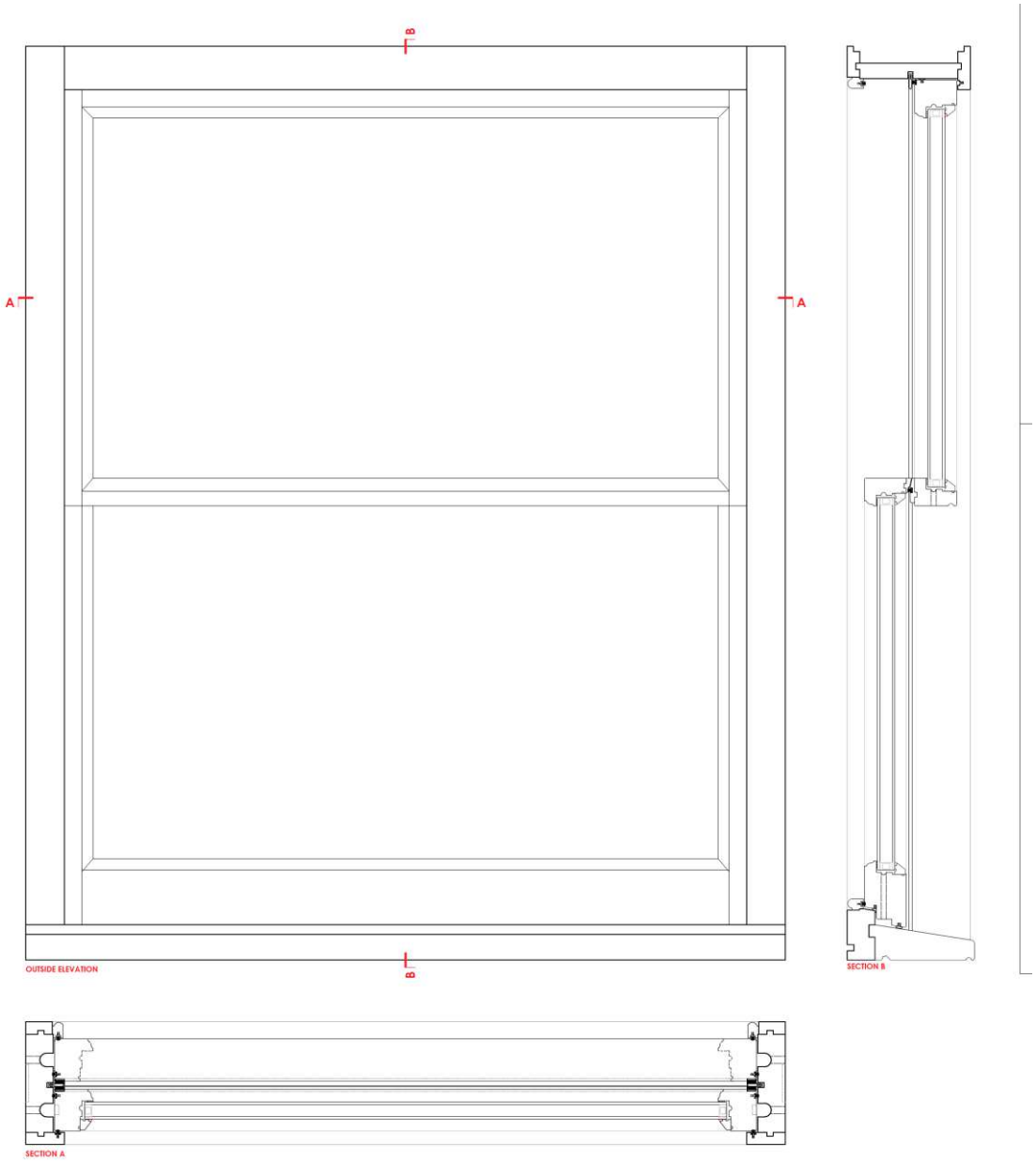
ELEVATION

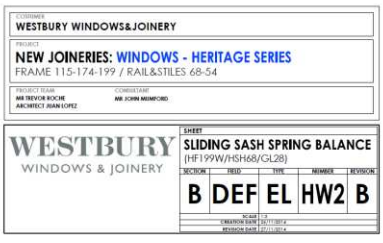
SECTION YY



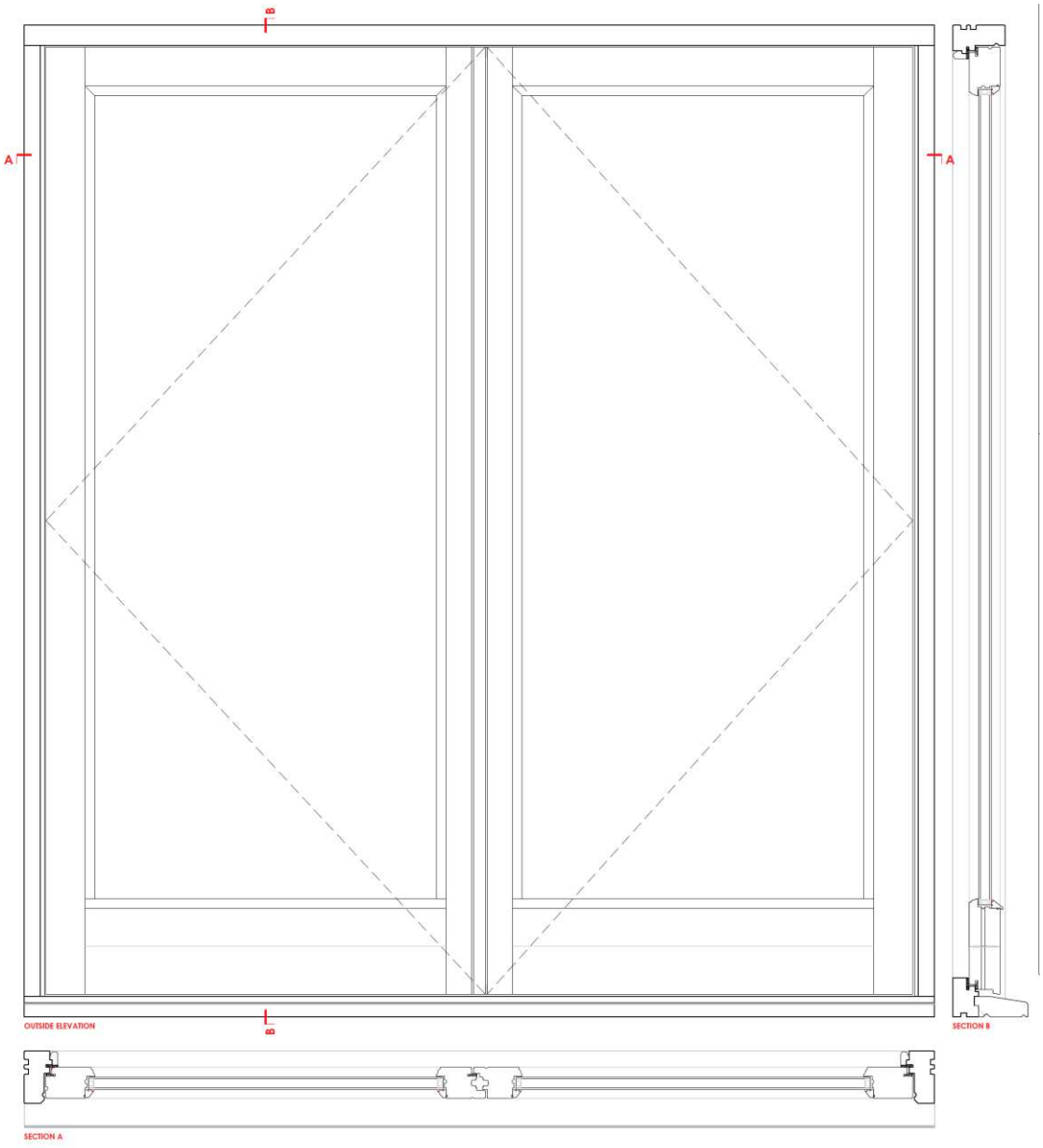
SECTION XX

Drawing 3 – Westbury Sliding Sash - Spring





Drawing 4 – Westbury French Door



WESTBURY WINDOWS&JOINERY

NEW JOINERIES: DOORS - HERITAGE SERIES
FRAME 115-155 / RAIL&STILES 68

WESTBURY WINDOWS & JOINERY

FRENCH DOOR - FULL GLAZED
(HF115D/HDO68/GL28)

SECTION	FINISH	TYPE	NUMBER	REVISION
B	DEF	EL	HD1	B

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 115 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 300 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.

$$D = L1 - L2$$

where

D is the equivalent sound pressure level difference in dB

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

L2 is the equivalent sound pressure level in the receiving room in 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:

$R = D + 10\log 10 \frac{S}{A}$ ……..in decibels

Where

S is the area of the sample (m^2)

A is the total absorption in the receiving room (m^2)

both dimensions being in consistent units

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

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, ± 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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