SRL

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Project

The Laboratory Measurement of Airborne Sound Insulation of Various Doorsets

Prepared for

Acoustic & Fire Door Solutions Ltd

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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 a door set 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 Sheet 1.

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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1.0 Details of Measurements

1.1 Location

Sound Research Laboratories

Holbrook House

Little Waldingfield

Sudbury

Suffolk

CO10 0TF

1.2 Test Dates

13 April 2016

1.3 Tester

Richard Calvert 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	12mm Condenser Microphones	4166
	Windshields	UA0237
	Pre Amplifiers	2639, 2669C
	Microphone Calibrator	4231
	Omnipower Sound Source	4296
Larson Davis	12mm Condenser Microphone	2560
Celestion	Loudspeakers	100w
Douglas Curtis	Rotating Microphone Boom	
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 doorsets were tested. See section 3 and drawing 1 for further details.

Sampling plan: Enough for Test

Sample condition: New

Details supplied by: Acoustic & Fire Door Solutions Ltd

Sample installed by: Acoustic & Fire Door Solutions Ltd

2.2 Sample Delivery date

12 April 2016

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 Sheet 1 and summarised below.

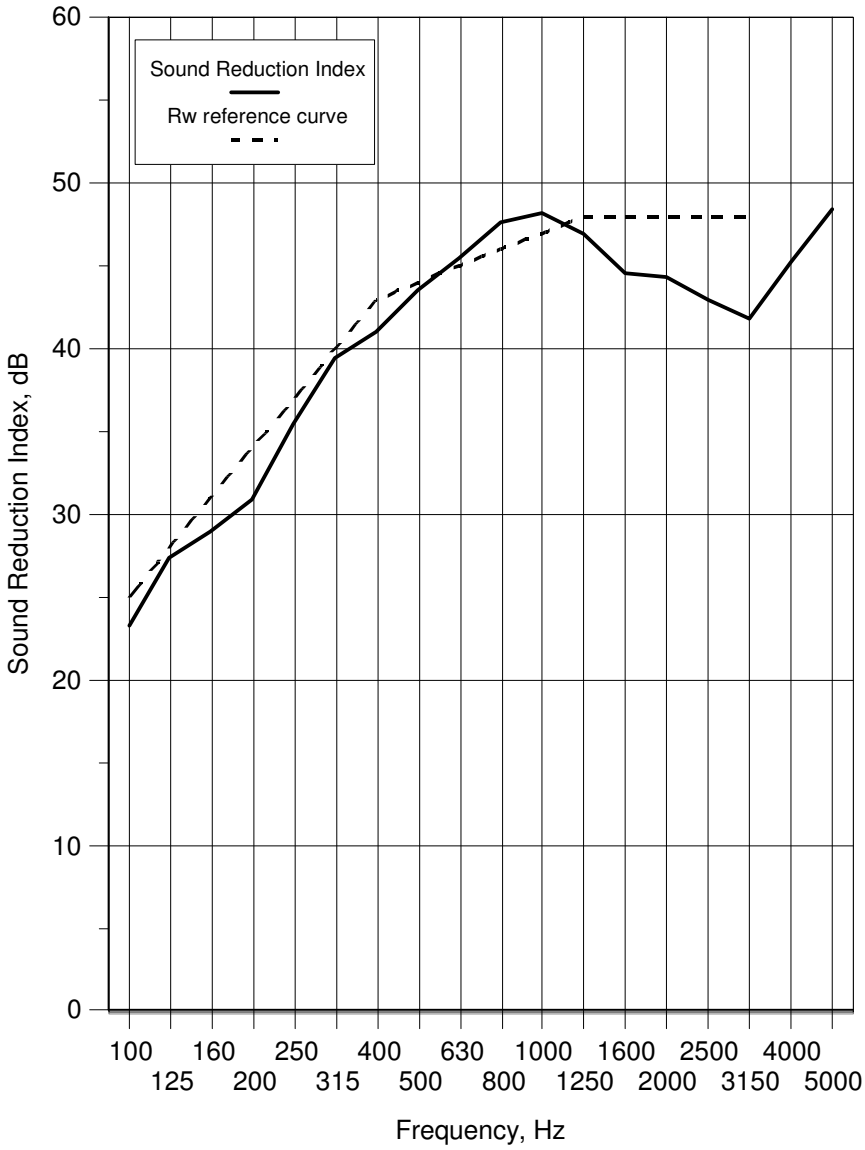
Results relate only to the items tested.

SRL Test No.	Description in Brief	$R_w(C;C_{tr})$
35	Trisound SK3 54mm Door 1 x ST1009 & 1 x flare bladed seal to head & jambs 1 x ST422GT at threshold	44 (-2 ; -6)

Data Sheet 1

Test Number :	35	**Test Room:**	**Source**	**Receiving**
Client:	Acoustic & Fire Door Solutions Ltd	**Air temperature:**	14.1 °C	16.6 °C
Test Date:	13/04/2016	**Air humidity:**	61 %	50 %
Sample height:	2.12 m	**Volume:**	55 m3	300 m3
Sample width:	1.04 m			
Sample weight:	34.5 kg/m2	**Air Pressure:**	1000 mbar	
Product Identification:	Trisound SK3 54mm Door 1xST1009 & Flare bladed seal to Head & Jambs ST422GT Threshold			

Freq f Hz	Sound Reduction Index, dB 1/3 Oct	1/1 Oct
50+	19.5	21.8
63+	24.0	
80+	23.7	
100	23.3	25.9
125	27.4	
160	29.0	
200	30.9	33.9
250	35.5	
315	39.4	
400	41.1	43.1
500	43.6	
630	45.5	
800	47.7	47.6
1000	48.2	
1250	47.0	
1600	44.6	43.9
2000	44.3	
2500	43.0	
3150	41.8	44.4
4000	45.3	
5000	48.5	
6300+	50.3	48.1
8000+	48.6	
10000+	46.3	
Average 100-3150	39.5	Version v2.1



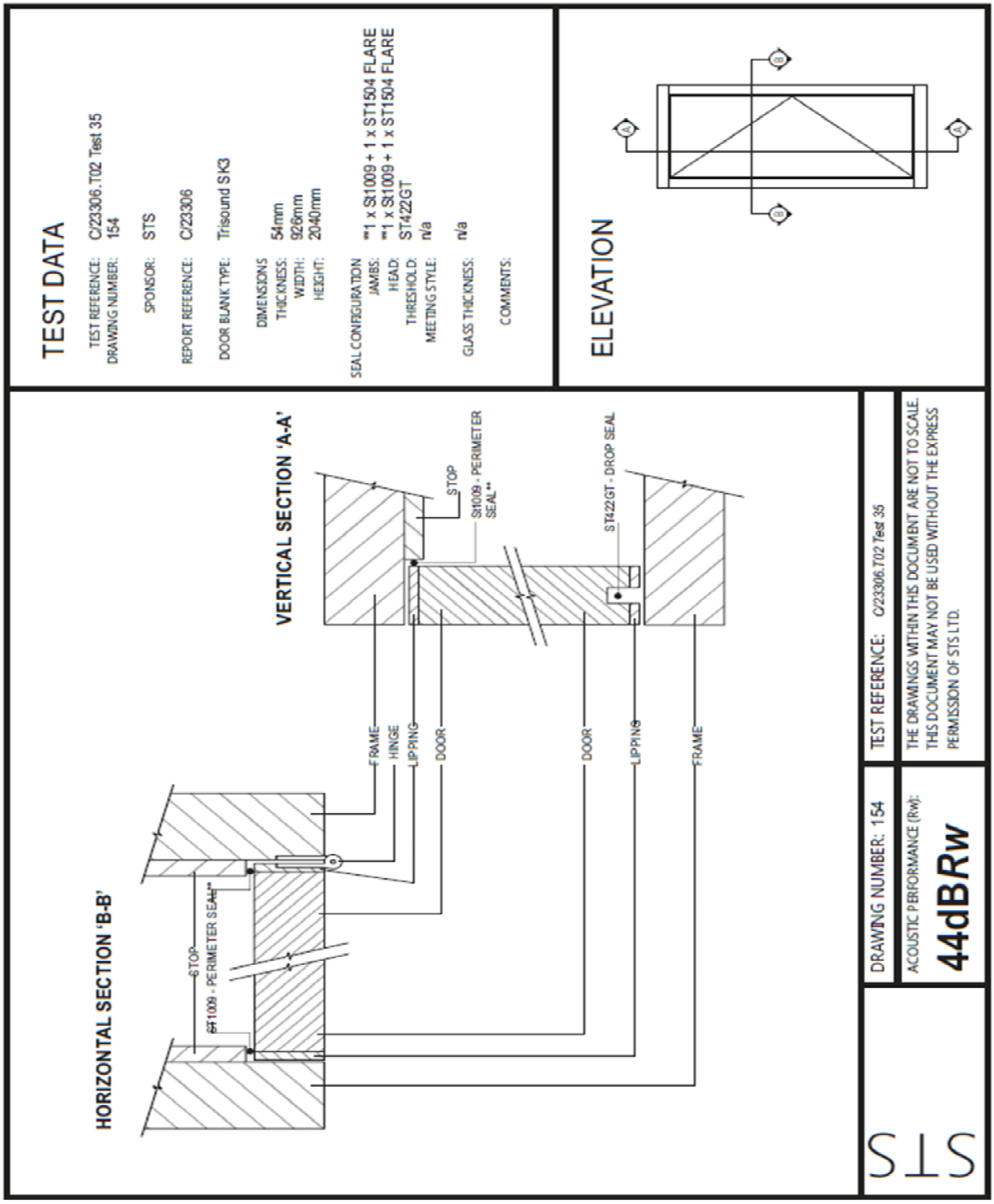
Rating according to BS EN ISO 717-1:2013

Rw(C;Ctr)= **44 (-2;-6) dB**

* shows measurement corrected for background

\+ shows frequency beyond standard and not UKAS accredited

Drawing 1



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 (i.e. acoustically "live") room, both of which are constructed from 215mm brick with reinforced concrete floors and roofs. The brick wall has dimensions of 4.8m wide x 3.1m high and 550mm nominal thickness and forms the whole of the common area between the two rooms.

One of the rooms is used as the receiving room and has a volume of 300 cubic metres. It is isolated from the surrounding structure and the adjoining room by the use of resilient mountings and seals ensuring good acoustic isolation. The adjoining source room has a volume of 55 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 (m2)

A is the total absorption in the receiving room (m2)

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.

Rw, C and Ctr have been calculated in accordance with the relevant section of

BS EN ISO 717-1:1997 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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SRL offers services in:
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