

## **Technical Report**

Ref NumberC/22875/T01bThis superecedes report C/22875/T01a dated 08 July 2015

Date

25 August 2015

### **Project**

The Laboratory Measurement of Airborne Sound Insulation of Various Doors

### **Prepared for**

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### By

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#### Sound Research Laboratories

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### 1.0 Summary

Tests have been done in SRL's Laboratory at Holbrook House, Sudbury, Suffolk, to determine the sound reduction index of various doors 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 Test Certificates 8999b to 9040b.

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

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### 2.0 Details of Measurements

### 2.1 Location

Sound Research Laboratories Holbrook House Little Waldingfield Sudbury Suffolk CO10 OTF

### 2.2 Test Dates

9,10 & 13 April 2015

### 2.3 Tester

Allen Smalls of SRL Technical Services Limited

### 2.4 Personnel Present

P Grimwood	Dixon International Group Ltd
B Richardson	Dixon International Group Ltd
A Grey	Dixon International Group Ltd
A Ackroyd	Dixon International Group Ltd

### 2.5 Instrumentation and Apparatus Used

Description	Туре		
Microphone Multiplexer			
Microphone Power Supply Unit			
Real Time Analyser	830		
Rotating Microphone Boom	231		
12mm Condenser Microphones	4166		
Windshields	UA0237		
Pre Amplifiers	2639, 2669C		
Microphone Calibrator	4231		
Omnipower Sound Source	4296		
12mm Condenser Microphone	2560		
Loudspeakers	100w		
	Description Microphone Multiplexer Microphone Power Supply Unit Real Time Analyser Rotating Microphone Boom 12mm Condenser Microphones Windshields Pre Amplifiers Microphone Calibrator Omnipower Sound Source 12mm Condenser Microphone Loudspeakers		

2.6

Douglas Curtis	Rotating Microphone Boom					
Oregon Scientific	Temperature & Humidity & Probe	THGR810				
ТОА	Graphic Equalizer	E-1231				
QSC Audio	Power Amplifier	RMX 1450				
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 of building element – Part 2: Measurement of airborne sound insulation.					

## 3.0 Description of Test

### 3.1 Description of Sample

Various door sets. See Appendix 3 and drawings for details.

Sampling plan:	Enough for test only
Sample condition:	New
Details supplied by:	Dixon International Group Ltd
Sample installed by:	Dixon International Group Ltd

### 3.2 Sample Delivery date

9 April 2015

### 3.3 Test Procedures

The sample was mounted/located and tested in accordance with the relevant standard. The method and procedure is described in Appendix 1. The measurement uncertainty is given in Appendix 2.

### 4.0 Results

The results of the measurements and subsequent analysis are given in Test Certificates 8999b to 9040b.

Results relate only to the items tested.

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### Appendix 1

### **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 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 115 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 using a microphone mounted on an oscillating boom and connected to a real time analyser. The signal is filtered into one third octave band widths, integrated and averaged. The value obtained at each frequency is known as the average sound pressure level for either the source or the receiving room. The change in level across the test sample is termed the sound pressure level difference, i.e.

 $\mathsf{D} = \mathsf{L}_1 - \mathsf{L}_2$ 

#### where

- D is the equivalent Sound Pressure level difference in dB
- $L_1$  is the equivalent Sound Pressure level in the source room in dB
- L<sub>2</sub> 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:

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

Where

- S is the area of the sample
- A is the total absorption in the receiving room

### 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 an example of this construction is installed on site, the sound insulation obtained will depend upon its surface area, as well as the absorption in the receiving room. The larger the area the greater the sound energy transmitted. Also, the overall sound insulation is affected by the sound transmission through other building elements, some of which may have an inferior performance to the sample tested. In practice, therefore, the potential sound reduction index of a construction is not fully realised on site. Furthermore, the sound reduction index of a particular sample of that construction can only be measured accurately in a laboratory, because only under such controlled conditions can the sound transmission path be limited to the sample under test.

R<sub>w</sub>, C and C<sub>tr</sub> 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 140-3:1995.

## Appendix 2

### Measurement Uncertainty BS EN ISO 140-3:1995 - TP15

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

### Appendix 3 – Sample Details

CDI Toot No	Deerlasf	Head/Jamp Saal(a)	Threshold Seel	Dw (dD)	
OKL TEST NO.	Strobard 44mm Clazad	Nene	Nono	22	
2	Strebold 44mm Glazed	Coullead	None	22	
3	Strebold 44mm Glazed	Caulked	Dropped offect	30	
4	Strebord 44mm Glazed	Delta against stop	towards stop	34	
5	Strebord 44mm	Delta against stop	Dropseal offset towards stop	31	
6	Strebord 44mm	Caulked	Caulked	33	
7	Strobord 11mm	Dolto against stop	Dropseal offset	21	
/		Della agailist stop	towards stop	51	
8	Strebord 44mm	Delta against stop	Caulked	32	
10	Strebord 44mm	Double Fin against stop	Dropseal offset towards stop	32	
11	Strebord 44mm Glazed	Double Fin against stop	Dropseal offset towards stop	34	
12	Strebord 44mm Glazed	Double Fin against stop	Dropseal centre of leaf	34	
13	Strebord 44mm	Double Fin against stop	Dropseal centre of leaf	31	
14	FD30 PremCORE Lite	Caulked	Caulked	32	
15	FD30 PremCORE Lite	Double Fin against stop	Dropseal centre of	30	
16	FD30 Tube Core 44mm	Caulked	Caulked	28	
17	FD30 Moulded Skin	Caulked	Caulked	28	
18	Chipboard Core 44mm FD30 PremCORE Lite	Delta against stop	Dropseal centre of	30	
10	44mm Tri-Sound ED30 56mm	Caulked	leaf	<u> </u>	
13		Caulkeu	Dronseal centre of	41	
20	Tri-Sound FD30 56mm	Delta against stop	leaf	37	
21	Tri-Sound FD30 56mm	Delta against stop	Caulked	40	
22	Tri-Sound FD30 56mm	Delta against stop	towards stop	38	
23	Tri-Sound FD30 56mm	Delta against stop + Double Fin adjacent	Dropseal offset towards stop	39	
24	Tri-Sound FD30 56mm	Delta against stop +	Dropseal offset towards stop	39	
26	Tri-Sound FD30 56mm	Caulked	Caulked	30	
20	Glazed	Ocultural	Ocultod	0.1	
27	Strebord 54mm	Caulked	Caulked	34	
28	Strebord 54mm	Delta against stop	leaf	32	
29	Strebord 54mm	Delta against stop	Dropseal offset towards stop	33	
30	Strebord 54mm Glazed	Caulked	Caulked	37	
31	Strebord 54mm Glazed	Delta against stop	Dropseal offset towards stop	35	
32	Strebord 54mm Glazed	Delta against stop	Dropseal centre of	34	
33	Strebord 54mm Glazed	Double Fin against stop	Dropseal centre of	34	
34	Strebord 54mm	Double Fin against stop	Dropseal centre of	32	
35	Strebord 64mm Glazed	Caulked	Caulked	38	
36	Strebord 64mm Glazed	Double Fin against stop	Dropseal centre of	35	
37	Strebord 64mm	Caulked	Caulked	37	
38	Strebord 64mm	Double Fin against stop	Dropseal offset	35	
39	Strebord 64mm	Double Fin against stop	Dropseal centre of	34	
40	Strebord 64mm Glazed	Double Fin against stop	Dropseal offset	36	
41	Strebord 64mm Glazed	Delta against stop	Towards stop Dropseal offset	37	
42	Strebord 64mm	Delta against stop	towards stop Dropseal centre of	33	
			leaf Dropseal offset		
43	Strebora 64mm	Deita against stop	towards stop	34	
44	Strebord 64mm Glazed	Delta against stop	leaf	35	
45	Strebord 64mm Glazed	Deita against stop + Double Fin adjacent	leaf	36	

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## SRL

Manufacturer	Door Leaf	Door Size(mm)	Door Weight (kg) - With Hinges	Door Weight (kg) - Without Hinges	Glazing Aperture Cut-Out Size (mm)	Glass Size (mm)	Glass Thk. (mm)	Glass Sight Size (mm)	Glass Type	Bead Material	Bead Height (mm)	Splay Angle (deg)	Aperture Liner	Glass-To- Bead Intumescent	Bead fixings	Fixing Centres (mm)	Fixing Angle To Glass (deg)
Falcon	Strebord 44mm	2050(h) x 925(w)	51.15	50.74	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Falcon	Strebord 44mm Glazed	2050(h) x 925(w)	48.25	47.84	1610(h) x 330(w)	1600(h) x 320(w)	7	1580(h) x 300(w)	Promat Securiglass Pyrosec EW30/7 7mm	Hardwood	15	15	None	15x4 Therm-A- Bead	50mm Steel Pins	150	35
Premdor	FD30 PremCORE Lite 44mm	2038(h) x 925(w)	44.90	44.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Premdor	FD30 Tube Core 44mm	2038(h) x 925(w)	33.95	33.54	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Premdor	FD30 Moulded Skin Chipboard Core 44mm	2038(h) x 925(w)	36.60	36.19	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Falcon	Strebord 54mm	2050(h) x 925(w)	63.40	62.99	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Falcon	Strebord 54mm Glazed	2050(h) x 925(w)	61.25	60.84	1624(h) x 344(w)	1610(h) x 330(w)	10	1580(h) x 300(w)	Pilkington Pyrodur EW60-10 10mm CS	Hardwood	20	15	2mm Therm-A- Line	20x4 Therm-A- Bead	75mm Steel Screws	150	30
Falcon	Tri-Sound FD30 56mm	2050(h) x 925(w)	65.05	64.64	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Falcon	Tri-Sound FD30 56mm Glazed	2050(h) x 925(w)	67.60	67.19	1622(h) x 342(w)	1600(h) x 320(w)	15	1580(h) x 300(w)	Pilkington Pyrostop El30-10 15mm CS	Hardwood	15	12	6mm Hardwood	10x2 Therm-A- Glaze 45	50mm Steel Pins	150	30
Falcon	Strebord 64mm	2050(h) x 925(w)	81.80	81.39	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Falcon	Strebord 64mm Glazed	2050(h) x 925(w)	74.90	74.49	1634(h) x 354(w)	1620(h) x 340(w)	10	1580(h) x 300(w)	Pilkington Pyrodur EW60-10 10mm CS	Hardwood	25	30	2mm Therm-A- Line	25x4 Therm-A- Bead	75mm Steel Screws	150	30
Manufacturer of	"Delta Seal", "[	Double Fin" a	and "2712	Drop Seal"	acoustic sea	als - Sealn	naster										
Manufacturer of "Therm-A-Bead", "Therm-A-Glaze 45" and "Therm-A-Line" glazing seals - Intumescent Seals																	
Each leaf hung of Erame, stops and	on 3No. Royde d beading all sa	& Tucker H1	01 lift-off	hinges													
		- 510 1101 0100															

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SRL's Laboratory is accredited for testing under UKAS Number 0444

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