Technical Report

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Date ***21 April 2010***

Project

The Laboratory Determination of The Airborne Sound Transmission of an Access Hatch

Prepared for

Fire Proofing Services
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By

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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 an access hatch in accordance with BS EN ISO 140-3:1995.

From these measurements the required results have been derived and are presented in both tabular and graphic form in Data Sheets 1 to 3.

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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Trevor Hickman
Deputy Technical Manager

SRL

Contents

2.0 Details of Measurements

2.1 Location

Sound Research Laboratories Ltd
Holbrook House
Little Waldingfield
Sudbury
Suffolk
CO10 OTH

2.2 Test Dates

4 March 2010

2.3 Instrumentation and Apparatus Used

Make	Description	Type
E D I	Microphone Multiplexer	
	Microphone Power Supply Unit	
Norwegian Electronics	Tapping Machine	211
	Real Time Analyser	830
	Rotating Microphone Boom	231
Brüel & Kjaer	12mm Condenser Microphones	4166, 4189
	Windshields	UA0237
	Pre Amplifiers	2639, 2669C,ZG0026
	Microphone Calibrator	4231
	Omnipower Sound Source	4296
	Sound Level Analyser	2260
Larson Davis	12mm Condenser Microphone	2560
Celestion	Loudspeakers	100w
Douglas Curtis	Rotating Microphone Boom	
Thermo Hygro	Temperature & Humidity Probe	
TOA	Graphic Equalizer	E-1231

QSC Audio	Power Amplifier	RMX 1450

2.4 References

BS EN ISO 140-3:1995	Laboratory measurement of airborne sound insulation of building elements
BS EN ISO 717-1:1997	Rating of sound insulation in buildings and of building elements. Airborne Sound Insulation.

2.5 Personnel Present

Ross Stokes	Fire Proofing Services

3.0 Description of Test

3.1 Description of Sample

An access hatch was tested with two types of screw plug fitted, and an additional test was done covering the seal between the frame and door with Arboseal.

See drawings 1 and 2, and photographs 1 to 4 for details.

Sampling plan: None, enough for test only.

Sample condition: New.

Details supplied by: Fire Proofing Services

Sample installed by: Fire Proofing Services

3.2 Sample Delivery date

4 March 2010

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. Note. The samples weights were not measured.

4.0 Results

The results of the measurements and subsequent analysis are given in Data Sheets 1 to 3 and summarised below.

Results relate only to the items tested.

SRL Test No.	Description in Brief	Rw (C;Ctr)
2	Access Hatch as drawing 1	29 (0;-2)
3	Access Hatch as drawing 1with screw plug changed as drawing 2	30 (0;-2)
4	Access Hatch as test 3 with Arboseal covering frame-to-door seal	35 (-1;-5)

End of Text

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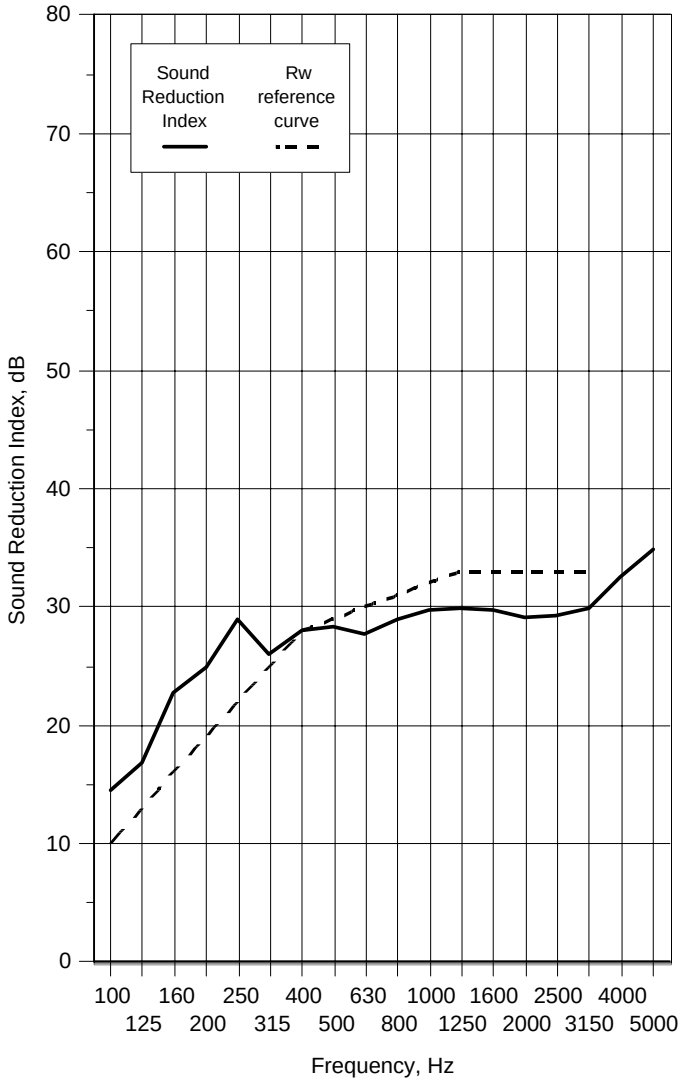
Data Sheet 1

Test Number :	2	**Air temperature:**	13.9 °C
Client:	Fire Proofing Services	**Air humidity:**	40 %
Test Date:	04/03/2010	**Receiving room volume**	300 m3
Sample height:	0.6 m	**Source room volume:**	115 m3
Sample width:	0.6 m		
Product Identification:	Access Hatch as drawing 1		

Freq f Hz	Sound Reduction Index, dB 1/3 Oct	1/1 Oct
50+	15.9	
63+	17.8	17.5
80+	19.5	
100	14.5	
125	16.9	16.9
160	22.7	
200	25.0	
250	28.9	26.3
315	26.0	
400	28.0	
500	28.4	28.1
630	27.8	
800	29.0	
1000	29.8	29.5
1250	29.9	
1600	29.7	
2000	29.2	29.4
2500	29.3	
3150	29.9	
4000	32.6	32.0
5000	34.8	
6300+	36.1	
8000+	33.3	34.6
10000+	34.9	
Average 100-3150	26.6	



Rating according to BS EN ISO 717-1:1997

Rw(C;Ctr)= **29 (0;-2)** dB

Notes * designates measurement corrected for background

\# designates limit of measurement due to background

\+ designates frequency beyond standard and not UKAS accredited

v1.6

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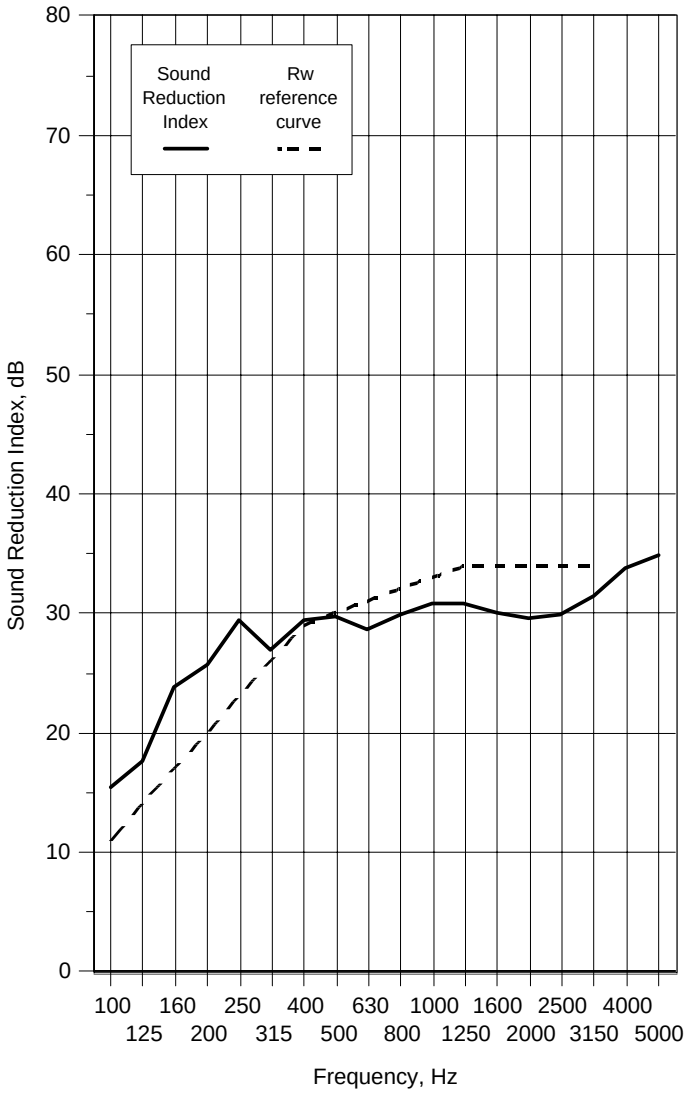
Data Sheet 2

Test Number :	3	**Air temperature:**	13.9 °C
Client:	Fire Proofing Services	**Air humidity:**	40 %
Test Date:	04/03/2010	**Receiving room volume**	300 m3
Sample height:	0.6 m	**Source room volume:**	115 m3
Sample width:	0.6 m		
Product Identification:	Access Hatch as drawing 1with screw plug changed as drawing 2		

Freq f Hz	Sound Reduction Index, dB 1/3 Oct	1/1 Oct
50+	15.1	
63+	18.2	16.6
80+	17.1	
100	15.4	
125	17.7	17.8
160	23.8	
200	25.7	
250	29.5	27.1
315	27.0	
400	29.4	
500	29.7	29.3
630	28.7	
800	29.9	
1000	30.8	30.5
1250	30.9	
1600	30.1	
2000	29.6	29.8
2500	29.9	
3150	31.5	
4000	33.8	33.2
5000	34.9	
6300+	36.5	
8000+	33.5	34.7
10000+	34.7	
Average 100-3150	27.5	



Rating according to BS EN ISO 717-1:1997

Rw(C;Ctr)= **30 (0;-2)** dB

Notes * designates measurement corrected for background

\# designates limit of measurement due to background

\+ designates frequency beyond standard and not UKAS accredited

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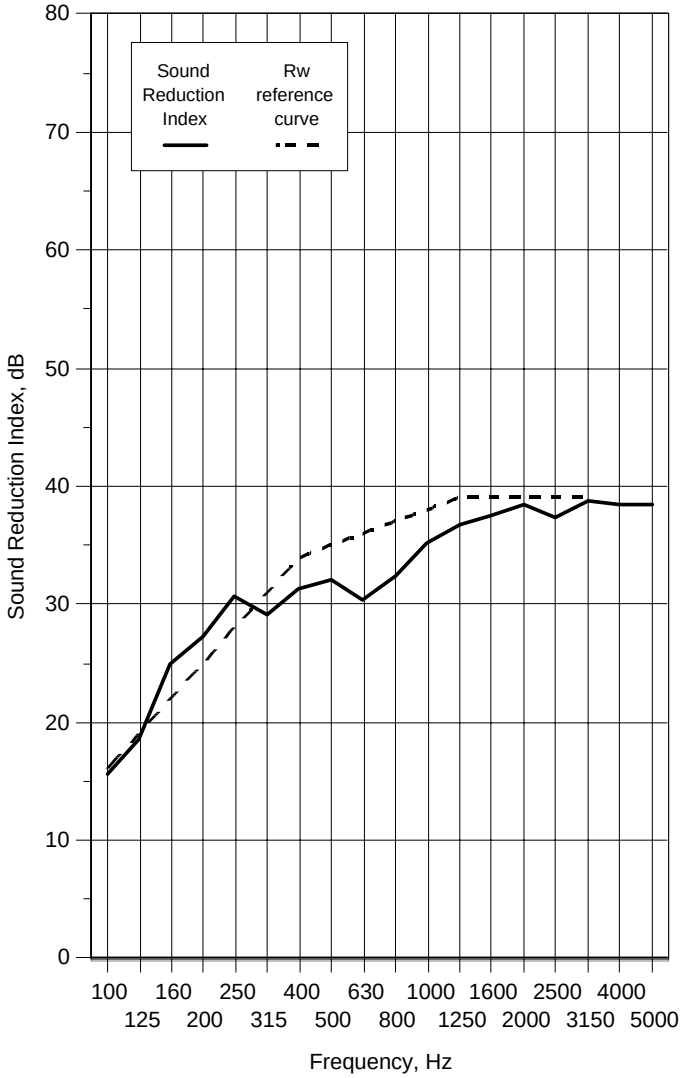
Data Sheet 3

Test Number :	4	**Air temperature:**	13.9 °C
Client:	Fire Proofing Services	**Air humidity:**	40 %
Test Date:	04/03/2010	**Receiving room volume**	300 m3
Sample height:	0.6 m	**Source room volume:**	115 m3
Sample width:	0.6 m		
Product Identification:	Access Hatch as test 3 with Arboseal covering frame to-door-seal		

Freq f Hz	Sound Reduction Index, dB 1/3 Oct	1/1 Oct
50+	19.1	
63+	17.6	17.4
80+	16.0	
100	15.6	
125	18.6	18.3
160	25.0	
200	27.3	
250	30.7	28.8
315	29.2	
400	31.3	
500	32.1	31.2
630	30.4	
800	32.4	
1000	35.2	34.4
1250	36.7	
1600	37.5	
2000	38.4	37.7
2500	37.4	
3150	38.7	
4000	38.5	38.6
5000	38.5	
6300+	41.5	
8000+	41.7	41.6
10000+	41.7 *	
Average 100-3150	31.0	



Rating according to BS EN ISO 717-1:1997

Rw(C;Ctr)= **35 (-1;-5)** dB

Notes * designates measurement corrected for background

\# designates limit of measurement due to background

\+ designates frequency beyond standard and not UKAS accredited

v1.6

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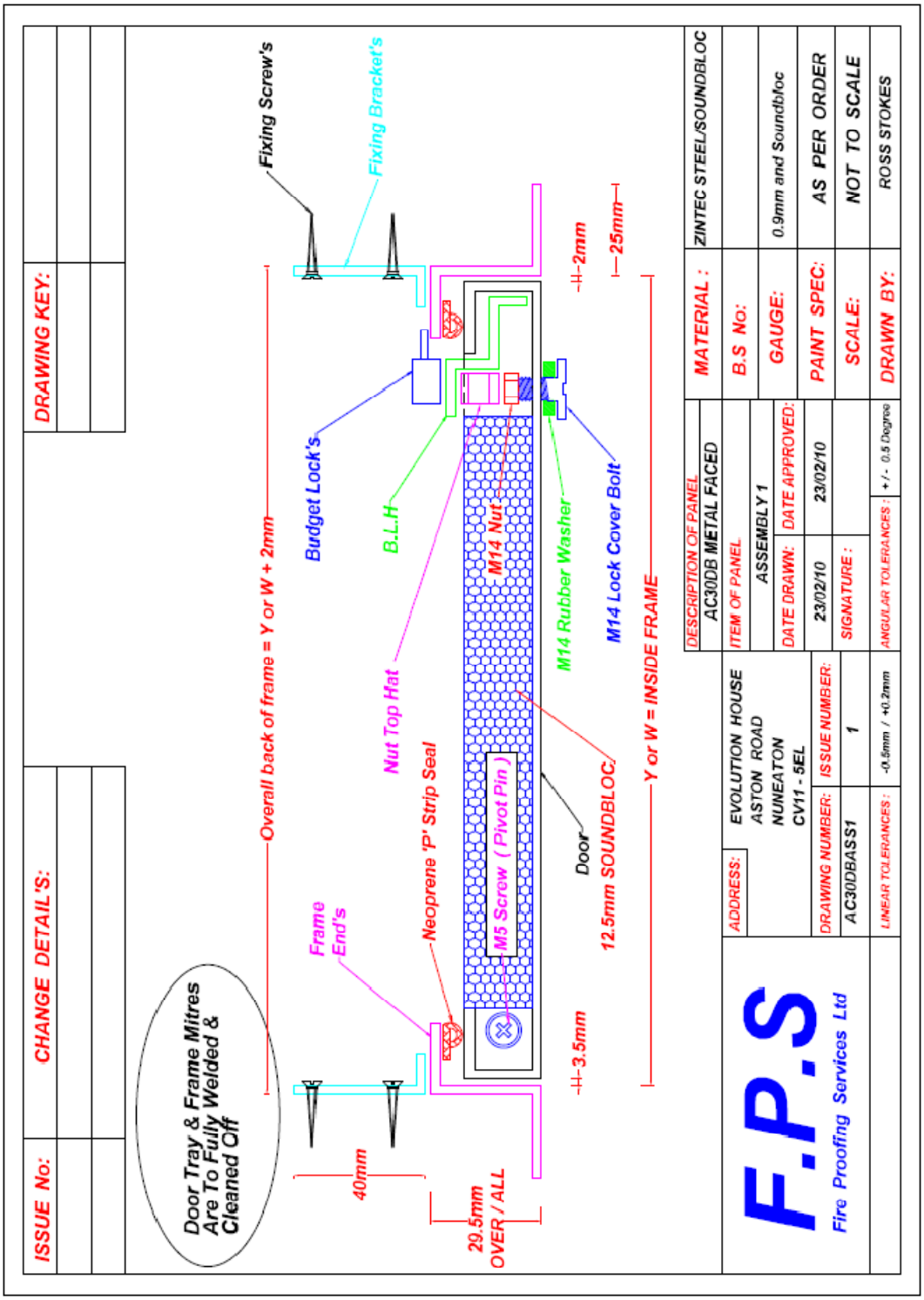
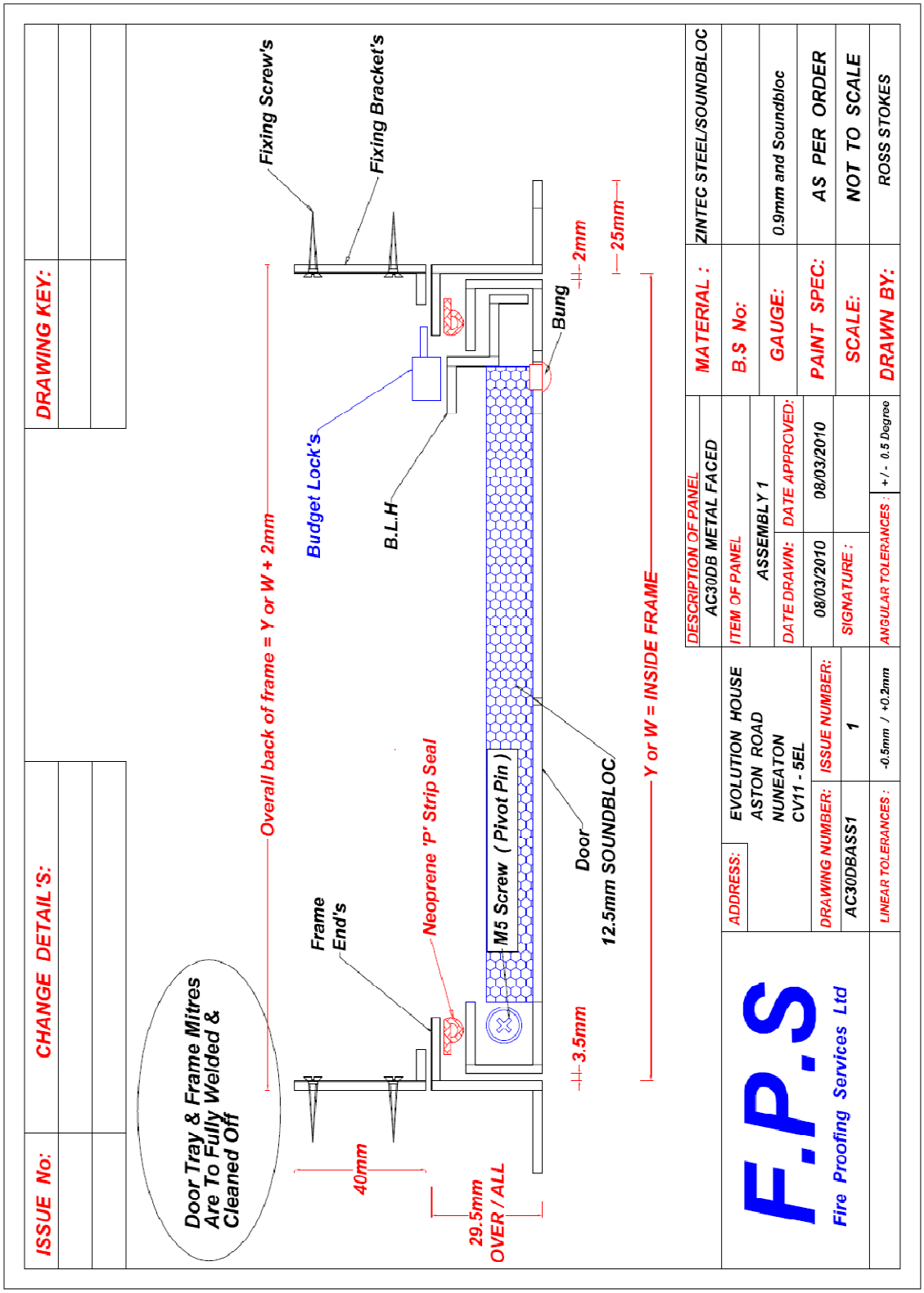
Drawing 1



Drawing 2


DRAWING KEY:
ISSUE No:
CHANGE DETAIL'S:
Fixing Screw's
Fixing Bracket's
Budget Lock's
B.L.H
Bung
2mm
25mm
Overall back of frame = Y or W + 2mm
Y or W = INSIDE FRAME
Door Tray & Frame Mitres Are To Fully Welded & Cleaned Off
Frame End's
Neoprene 'P' Strip Seal
M5 Screw (Pivot Pin)
Door
12.5mm SOUNDBLOC
3.5mm
40mm
29.5mm OVER / ALL
DESCRIPTION OF PANEL
AC30DB METAL FACED
ITEM OF PANEL
ASSEMBLY 1
DATE DRAWN:
08/03/2010
DATE APPROVED:
08/03/2010
SIGNATURE :
MATERIAL :
ZINTEC STEEL/SOUNDBLOC
B.S No:
GAUGE:
0.9mm and Soundbloc
PAINT SPEC:
AS PER ORDER
SCALE:
NOT TO SCALE
DRAWN BY:
ROSS STOKES
ADDRESS:
EVOLUTION HOUSE
ASTON ROAD
NUNEATON
CV11 - 5EL
DRAWING NUMBER:
AC30DBASS1
ISSUE NUMBER:
1
LINEAR TOLERANCES :
-0.5mm / +0.2mm
ANGULAR TOLERANCES :
+/- 0.5 Degree
F.P.S
Fire Proofing Services Ltd

Photograph 1 – Test 2 – View from receive room

Photograph 2 – Test 2 – Screw plug

Photograph 3 – Sample viewed from source room

Photograph 4 – Test 3 – Screw plug

Appendix 1

Test Procedure

Measurement of Sound Transmission in accordance with BS EN ISO 140-3 : 1995 - TP15

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 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.

$$D = L_1 - L_2$$

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_2 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:

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

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_w, C and C_{tr} 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	2.6
125	2.4
160	2.1
200	2.1
250	1.5
315	1.5
400	1.2
500	1.2
800	1.0
1000	1.0
1250	1.0
1600	1.0
2000	1.0
2500	1.0
3150	1.0

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SRL offers services in:
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Air Tightness

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

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