Technical Report

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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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Tester
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Trevor Hickman
Deputy Technical Manager

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Contents

2.0 Details of Measurements

2.1 Location

SRL Technical Services Ltd
Holbrook House
Little Waldingfield
Sudbury
Suffolk
CO10 0TH

2.2 Test Dates

14 July 2011

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 both with seals, and also fully caulked to eliminate any effect of the seals.

See drawings 1 and 2, and photograph 1.

Sampling plan:	None, enough for test only.
Sample condition:	New.
Details supplied by:	Fire Proofing Services
Sample installed by:	Fire Proofing Services / SRL

3.2 Sample Delivery date

14 July 2011

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 weight of the sample was 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	45 (-4;-9) dB
3	Access Hatch as drawing 1 with hatch to frame caulked on both faces	48 (-3;-9) dB
4	Access Hatch as drawing 1 with seals adjusted	45 (-2;-7) dB

End of Text

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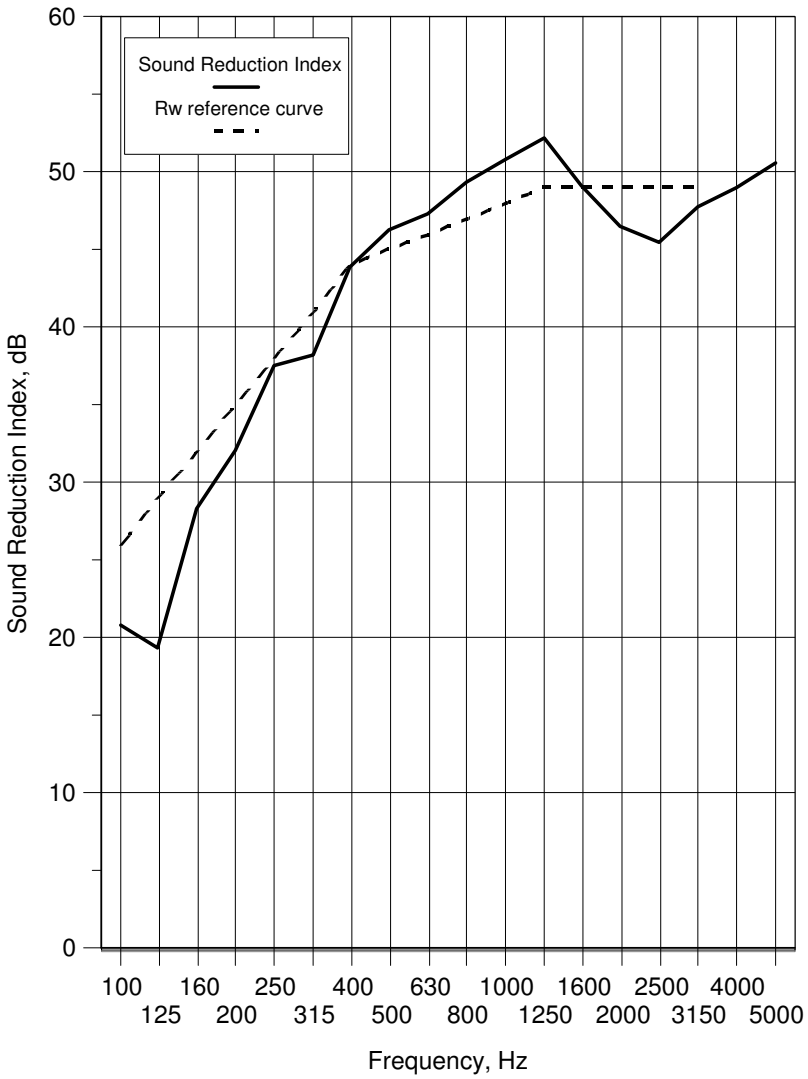
Data Sheet 1

Test Number :	2	**Air temperature:**	18.2 ℃
Client:	Exitile	**Air humidity:**	58 %
Test Date:	14/07/2011	**Receiving room volume**	300 m3
Sample height:	1.21 m	**Source room volume:**	55 m3
Sample width:	0.665 m		
Product Identification:	Metal faced access hatch with neoprene P profile seal		

Freq f Hz	Sound Reduction Index, dB 1/3 Oct	1/1 Oct
50+	21.4	
63+	21.0	21.6
80+	22.6	
100	20.8	
125	19.4	21.5
160	28.4	
200	32.1	
250	37.6	35.0
315	38.2	
400	43.9	
500	46.3	45.6
630	47.3	
800	49.4	
1000	50.8	50.6
1250	52.2	
1600	49.1	
2000	46.5	46.8
2500	45.5	
3150	47.8	
4000	49.0	49.0
5000	50.6	
6300+	53.3	
8000+	48.8 *	45.9
10000+	42.3 #	
Average 100-3150	41.0	Version v1.7



Rating according to BS EN ISO 717-1:1997
Rw(C;Ctr)= **45 (-4;-9) dB**

* shows measurement corrected for background
\# shows limit of measurement due to background
\+ shows frequency beyond standard and not UKAS accredited

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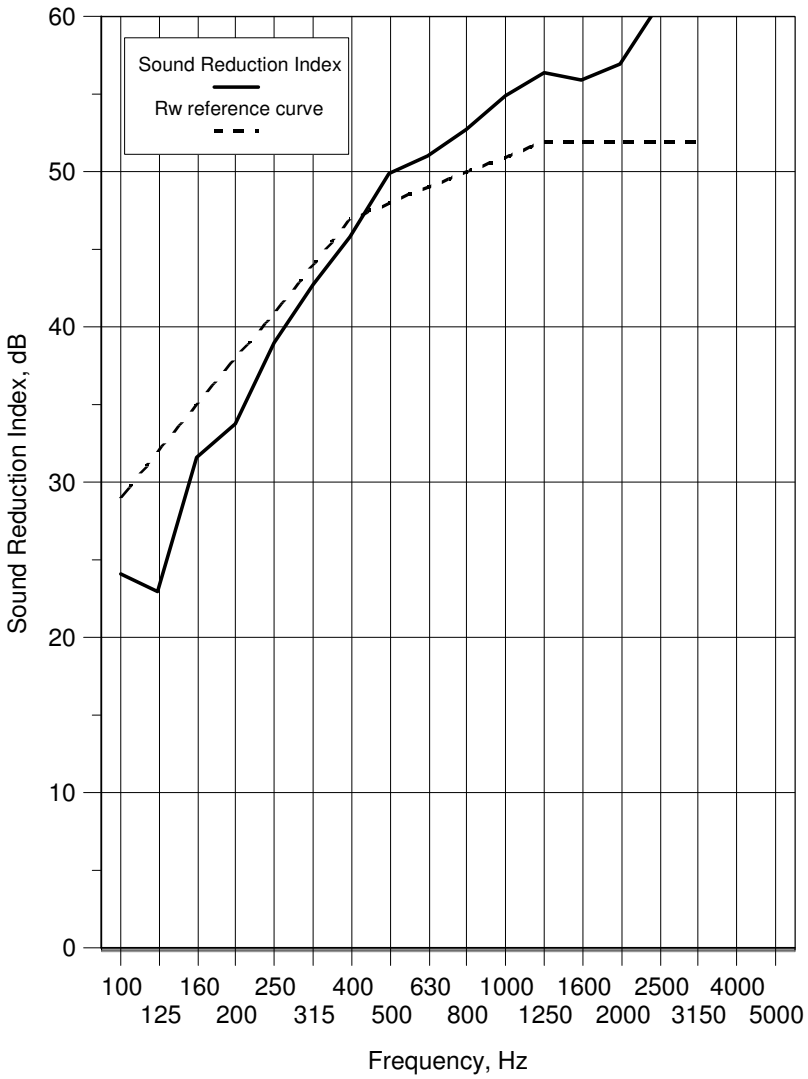
Data Sheet 2

Test Number :	3	**Air temperature:**	18.2 ℃
Client:	Exitile	**Air humidity:**	58 %
Test Date:	14/07/2011	**Receiving room volume**	300 m3
Sample height:	1.21 m	**Source room volume:**	55 m3
Sample width:	0.665 m		

Product Identification: Metal faced access hatch with neoprene P profile seal
Hatch to frame seal caulked both sides

Freq f Hz	Sound Reduction Index, dB 1/3 Oct	1/1 Oct
50+	22.8	
63+	21.8	22.9
80+	24.6	
100	24.1	
125	23.0	24.9
160	31.6	
200	33.8	
250	39.0	37.0
315	42.8	
400	45.9	
500	49.9	48.4
630	51.1	
800	52.8	
1000	54.9	54.4
1250	56.4	
1600	56.0	
2000	57.0	57.5
2500	60.8	
3150	62.9 *	
4000	62.5 *	62.8
5000	63.0 *	
6300+	63.6 *	
8000+	51.5 #	47.5
10000+	43.4 #	
Average 100-3150	46.4	Version v1.7



Rating according to BS EN ISO 717-1:1997
Rw(C;Ctr)= **48 (-3;-9) dB**

* shows measurement corrected for background
\# shows limit of measurement due to background
\+ shows frequency beyond standard and not UKAS accredited

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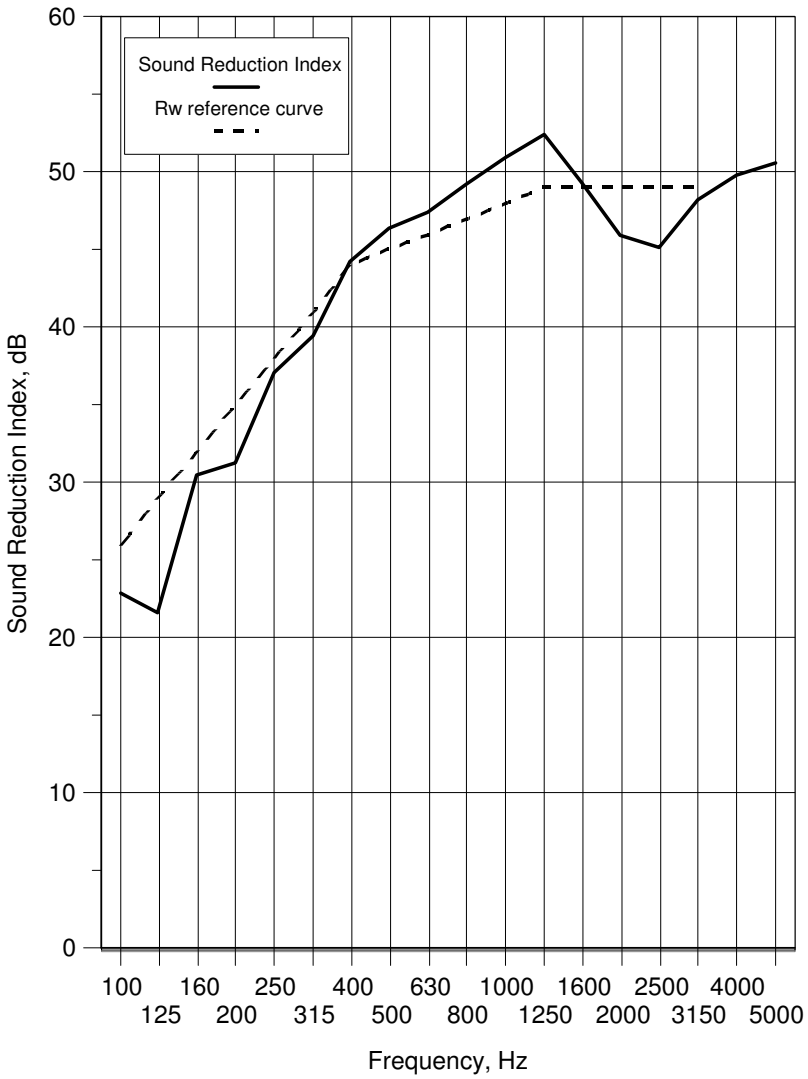
Data Sheet 3

Test Number :	4	**Air temperature:**	18.4 ℃
Client:	Exitile	**Air humidity:**	57 %
Test Date:	14/07/2011	**Receiving room volume**	300 m3
Sample height:	1.21 m	**Source room volume:**	55 m3
Sample width:	0.665 m		
Product Identification:	Metal faced access hatch with neoprene P profile seal		

Freq f Hz	Sound Reduction Index, dB 1/3 Oct	1/1 Oct
50+	21.5	
63+	20.1	21.4
80+	23.3	
100	22.9	
125	21.6	23.6
160	30.5	
200	31.3	
250	37.1	34.6
315	39.5	
400	44.3	
500	46.4	45.8
630	47.4	
800	49.3	
1000	51.0	50.7
1250	52.4	
1600	49.4	
2000	46.0	46.5
2500	45.2	
3150	48.2	
4000	49.8	49.4
5000	50.6	
6300+	52.8	
8000+	48.6 *	46.2
10000+	42.8 #	
Average 100-3150	41.4	Version v1.7



Rating according to BS EN ISO 717-1:1997
Rw(C;Ctr)= **45 (-2;-7) dB**

* shows measurement corrected for background
\# shows limit of measurement due to background
\+ shows frequency beyond standard and not UKAS accredited

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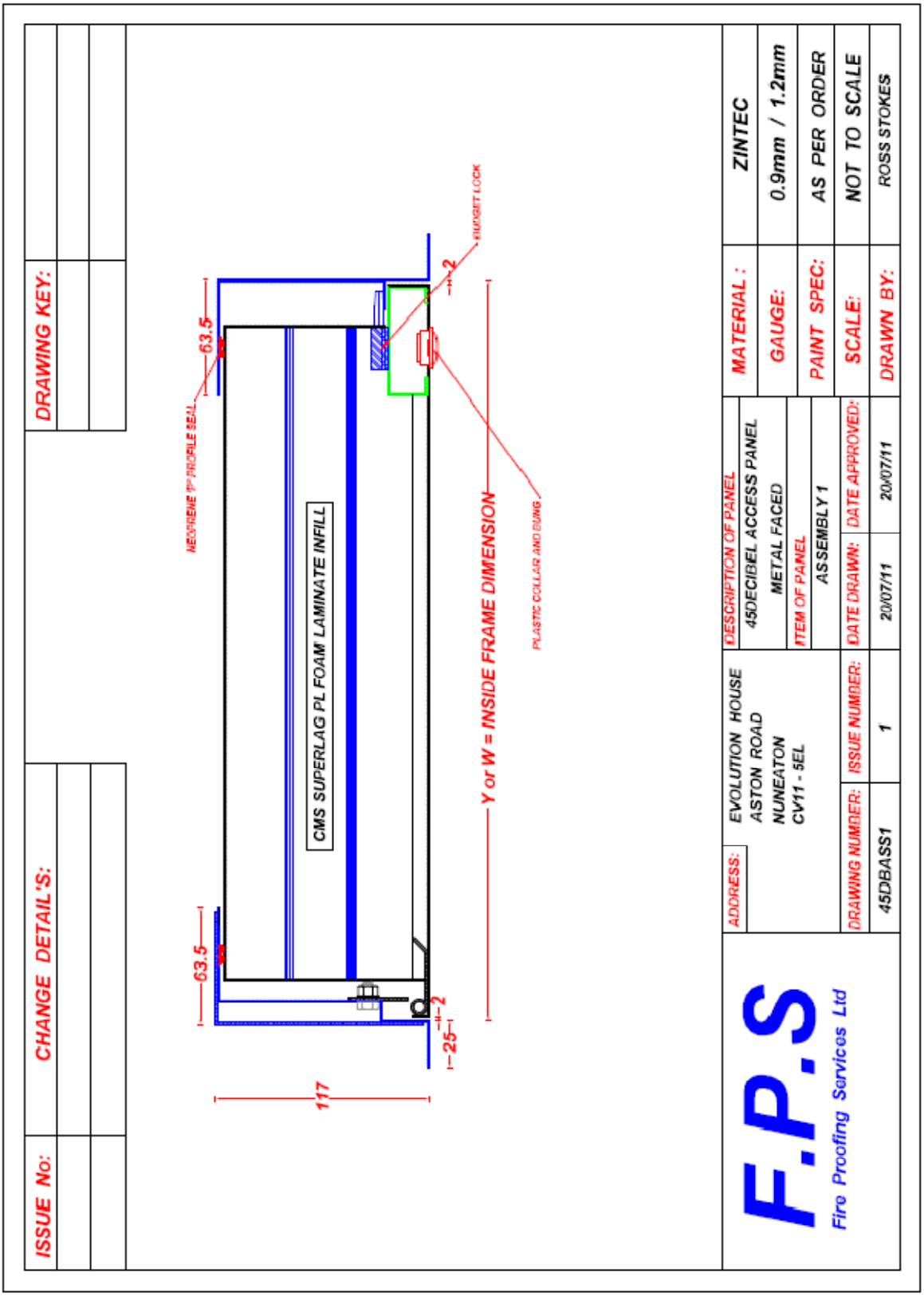
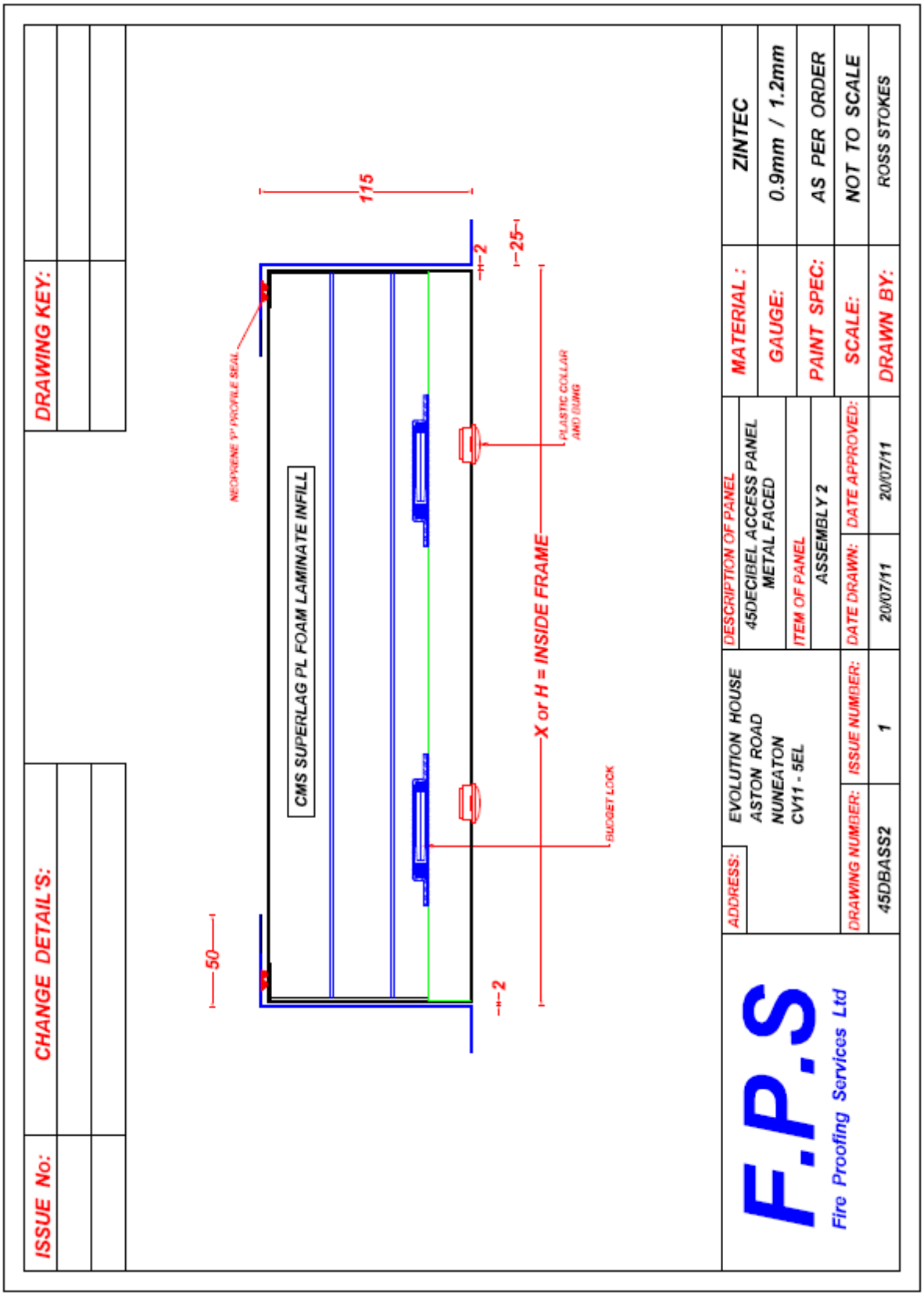
Drawing 1



Drawing 2


DRAWING KEY:
CHANGE DETAIL'S:
ISSUE No:
115
25
2
50
2
NEOPRENE 'P' PROFILE SEAL
CMS SUPERLAG PL FOAM LAMINATE INFILL
PLASTIC COLLAR AND RING
X or H = INSIDE FRAME
BUDGET LOCK
F.P.S
Fire Proofing Services Ltd
ADDRESS:
EVOLUTION HOUSE
ASTON ROAD
NUNEATON
CV11 - 5EL
DESCRIPTION OF PANEL
45DECIBEL ACCESS PANEL
METAL FACED
ITEM OF PANEL
ASSEMBLY 2
DRAWING NUMBER:
45DBASS2
ISSUE NUMBER:
1
DATE DRAWN:
20/07/11
DATE APPROVED:
20/07/11
MATERIAL :
ZINTEC
GAUGE:
0.9mm / 1.2mm
PAINT SPEC:
AS PER ORDER
SCALE:
NOT TO SCALE
DRAWN BY:
ROSS STOKES

Photograph 1 – Access Hatch installed in Test Aperture

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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