SRL

UKAS TESTING 0444

Technical Report
C/23366/T02

Project

The Laboratory Measurement of the Fireplug Cable Passthrough System

Prepared for

Complete Fire Protection Ltd

By

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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 cable pass system 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 Table Data Sheets 1 to 4.

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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Contents

1.0 Details of Measurements

1.1 Location

Sound Research Laboratories

Holbrook House

Little Waldingfield

Sudbury

Suffolk

CO10 0TF

1.2 Test Dates

11 April 2016

1.3 Tester

Allen Smalls of SRL Technical Services Limited

1.4 Personnel Present

R Maggs Complete Fire Protection Ltd

1.5 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
Oregon Scientific	Temperature & Humidity & Probe	THGR810
TOA	Graphic Equalizer	E-1231
QSC Audio	Power Amplifier	RMX 1450

1.6 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

Fireplug cable pass through system installed in plasterboard partition, see Drawing for details of partition and set-up.

Fireplug cable pass through system consisted of

- Two hinged metal doors
- Two smoke socks
- FPB150 intumescent pipe closer
- One or two acoustic bungs

See also Photographs 1 to 3.

Sampling plan: Enough for test only

Sample condition: New

Details supplied by: Complete Fire Protection Ltd

Sample installed by: Complete Fire Protection Ltd

2.2 Sample Delivery date

11 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 Sheets 1 to 4 and summarised below.

Results relate only to the items tested.

SRL Test No.	Description in Brief	R_w (C;C_{tr})
2	Partition without cable pass system (no penetrations)	62 (-3;-9)
3	Partition with double bung cable pass system	56 (-1;-6)
4	Partition with single bung cable pass system	49 (-1;-4)
5	Partition with double bung pass system – Doors closed, no cables	60 (-2;-7)

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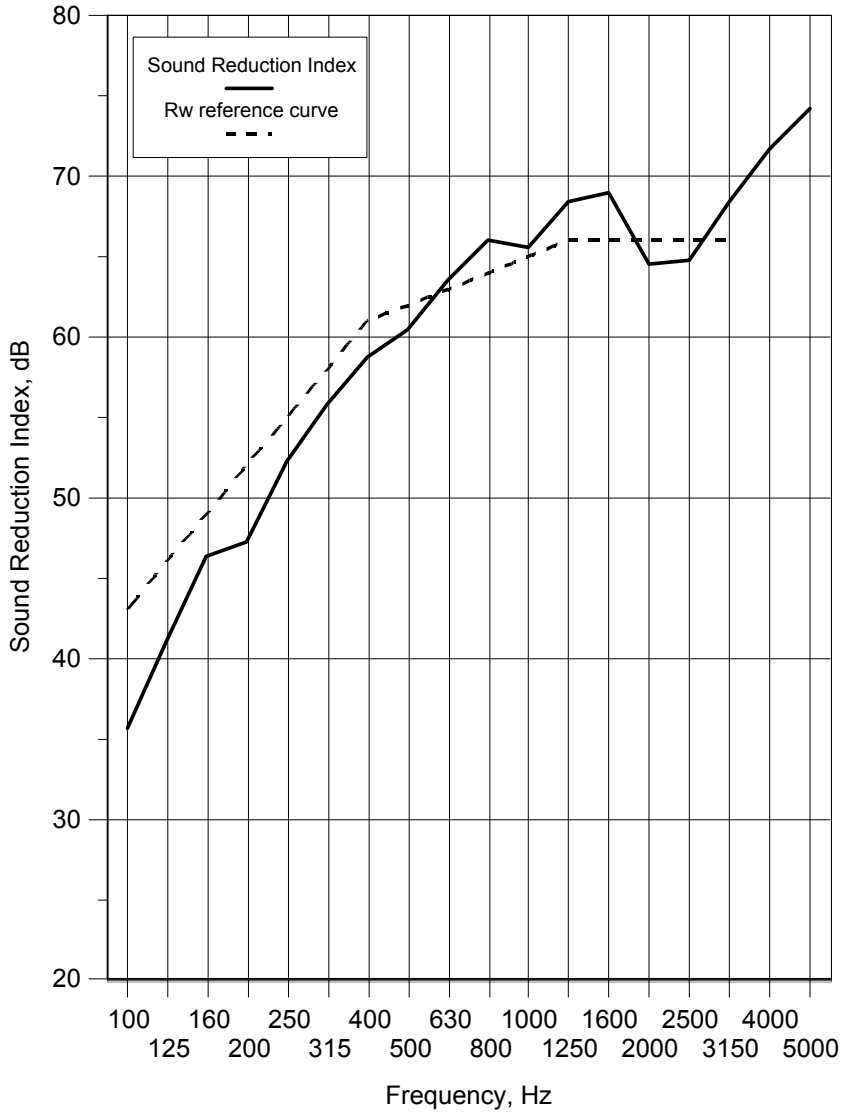
Data Sheet 1

Test Number :	2	**Test Room:**	**Source**	**Receiving**
Client:	Complete Fire Protection Ltd	**Air temperature:**	11.9 °C	12.1 °C
Test Date:	11/04/2016	**Air humidity:**	69 %	54 %
Sample height:	2.2 m	**Volume:**	115 m3	300 m3
Sample width:	2 m			
Sample weight:	26.32 kg/m2		**Air Pressure:**	998 mbar
Product Identification:	Partition without cable system			

Freq f Hz	Sound Reduction Index, dB 1/3 Oct	1/1 Oct
50+	19.3	
63+	20.7	21.2
80+	26.1	
100	35.7	
125	41.0	39.0
160	46.3	
200	47.3	
250	52.3	50.5
315	55.8	
400	58.8	
500	60.5	60.5
630	63.6	
800	66.0	
1000	65.6	66.5
1250	68.5	
1600	69.0	
2000	64.6	65.7
2500	64.8	
3150	68.5	
4000	71.7 *	70.9
5000	74.3 *	
6300+	77.3 *	
8000+	67.1 *	61.8
10000+	57.5 *	
Average 100-3150	58.0	Version v2.1



Rating according to BS EN ISO 717-1:2013

Rw(C;Ctr)= **62 (-3;-9) dB**

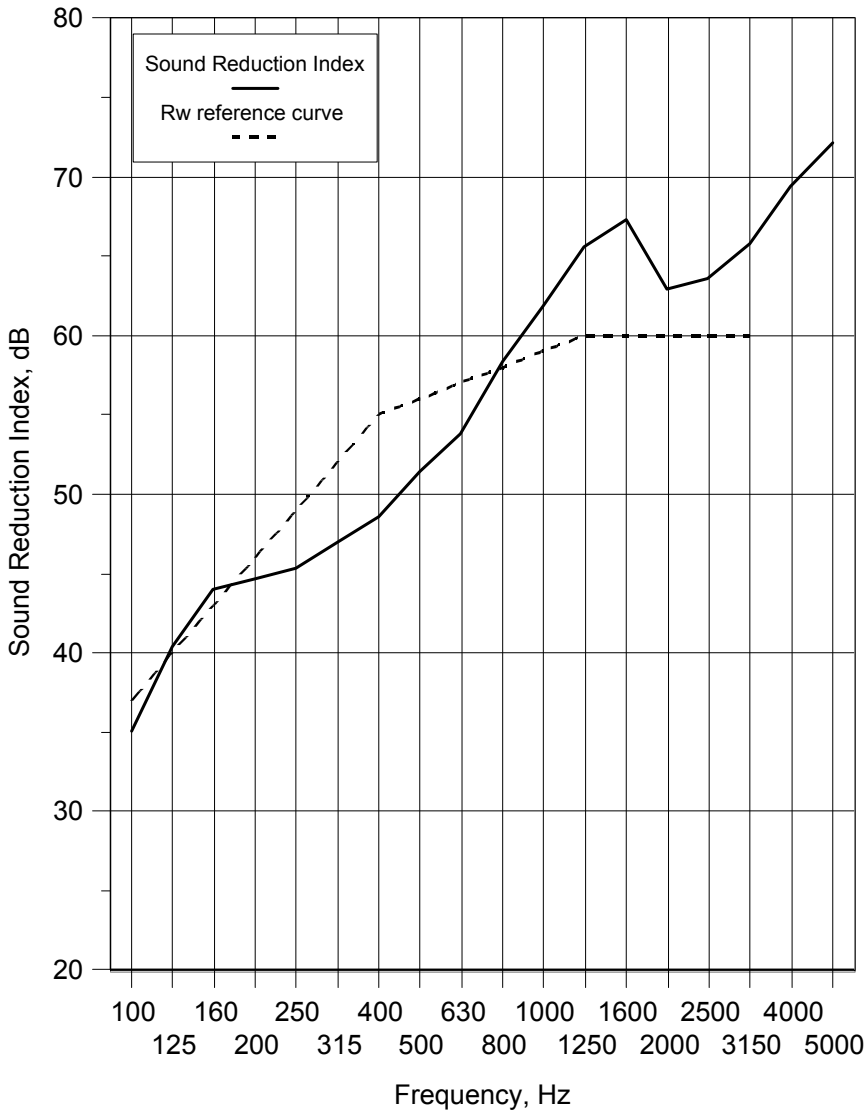
* shows measurement corrected for background

\+ shows frequency beyond standard and not UKAS accredited

Data Sheet 2

Test Number :	3	**Test Room:**	**Source**	**Receiving**
Client:	Complete Fire Protection Ltd	**Air temperature:**	11.8 °C	12.2 °C
Test Date:	11/04/2016	**Air humidity:**	70 %	56 %
Sample height:	2.2 m	**Volume:**	115 m3	300 m3
Sample width:	2 m			
Sample weight:	26.32 kg/m2		**Air Pressure:**	999 mbar
Product Identification:	Partition with double bung cable pass system			

Freq f Hz	Sound Reduction Index, dB 1/3 Oct	1/1 Oct
50+	16.9	19.5
63+	19.6	
80+	26.9	
100	35.1	38.3
125	40.4	
160	44.0	
200	44.7	45.6
250	45.3	
315	47.0	
400	48.6	50.8
500	51.4	
630	53.8	
800	58.4	61.0
1000	61.9	
1250	65.6	
1600	67.3	64.2
2000	62.9	
2500	63.6	
3150	65.8	68.4
4000	69.4 *	
5000	72.2 *	
6300+	75.3 *	61.8
8000+	67.1 *	
10000+	57.5 *	
Average 100-3150	53.5	Version v2.1



Rating according to BS EN ISO 717-1:2013

Rw(C;Ctr)= **56 (-1;-6) dB**

* shows measurement corrected for background

\+ shows frequency beyond standard and not UKAS accredited

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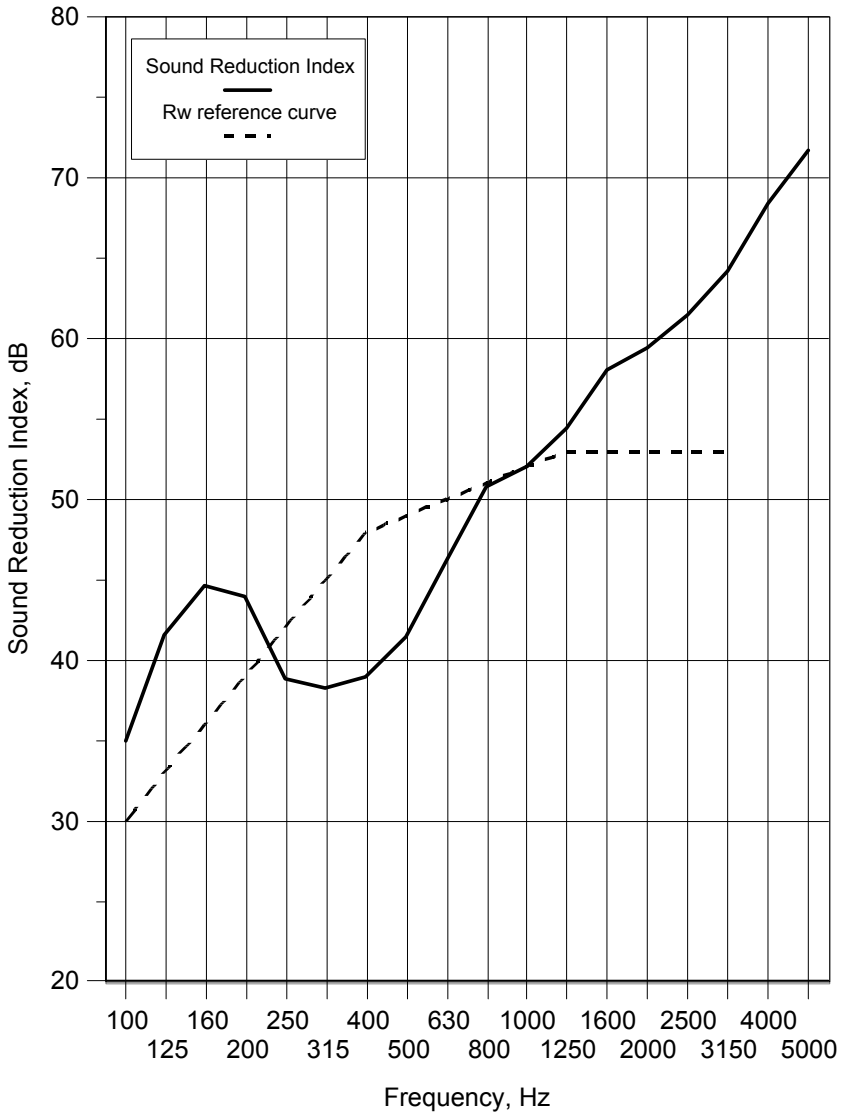
Data Sheet 3

Test Number :	4	**Test Room:**	**Source**	**Receiving**
Client:	Complete Fire Protection Ltd	**Air temperature:**	11.8 °C	12.2 °C
Test Date:	11/04/2016	**Air humidity:**	70 %	56 %
Sample height:	2.2 m	**Volume:**	115 m3	300 m3
Sample width:	2 m			
Sample weight:	26.32 kg/m2		**Air Pressure:**	999 mbar
Product Identification:	Partition with single bung cable pass system			

Freq f Hz	Sound Reduction Index, dB 1/3 Oct	1/1 Oct
50+	16.5	19.1
63+	19.1	
80+	25.8	
100	35.0	38.5
125	41.6	
160	44.7	
200	44.0	39.7
250	38.8	
315	38.3	
400	39.0	41.3
500	41.5	
630	46.1	
800	50.8	52.2
1000	52.1	
1250	54.4	
1600	58.1	59.5
2000	59.5	
2500	61.5	
3150	64.2	67.1
4000	68.5 *	
5000	71.7 *	
6300+	74.9 *	61.6
8000+	66.9 *	
10000+	57.3 *	
Average 100-3150	48.1	Version v2.1



Rating according to BS EN ISO 717-1:2013

Rw(C;Ctr)= **49 (-1;-4) dB**

* shows measurement corrected for background

\+ shows frequency beyond standard and not UKAS accredited

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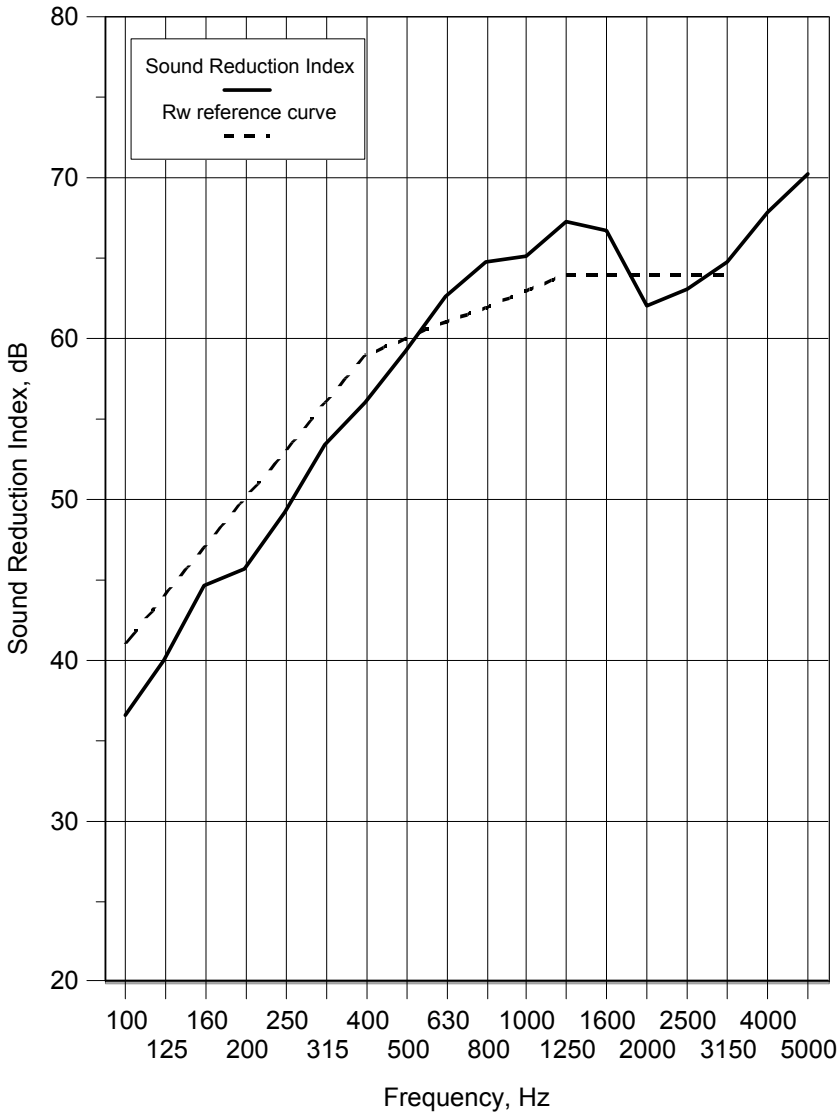
Data Sheet 4

Test Number :	5	**Test Room:**	**Source**	**Receiving**
Client:	Complete Fire Protection Ltd	**Air temperature:**	11.8 °C	12.2 °C
Test Date:	11/04/2016	**Air humidity:**	70 %	56 %
Sample height:	2.2 m	**Volume:**	115 m3	300 m3
Sample width:	2 m			
Sample weight:	26.32 kg/m2		**Air Pressure:**	999 mbar
Product Identification:	Partition with single bung cable pass system. Doors closed, no cables			

Freq f Hz	Sound Reduction Index, dB 1/3 Oct	1/1 Oct
50+	17.5	
63+	21.0	20.4
80+	29.4	
100	36.6	
125	40.0	39.3
160	44.7	
200	45.7	
250	49.2	48.4
315	53.4	
400	56.0	
500	59.2	58.5
630	62.6	
800	64.8	
1000	65.1	65.6
1250	67.3	
1600	66.7	
2000	62.1	63.6
2500	63.1	
3150	64.8	
4000	67.9 *	67.1
5000	70.3 *	
6300+	74.7 *	
8000+	66.9 *	61.7
10000+	57.5 *	
Average 100-3150	56.3	Version v2.1



Rating according to BS EN ISO 717-1:2013

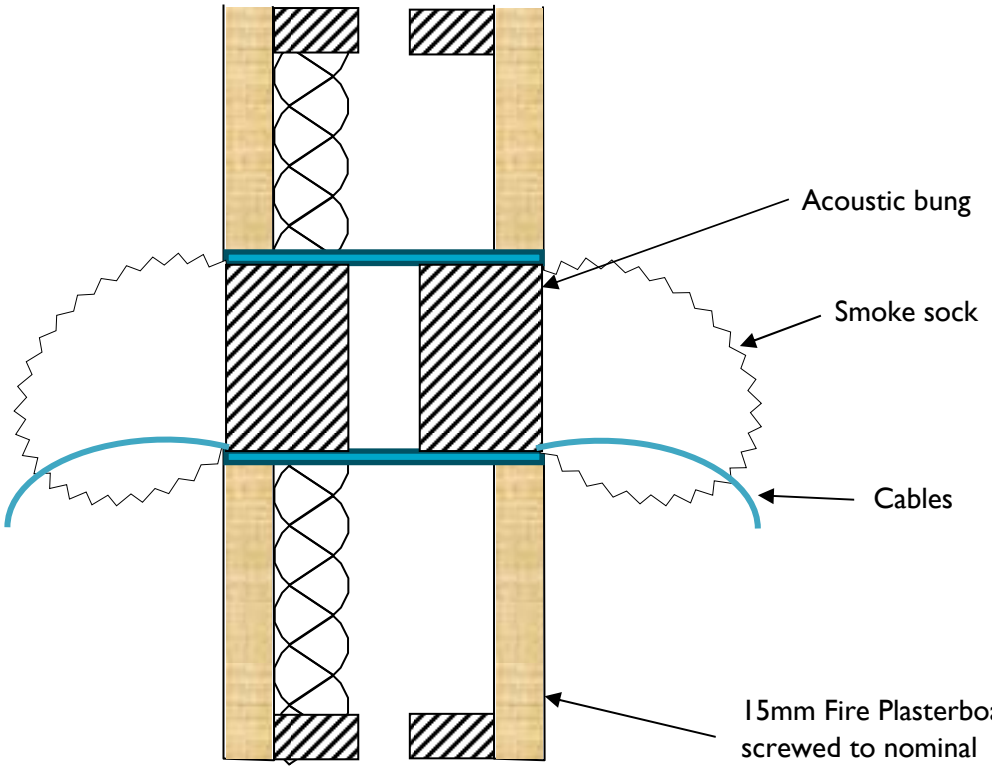
Rw(C;Ctr)= **60 (-2;-7) dB**

* shows measurement corrected for background

\+ shows frequency beyond standard and not UKAS accredited

Drawing 1 – Partition & Set-Up

Partition size nominally 2m wide by 2.2m high



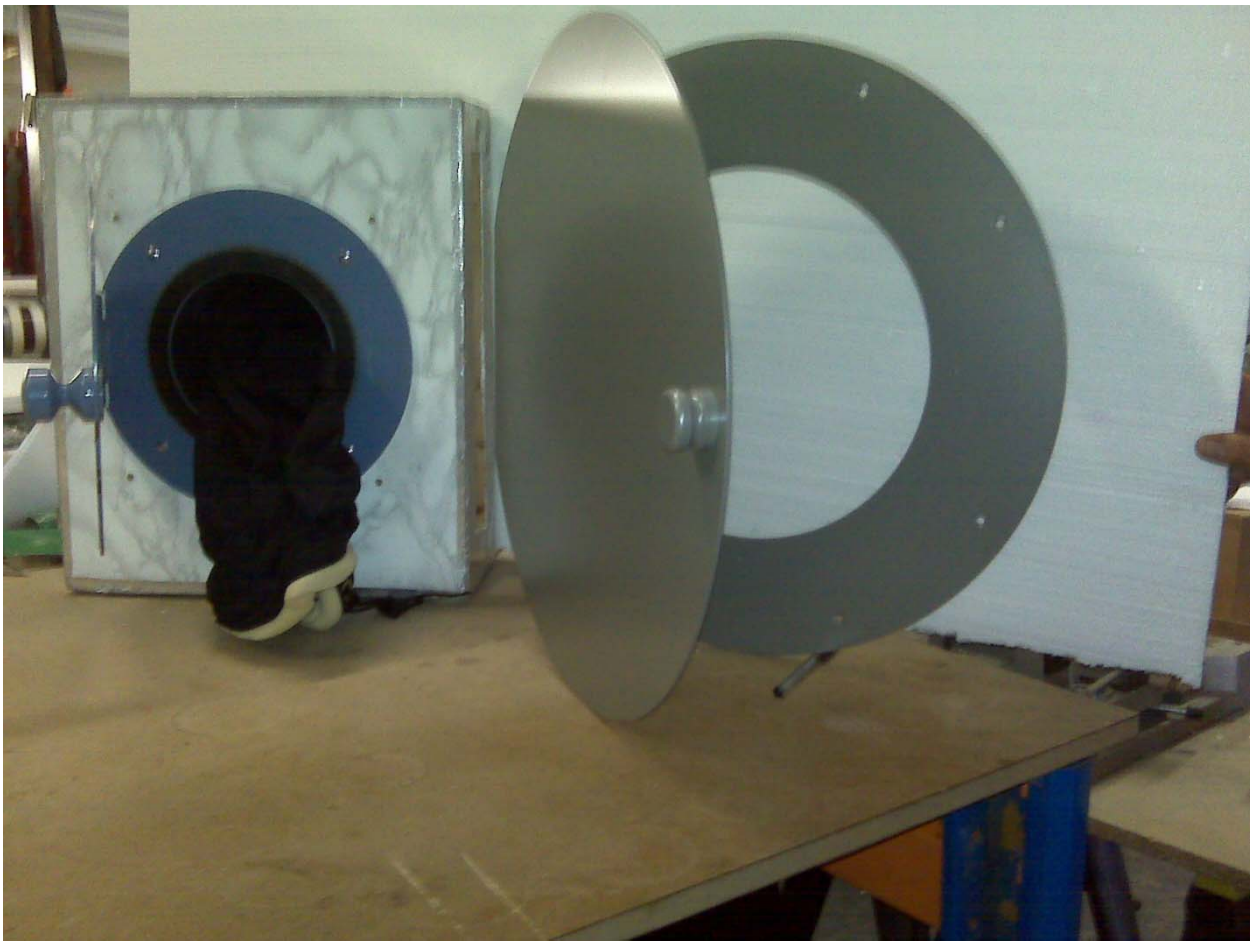
Fire Plug cable pass through system installed in nominal 200mm diameter hole

NOT TO SCALE

Photographs 1 to 3

Photograph 1

Photograph 2



Photograph 3

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 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 717-1:2013 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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