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UKAS TESTING
1262

TEST REPORT No : 125-76,77&79-81 R1 **DATE OF ISSUE : 7 October 2011**

INTERNATIONAL STANDARD METHOD FOR MEASUREMENT OF AIRBORNE SOUND INSULATION OF BUILDING ELEMENTS BS EN ISO 140-3 : 1995

CLIENT:	BritChem Ltd Unit 6, Beehive Business Park Smithies Lane West Yorkshire WF16 0NF
JOB NUMBER:	125
TEST SAMPLE:	Various Sealants
MANUFACTURER:	BritChem Ltd
DATE RECEIVED:	26 August 2010
DATE OF TEST:	31 August 2010

Signed:..... Approved:.....

I G Rattigan
Laboratory Manager

D J M^{c}Caul
Technical Manager

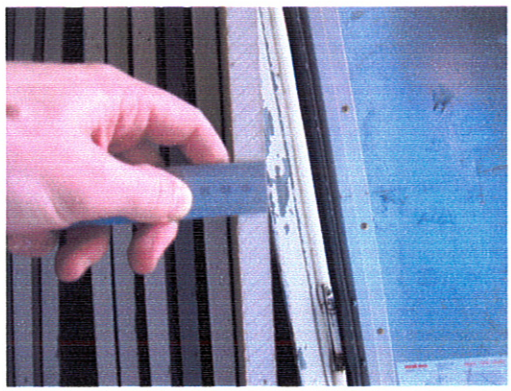
1 TEST SAMPLES

1.1 Description of Test Samples

The following plasterboard partition was built and tested in the 2400mm x 3600mm aperture in the transmission suite.

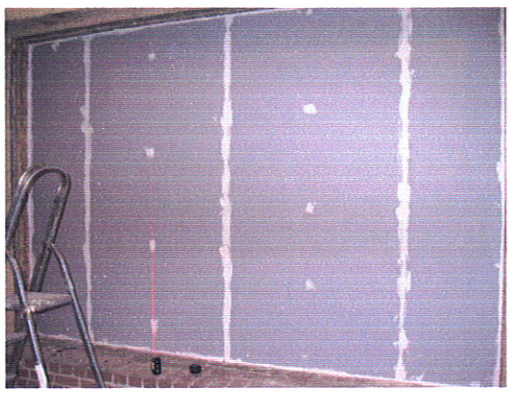
Test Ref: 125-76

Plasterboard partition consisting of 2 staggered layers of 15mm thick Knauf Soundshield Boards mounted on aluminium Knauf 'U' channel, 70mm cavity filled with 25mm thick Knauf Crown Acoustic Partition roll and 2 staggered layers of 15mm thick plasterboard. The perimeter of the partition was sealed with mastic sealant. The nominal mass per unit area was 52.08 kg/m^2.

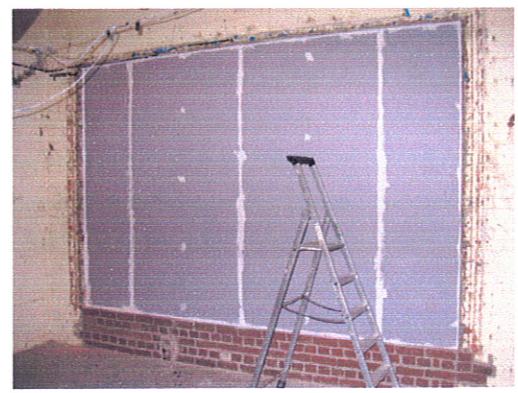


15mm Knauf Soundshield Boards

25mm thick Knauf Crown Acoustic Partition rolls



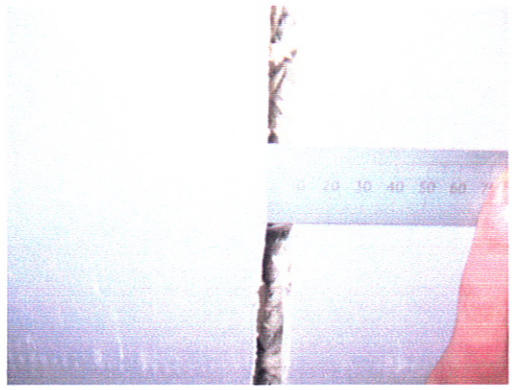
View of Partition from the Source Room



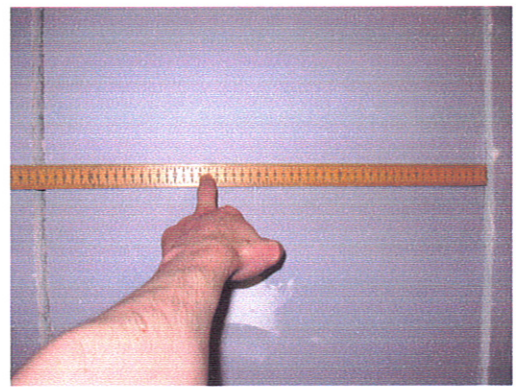
View of Partition from the Receiving Room

Test Ref: 125-77

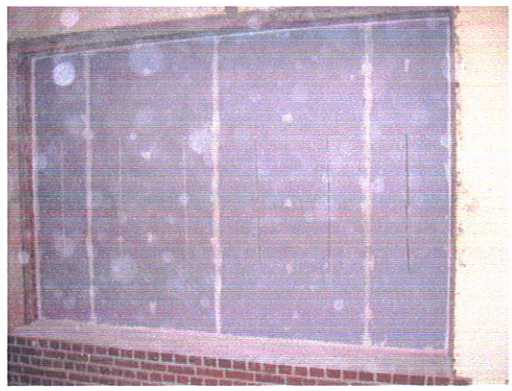
As 125-76. Six 1000mm long × 10mm wide (nominal) perforations were cut all the way through the plasterboards on both sides of the partition. The perforations nearest the edge of the aperture were placed approximately 300mm away from the partition edge with respective perforations being placed at approximately 600mm centres.



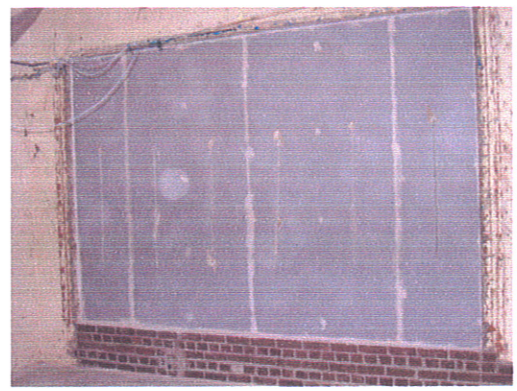
Perforation width approx. 10mm wide



Distance between perforations approx. 600mm



View of Partition from the Source Room



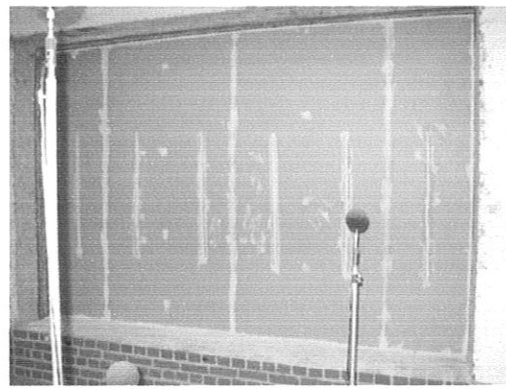
View of Partition from the Receiving Room

The following tests and results have been reported as a total system comprising of the above (Test Ref: 125-77) with various sealants individually applied and tested within 30 minutes of application.

Test Ref: 125-79

As 125-77, with "BritChem Intumescent Acrylic Sealant" used to fill the six 1000mm long × 10mm wide (nominal) perforations on the source and receiving room sides of the partition.

Additional data provided by client: Sealant Density = 1.64 ± 0.02 g/cc

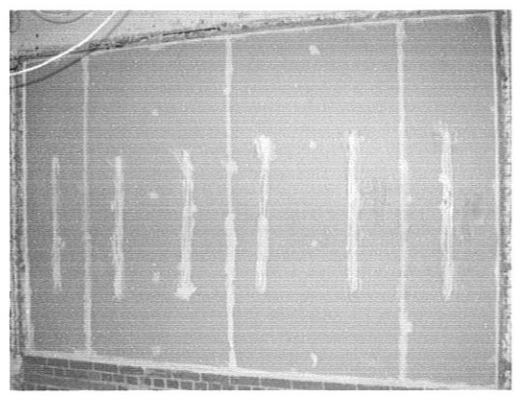


View of Partition from the Source Room

Test Ref: 125-80

As 125-77, with "BritChem Fire-Resistant Silicone Sealant " used to fill the six 1000mm long × 10mm wide (nominal) perforations on the source and receiving room sides of the partition.

Additional data provided by client: Sealant Density = 1.35 ± 0.02 g/cc

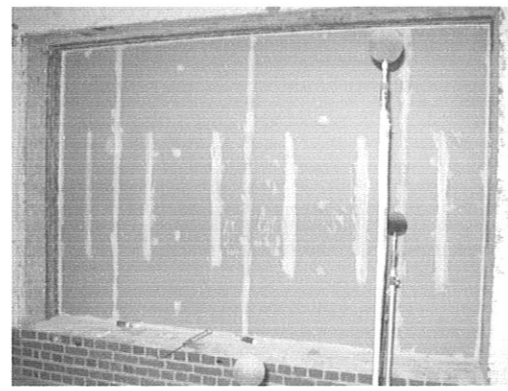


View of Partition from the Receiving Room

Test Ref: 125-81

As 125-77, with "BritChem Water-Based Silicone Sealant" used to fill the six 1000mm long × 10mm wide (nominal) perforations on the source and receiving room sides of the partition.

Additional data provided by client: Sealant Density = 1.30 ± 0.02 g/cc

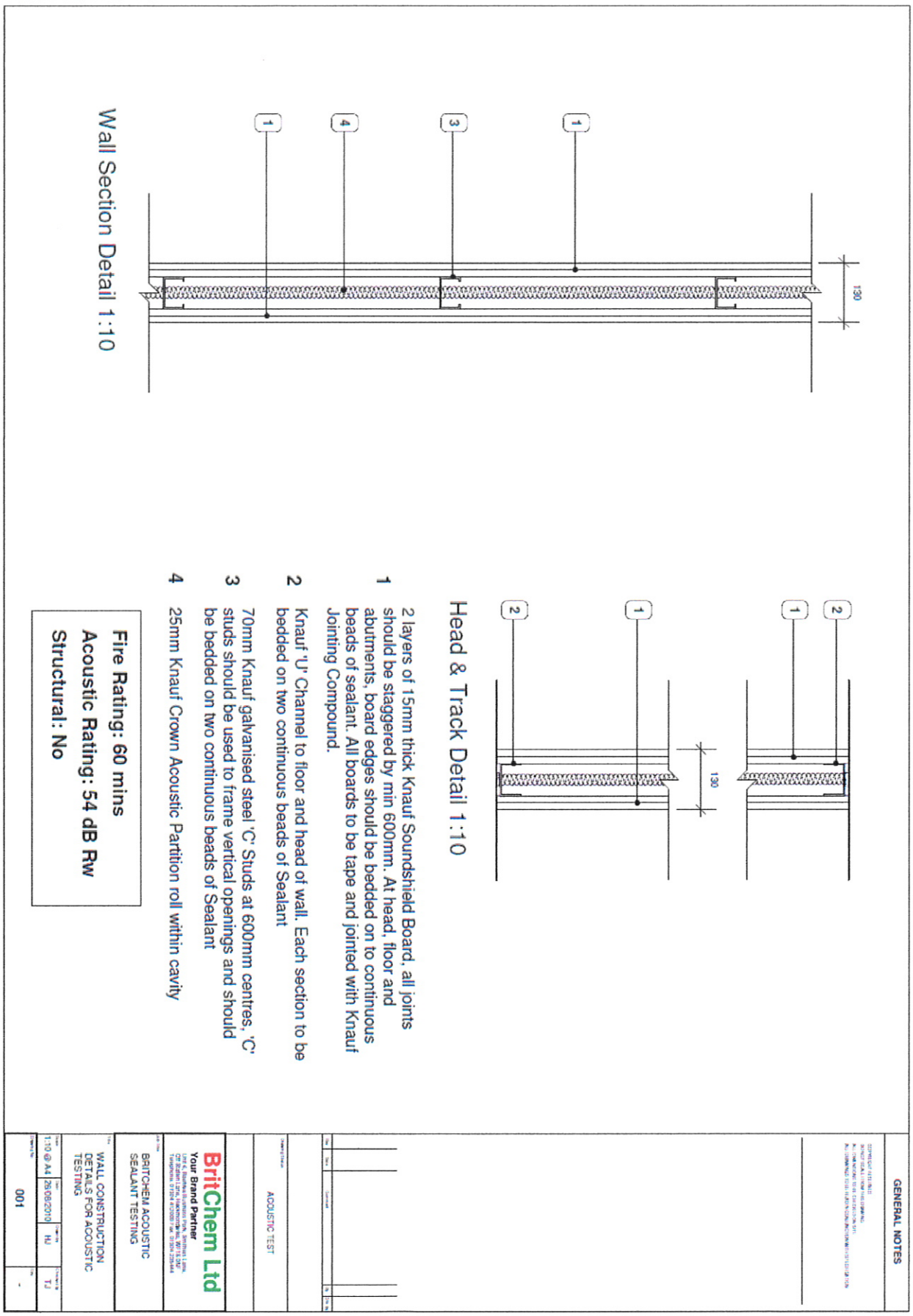


View of Partition from the Source Room

1.2 Sectional Drawings

A sectional drawing of the partition, as provided by client can be found on the following page.

Test ref: 125-76



2 DESCRIPTION OF TEST PROCEDURE

The test procedure adopted follows that detailed in BS EN ISO 140: Part 3: 1995, "Laboratory measurements of airborne sound insulation of building elements".

The measurements are performed in the large transmission suite at the University of Salford. The suite comprises two structurally isolated reverberant rooms with a test opening between them in which the test specimen is inserted. The vertical sides of the test aperture and the base are made from dense brick, whilst the soffit is made from reinforced concrete. Both rooms have been designed with hard surfaces and non-parallel walls. The smaller source room has 6 plywood diffusers and the larger receiving room has 11 plywood diffusers, to increase the diffusivity of the sound field in these areas.

The test involves producing a known sound field in the source room and measuring the resultant sound level difference between the source room and the receiving room with the specimen installed in the test aperture. This level difference is then corrected so as to take into account the equivalent absorption area of the receiving room.

The Sound Reduction Index, R, is defined in BS EN ISO 140: Part 3: 1995 as:

$$R = L_1 - L_2 + 10\log_{10}\frac{S}{A}\ dB \qquad (1)$$

where:

L_1 is the average sound pressure level in the source room (dB)

L_2 is the average sound pressure level in the receiving room (dB)

S is the area of the test specimen (m^2)

A is the equivalent absorption area of the receiving room (m^2)

2.1 Generation of Sound Field in the Source Room

Wide band, random noise from the generator in the real time analyser was amplified and reproduced in the source room using alternately one of two fixed loudspeaker systems, (**La** and **Lb**). Omni-directional loudspeakers were used. The output of the generator was set with the intention that the sound pressure level in the receiving room was at least 15dB higher than the background level in any frequency band. The loudspeakers were positioned in the corners of the room and at such a distance from the test specimen that the direct radiation upon it was not dominant.

2.2 Frequency Range of Measurements

The sound pressure levels were measured using one-third octave band filters. Measurements covered all the one-third octave bands having centre frequencies in the range from 100Hz to 5000Hz,

2.3 Measurement of Sound Pressure Levels

Sound pressure levels were measured simultaneously in the source and receiving rooms using loudspeaker **La** as the sound source. Measurements were recorded at 6 fixed microphone positions in each room, using an averaging time of 16 seconds and the average level in each room was calculated on an energy basis in each one-third octave frequency band. The procedure was then repeated with loudspeaker **Lb** as the sound source. The overall average level difference in each frequency band was then calculated as the arithmetic average of the two sets of results.

For each set of microphone/loudspeaker positions, the distances separating microphones from other microphones, room boundaries and diffusers, were greater than 0.7m and the distances separating microphones from the sound source and the test specimen were greater than 1m.

2.4 Measurement and Evaluation of the Equivalent Absorption Areas

The correction term of equation (1) containing the equivalent absorption area was evaluated from the reverberation time and calculated using Sabine's formula:

$$A = \frac{0.16\ V}{T} \qquad (2)$$

where:

V is the volume of the receiving room (m^3)

T is the reverberation time (s)

The reverberation time of the receiving room was measured using a decay technique. The decays were produced by exciting the room with wide band random noise and stopping the excitation once the room became saturated. The resulting decaying sound field was monitored at 6 fixed microphone positions using a one-third octave band real time analyser. The sound spectrum was sampled at 32 millisecond intervals and stored in memory. Five decays were measured at each microphone position and averaged. The time taken for the sound to decay by 20dB was measured and tripled to give the reverberation time. The measurements were repeated using an alternative sound source. The results from each set of positions were averaged (ie 60 reverberation decays at each frequency).

3 EQUIPMENT

	Departmental Record No
Norwegian Electronics 1/3 octave band real time analyser type 840 with in-built random noise generator	RTA2
Quad 510 power amplifier	PA7
2 off omni-directional broadband loudspeakers (source room)	LS10 – LS11
2 off broadband loudspeakers (receiving room)	LS3-LS4
3 off Bruel & Kjaer random incidence condenser microphones type 4166 in the source room	M2-M4
3 off G.R.A.S. random incidence condenser microphones type 40AP in the source room	M21, M22, M25
5 off Bruel &Kjaer random incidence condenser microphone type 4166 in the receiving room	M7-M9 M18, M19
1 off G.R.A.S. random incidence condenser microphones type 40AP in the receiving room	M20
2 off Norsonic Multiplexers type 834A	MP1-MP2
HP Brio Pentium personal computer and related peripheral equipment (printer, plotter, monitor etc.)	COM6
Yamaha GQ1031BII graphic equalizer	GE1

4 RESULTS

The sound reduction indices at one-third octave band intervals, (R), are given in the tables overleaf.

Source room volume: $136m^3$

Receiving room volume: $220m^3$

Sample sizes: 2400mm x 3600mm

Temperature & Relative Humidity:

Test Reference	Source Room		Receiving Room	
	Temperature [°C]	Relative Humidity [%]	Temperature [°C]	Relative Humidity [%]
125-76	19.3	50.8	18.4	50.8
125-77	19.9	48.7	19.5	50.3
125-79	20.3	46.7	19.9	50.4
125-80	20.5	44.8	20.1	50.9
125-81	20.4	47.1	20.0	49.8

Also given in the attached tables and computed from the one-third octave band sound reduction indices, is the weighted sound reduction index, R_w, calculated according to ISO 717/1-1996. This evaluation has been based on a result obtained by a laboratory method.

The results here presented relate only to the items tested and described in this report.

Sound Insulation ISO 717 (1982)

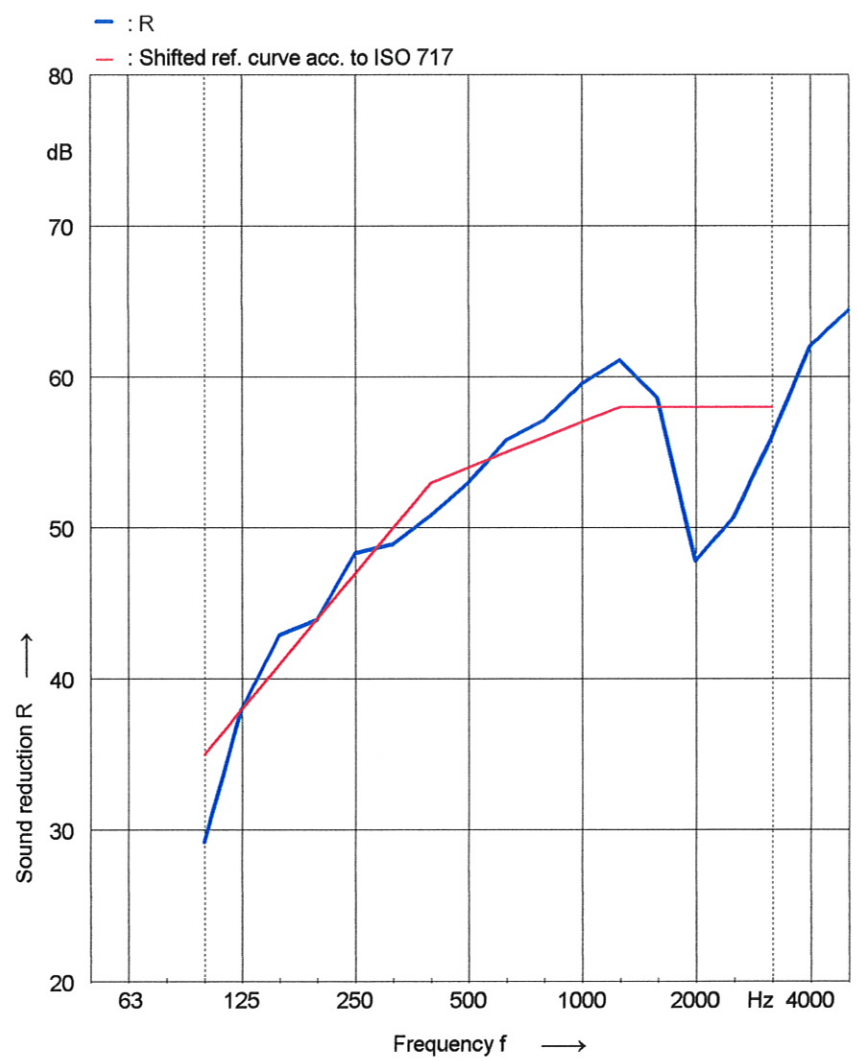
Client: BritChem Ltd, Unit 6
Test specimen mounted by: Client
Description of the specimen:
Plasterboard Partition
2 x 15mm Plasterboard
70mm Cavity with 25mm Rockwool
2 x 15mm Plasterboard

Product identification: Plasterboard Partition
Test room identification: Sm. Rev. Room / Lg. Rev. Room
Date of test: 31/08/10

Size: 8.64 m²
Mass per unit: 52.08 kg/m²
Temperature [°C]: 18.4
Humidity [%]: 50.8
Source room Volume: 136 m³
Receiving room Volume: 220 m³

FREQUENCIES 50, 63 & 80 Hz ARE NOT UKAS ACCREDITED

Frequency [Hz]	R 1/3 oct. [dB]
50	-.-
63	-.-
80	-.-
100	29.2
125	38.0
160	42.9
200	43.9
250	48.3
315	48.9
400	50.8
500	53.0
630	55.8
800	57.1
1000	59.5
1250	61.1
1600	58.6
2000	47.8
2500	50.7
3150	56.0
4000	62.0
5000	64.4



Rating according to ISO 717-1
$R_W(C,C_{tr})$ = 54 (-3; -7) dB

$C_{50\text{-}315o}$: ---
$C_{50\text{-}5000}$: ---
$C_{100\text{-}5000}$: -2 dB
$C_{tr50\text{-}315o}$: ---
$C_{tr50\text{-}5000}$: ---
$C_{tr100\text{-}5000}$: -7 dB

Evaluation based on laboratory measurement results obtained by an engineering method

University of Salford School of Computing Science & Engineering

No. of test report: 125-76
Salford, 31.08.2010
Signature:

Sound Insulation ISO 717 (1982)

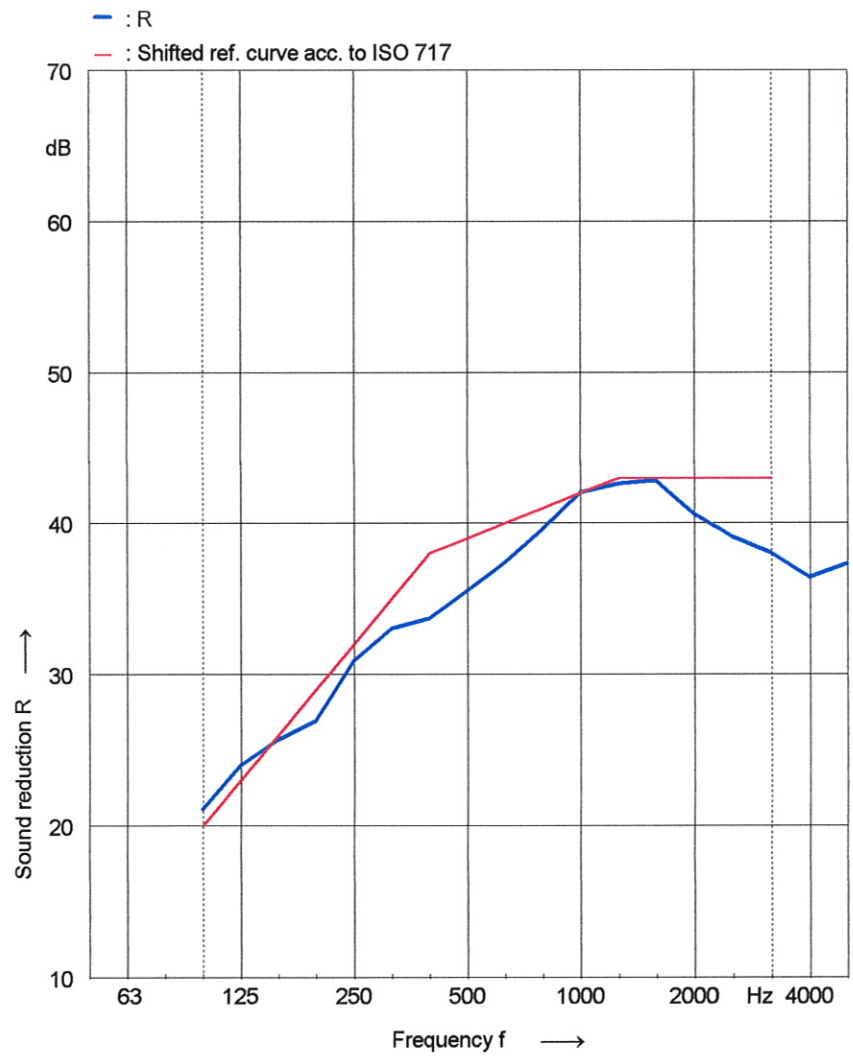
Client: BritChem Ltd, Unit 6
Test specimen mounted by: Client
Description of the specimen:
Plasterboard Partition
2 x 15mm Plasterboard
70mm Cavity withg 25mm Rockwool
2 x 15mm Plasterboard
6 x perforations [approx. 1000mm long x 10mm wide]

Product identification: Plasterboard Partition with perforations
Test room identification: Sm. Rev. Room / Lg. Rev. Room
Date of test: 31/08/10

Size: 8.64 m²
Mass per unit: 52.08 kg/m²
Temperature [°C]: 19.5
Humidity [%]: 50.3
Source room Volume: 136 m³
Receiving room Volume: 220 m³

FREQUENCIES 50, 63 & 80 Hz ARE NOT UKAS ACCREDITED

Frequency [Hz]	R 1/3 oct. [dB]
50	-.-
63	-.-
80	-.-
100	21.1
125	24.0
160	25.7
200	26.9
250	30.9
315	33.0
400	33.7
500	35.5
630	37.4
800	39.6
1000	42.0
1250	42.6
1600	42.8
2000	40.6
2500	39.1
3150	38.0
4000	36.4
5000	37.3



Rating according to ISO 717-1
$R_W(C,C_{tr})$ = 39 (-2; -5) dB

$C_{5o-315o}$: ---
$C_{5o-5ooo}$: ---
$C_{1oo-5ooo}$: -2 dB
$C_{tr5o-315o}$: ---
$C_{tr5o-5ooo}$: ---
$C_{tr1oo-5ooo}$: -5 dB

Evaluation based on laboratory measurement results obtained by an engineering method

University of Salford School of Computing Science & Engineering

No. of test report: 125-77
Salford, 31.08.2010

Signature:

Sound Insulation ISO 717 (1982)

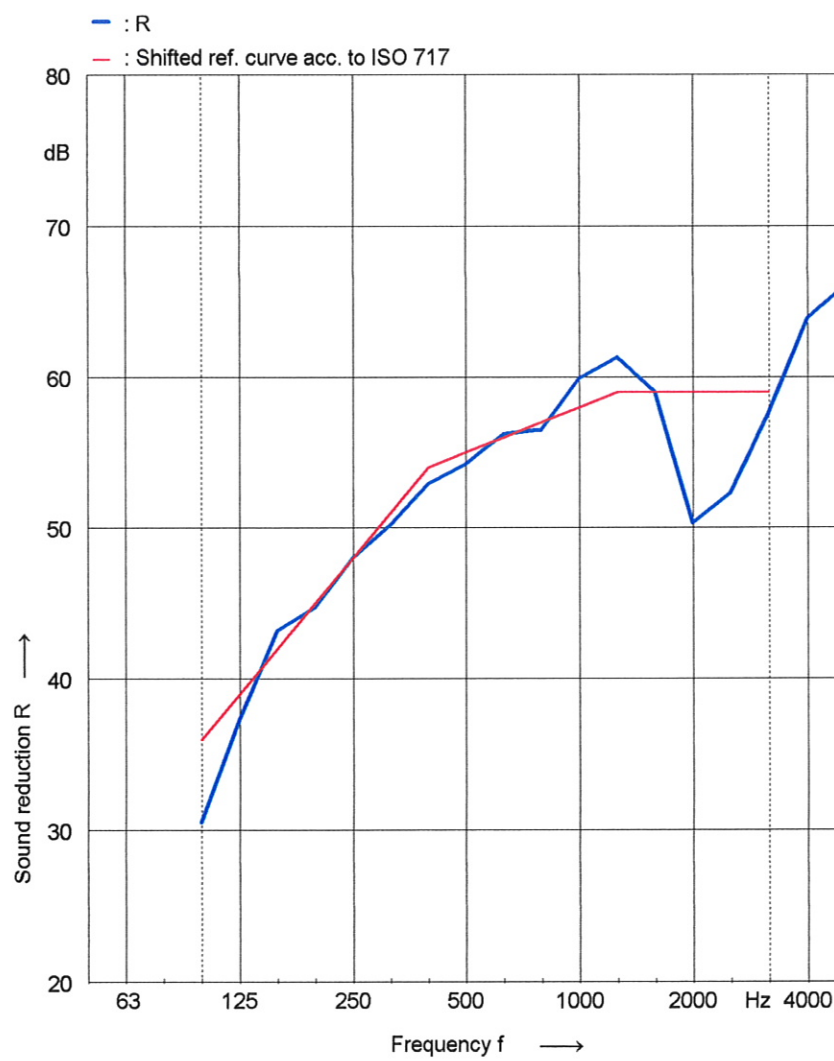
Client: BritChem Ltd, Unit 6
Test specimen mounted by: Client
Description of the specimen:
As 125-77 with "BritChem Intumescent Acrylic Sealant" applied to the perforations

Product identification: BritChem Intumescent Acrylic Sealant
Test room identification: Sm. Rev. Room / Lg. Rev. Room
Date of test: 31/08/10

Size: 8.64 m²
Mass per unit: 52.08 kg/m²
Temperature [°C]: 19.9
Humidity [%]: 50.4
Source room Volume: 136 m³
Receiving room Volume: 220 m³

FREQUENCIES 50, 63 & 80 Hz ARE NOT UKAS ACCREDITED

Frequency [Hz]	R 1/3 oct. [dB]
50	-.-
63	-.-
80	-.-
100	30.5
125	37.3
160	43.2
200	44.7
250	48.0
315	50.2
400	52.9
500	54.2
630	56.2
800	56.5
1000	59.9
1250	61.3
1600	59.0
2000	50.3
2500	52.3
3150	57.6
4000	63.9
5000	66.1



Rating according to ISO 717-1
$R_w(C,C_{tr})$ = 55 (-3; -7) dB

$C_{50\text{-}315o}$: ---
$C_{50\text{-}5000}$: ---
$C_{100\text{-}5000}$: -2 dB
$C_{tr50\text{-}315o}$: ---
$C_{tr50\text{-}5000}$: ---
$C_{tr100\text{-}5000}$: -7 dB

Evaluation based on laboratory measurement results obtained by an engineering method

University of Salford School of Computing Science & Engineering

No. of test report: 125-79
Salford, 31.08.2010

Signature:

Sound Insulation ISO 717 (1982)

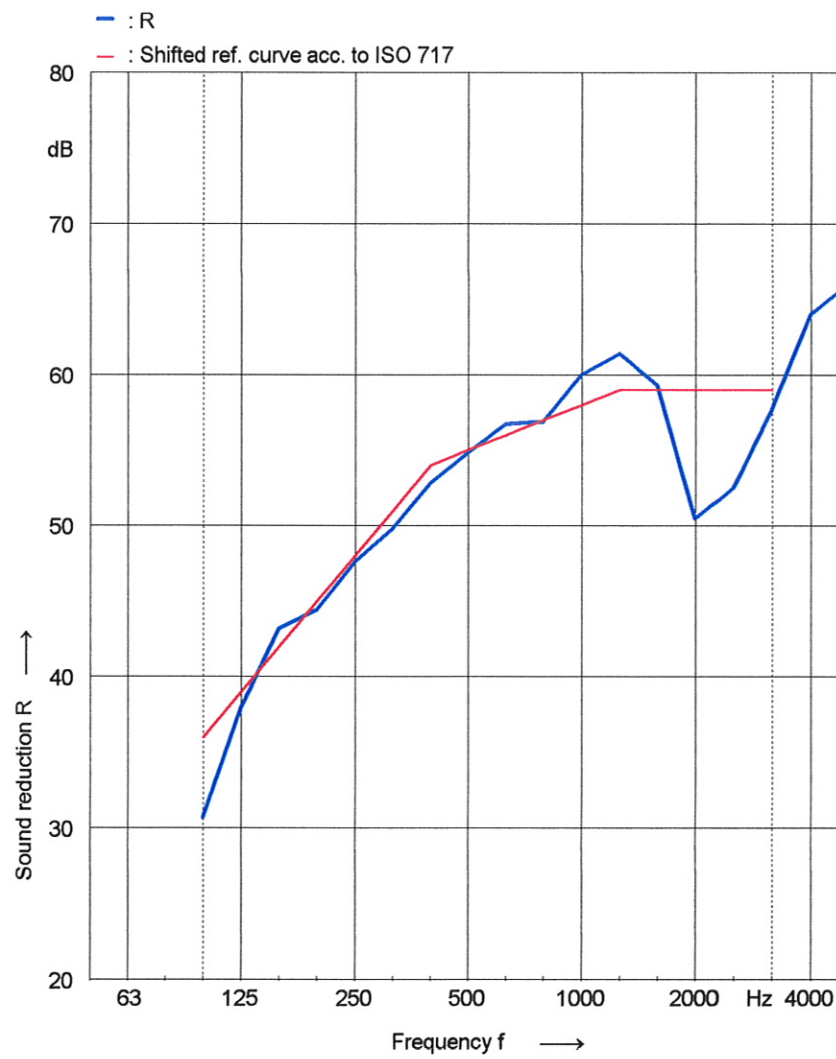
Client: BritChem Ltd, Unit 6
Test specimen mounted by: Client
Description of the specimen:
As 125-77 with "BritChem Fire Resistant Silicone Sealant" applied to the perforations

Product identification: BritChem Fire Resistant Silicone Sealant
Test room identification: Sm. Rev. Room / Lg. Rev. Room
Date of test: 31/08/10

Size: 8.64 m²
Mass per unit: 52.08 kg/m²
Temperature [°C]: 20.1
Humidity [%]: 50.9
Source room Volume: 136 m³
Receiving room Volume: 220 m³

FREQUENCIES 50, 63 & 80 Hz ARE NOT UKAS ACCREDITED

Frequency [Hz]	R 1/3 oct. [dB]
50	-.-
63	-.-
80	-.-
100	30.7
125	37.9
160	43.2
200	44.4
250	47.6
315	49.8
400	52.8
500	54.8
630	56.7
800	56.9
1000	60.0
1250	61.4
1600	59.3
2000	50.5
2500	52.5
3150	57.7
4000	64.0
5000	66.0



Rating according to ISO 717-1
$R_W(C,C_{tr})$ = 55 (-2; -7) dB

$C_{5o-315o}$: ---
$C_{5o-5ooo}$: ---
$C_{1oo-5ooo}$: -1 dB
$C_{tr5o-315o}$: ---
$C_{tr5o-5ooo}$: ---
$C_{tr1oo-5ooo}$: -7 dB

Evaluation based on laboratory measurement results obtained by an engineering method

University of Salford School of Computing Science & Engineering

No. of test report: 125-80
Salford, 31.08.2010

Signature:

Sound Insulation ISO 717 (1982)

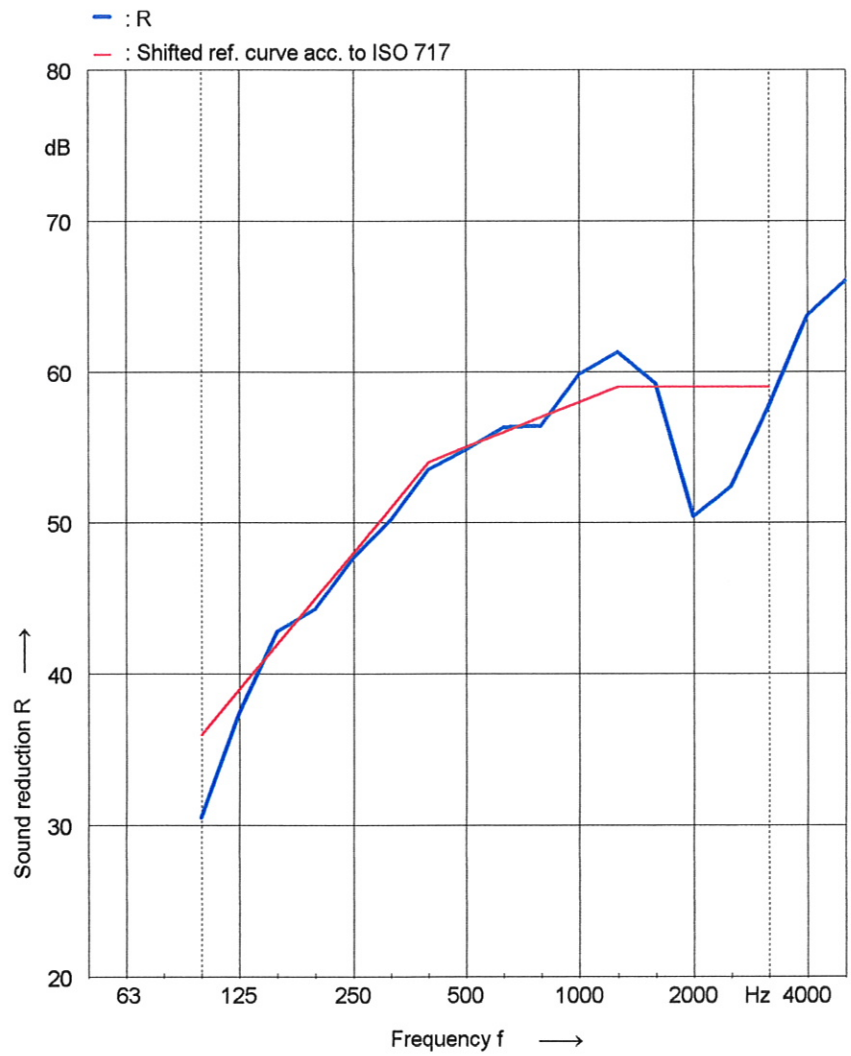
Client: BritChem Ltd, Unit 6
Test specimen mounted by: Client
Description of the specimen:
As 125-77 with "BritChem Water-Based Silicone Sealant" applied to the perforations

Product identification: BritChem Water-Based Silicone Sealant
Test room identification: Sm. Rev. Room / Lg. Rev. Room
Date of test: 31/08/10

Size: 8.64 m²
Mass per unit: 52.08 kg/m²
Temperature [°C]: 20.0
Humidity [%]: 49.8
Source room Volume: 136 m³
Receiving room Volume: 220 m³

FREQUENCIES 50, 63 & 80 Hz ARE NOT UKAS ACCREDITED

Frequency [Hz]	R 1/3 oct. [dB]
50	-.-
63	-.-
80	-.-
100	30.5
125	37.4
160	42.8
200	44.3
250	47.7
315	50.2
400	53.5
500	54.8
630	56.3
800	56.4
1000	59.8
1250	61.3
1600	59.2
2000	50.4
2500	52.4
3150	57.7
4000	63.7
5000	66.0



Rating according to ISO 717-1
$R_W(C;C_{tr})$ = 55 (-2; -7) dB

$C_{50\text{-}315o}$: ---
$C_{50\text{-}5ooo}$: ---
$C_{1oo\text{-}5ooo}$: -2 dB
$C_{tr5o\text{-}315o}$: ---
$C_{tr5o\text{-}5ooo}$: ---
$C_{tr1oo\text{-}5ooo}$: -7 dB

Evaluation based on laboratory measurement results obtained by an engineering method

University of Salford School of Computing Science & Engineering

No. of test report: 125-81
Salford, 31.08.2010
Signature: