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UKAS TESTING
1262

TEST REPORT No : AC08/129/04-07 **DATE OF ISSUE : 09 June 2008**

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

CLIENT:	Allaway Acoustics Ltd Old Police Station 1 Queens Rd Hertford Hertfordshire
JOB NUMBER:	AC08/129
TEST SAMPLE:	"Type 1 Pre-galvanised heavy-gauge perforated sheet metal case with medium-density fibreglass infill" "Type 2 Pre-galvanised heavy-gauge sheet metal case with medium-density fibreglass infill"
MANUFACTURER:	Allaway Acoustics
DATE RECEIVED:	23 May 2008
DATE OF TEST:	04 June 2008

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

C E Churchill
Laboratory Manager

A T Moorhouse
Laboratory Director

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 intension 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 3620mm
Temperature in source room	See individual results sheet for details
Temperature in receiving room	See individual results sheet for details
Relative humidity in source room:	See individual results sheet for details
Relative humidity in receiving room	See individual results sheet for details

Also given in the attached tables and computed from the one-third octave band sound reduction indices, 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.

ISO 140-3:1995 Laboratory measurements of airborne sound insulation of building elements

Client	Allaway Acoustics Old Police Station 1 Queens Rd Hertford
Manufacturer Allaway Acoustics Test specimen mounted by: Client Product identification: Type 2 panels	
Measurement procedure: ISO 140-3:1995	Test procedure: ISO 717-1:1996
Mass per unit: 48.6 kg/m²	Size: 8.64 m²
Temperature [°C]: 21.0	Humidity [%]: 49.6
Test room identification: Small Rev Room / Large Rev Room Source room Volume: 136 m³ Receiving room Volume: 220 m³ Date of test: 04/06/08	FREQUENCIES 50, 63 & 80 Hz ARE NOT UKAS ACCREDITED

Weighted Sound reduction $R_w(C,C_{tr})$ = 55 (-2; -5) dB

Sum of unfavourable deviations: 25.6 dB

Max. unfavourable deviation: 5.3 dB at 500 Hz

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

$C_{tr50\text{-}315o}$:: --- $C_{tr50\text{-}5000}$: --- $C_{tr100\text{-}5000}$: -6 dB

Frequency [Hz]	R [dB]	L1 [dB]	L2 [dB]	T [s]	Corr. [dB]	u.Dev. [dB]	
100	35.7	91.7	56.9	4.96	0.9	0.3	
125	39.2	93.3	55.2	5.21	1.1	-.-	
160	40.3	90.7	50.5	4.14	0.1	1.7	
200	42.8	93.9	51.1	4.03	0.0	2.2	
250	45.7	93.9	49.0	4.90	0.8	2.3	
315	47.7	93.4	46.5	4.90	0.8	3.3	
400	49.0	93.5	45.2	4.83	0.7	5.0	
500	49.7	94.0	45.4	5.23	1.1	5.3	
630	52.8	92.9	41.3	5.38	1.2	3.2	
800	55.6	94.2	39.8	5.39	1.2	1.4	
1000	57.3	92.7	36.6	5.31	1.2	0.7	
1250	58.8	93.2	35.3	5.03	0.9	0.2	
1600	59.7	92.1	33.1	4.79	0.7	-.-	
2000	59.3	94.4	35.3	4.29	0.2	-.-	
2500	61.1	93.9	32.5	3.83	-0.3	-.-	
3150	60.3	91.9	30.6	3.26	-1.0	-.-	
4000	52.3	93.7	39.7	2.78	-1.7	-.-	
5000	50.6	93.3	39.9	2.16	-2.8	-.-	

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No. of test report: AC08-129-04 Salford, 4.06.2008

Sound Insulation ISO 717 (1982)

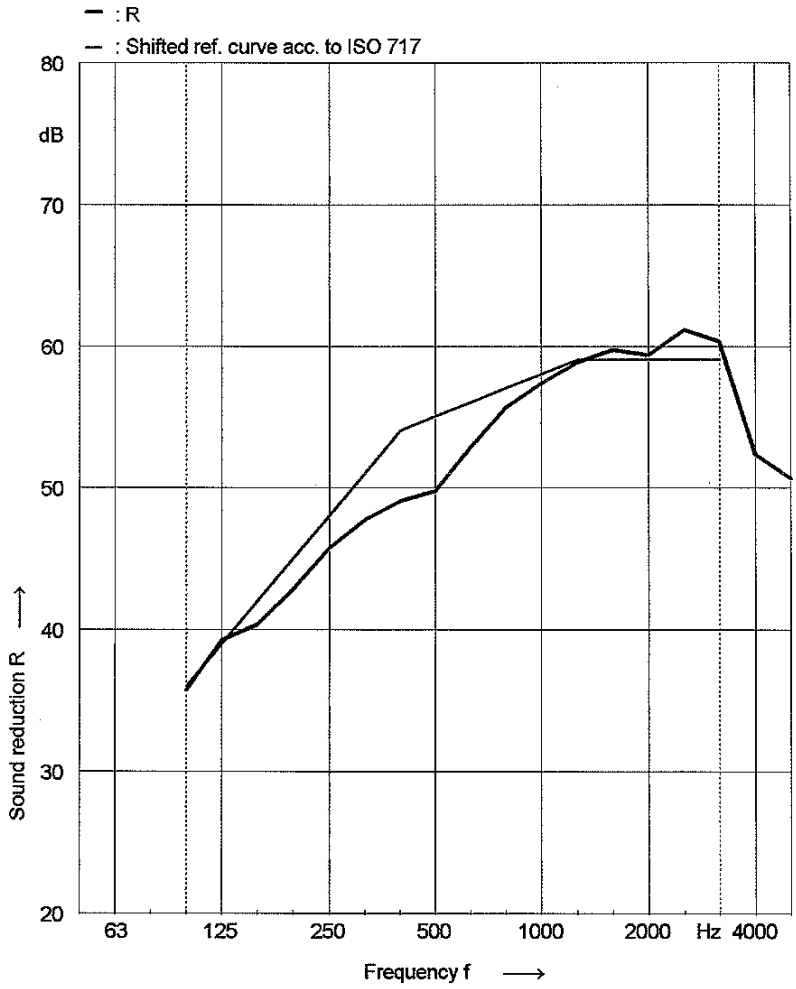
Client: Allaway Acoustics, Old Police Station
Test specimen mounted by: Client
Description of the specimen:
Type 2 panels

Product identification: Type 2 panels
Test room identification: Small Rev Room / Large Rev Room
Date of test: 04/06/08

Size: 8.64 m²
Mass per unit: 48.6 kg/m²
Temperature [°C]: 21.0
Humidity [%]: 49.6
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	35.7
125	39.2
160	40.3
200	42.8
250	45.7
315	47.7
400	49.0
500	49.7
630	52.8
800	55.6
1000	57.3
1250	58.8
1600	59.7
2000	59.3
2500	61.1
3150	60.3
4000	52.3
5000	50.6



Rating according to ISO 717-1
$R_W(C,C_{tr})$ = 55 (-2; -5) dB

$C_{50\text{-}315o}$: —
$C_{50\text{-}5000}$: —
$C_{100\text{-}5000}$: -2 dB
$C_{tr50\text{-}315o}$: —
$C_{tr50\text{-}5000}$: —
$C_{tr100\text{-}5000}$: -6 dB

Evaluation based on laboratory measurement results obtained by an engineering method

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Salford, 4.06.2008

Signature: