



The Building Test Centre

Fire Acoustics Structures

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Report Number **BTC 13621A**

AN ACOUSTIC TEST REPORT COVERING
LABORATORY SOUND INSULATION TESTS TO
BS EN ISO 140-3:1995 ON A TWIN TIMBER FRAMED
PLASTERBOARD SPANDREL PANEL SYSTEM
INCORPORATING TIMBER STUDS, A DOUBLE LAYER
OF 12MM FERMACELL EACH SIDE AND A SINGLE
LAYER OF 60mm ROCKSIL S60 WITHIN THE CAVITY.

Test Date: 15th October 2004

www.btconline.co.uk

Customer: Smartroof Limited
Old Station Road
Hampton in Arden
Solihull
B92 0HB

Customer: **Smartroof Limited**

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AN ACOUSTIC TEST REPORT COVERING LABORATORY SOUND INSULATION TESTS TO BS EN ISO 140-3:1995 ON A TWIN TIMBER FRAMED PLASTERBOARD SPANDREL PANEL PARTITION SYSTEM INCORPORATING TIMBER STUDS, A DOUBLE LAYER OF 12MM FERMACELL EACH SIDE AND A SINGLE LAYER OF 60mm ROCKSIL S60 WITHIN THE CAVITY.

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FOREWORD

This test report details sound insulation tests conducted on a Spandrel panel partition system. The test sponsor was Smartroof Limited.

Smartroof Limited installed the test specimen on 14th October 2004. The Building Test Centre played no role in the design of the test specimen.

REPORT AUTHORISATION

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TEST CONSTRUCTION

Timber frames were pre-constructed as shown in Fig 1 and Fig 2. Two pre-constructed frames were positioned within the test frame with a distance of 50mm between each pre-constructed frame. The pre-constructed frames consisted of 36mm x 72mm timber studs, a 36mm x 97mm timber bottom and top rails. Studs were nailed to the top and bottom rails.

A single layer of Knauf 60mm Rocksil S60 was positioned within the studs of one of the pre-constructed timber frame.

A double layer of 12mm Fermacell board was stapled on each side at 150mm centres at stud positions and around the board perimeter, using 35mm deep staples.

The perimeter and vertical joints were masked with acoustic tape and the perimeter was sealed with acoustic sealant.

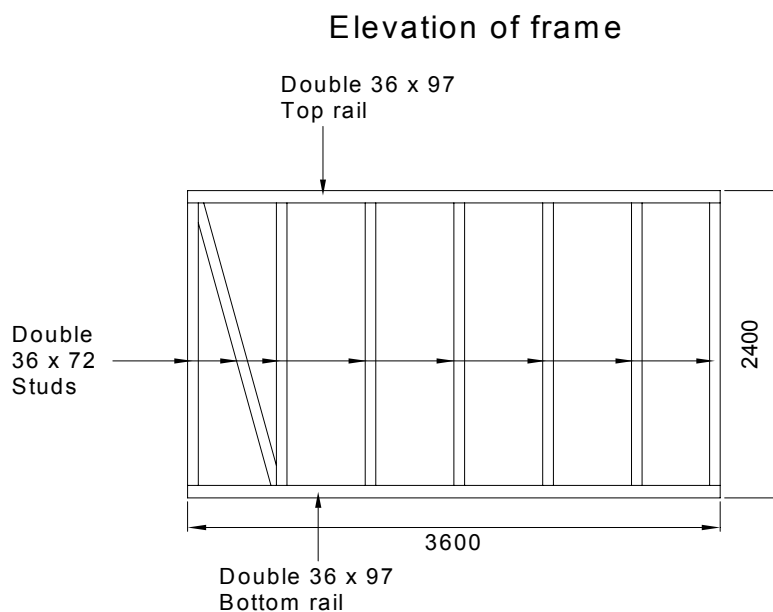


Figure 1 Front Elevation of the timber frame

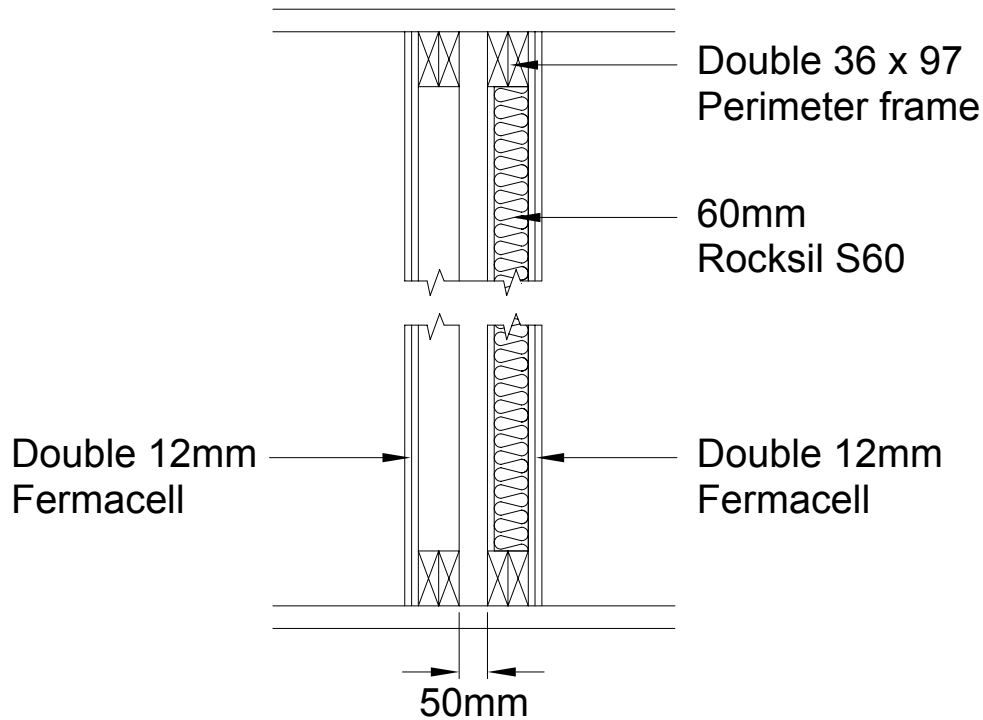


Figure 2 End elevation of construction

The descriptions of individual components making up the test specimen were provided by the customer and were checked for accuracy wherever possible.

TEST MATERIALS

Fermacell

Nominally 2400mm (long) x 1200mm (wide) x 12mm (thick) Fermacell board supplied by Wyckham Blackwell Limited.

Average surface density:	14.56 kg/m ²
Average thickness:	12.54 mm

Timber

Timber was supplied in pre-constructed timber frames by Wyckham Blackwell Limited. A section of the frame was measured for dimensions and weight once the system had been removed.

Actual Dimensions:	(2 x 34mm) wide x 72mm deep x 1245mm long
Actual weight:	3.24
Weight per unit length:	2.6kg/m

Insulation

Knauf Rocksil S60 slabs nominally 60mm x 1200mm x 600mm supplied by Wyckham Blackwell Limited.

Actual surface density:	62.91kg/m ³
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Fixings

35mm staples supplied by Wyckham Blackwell Limited

When measurements could not be taken weight and dimensions were provided by the customer or the manufacturer, e.g. from material labelling. Material information was recorded according to procedure MAT/1

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TEST PROCEDURE

The test specimen (3.6 m x 2.4 m) was constructed in a wall dividing two reverberant rooms of approximately 98m³ and 62m³. The accuracy of the test method conforms to BS EN 20140-2:1993, the test procedure used was 140/3 issue 5. Broad-band white noise was used to measure the level differences and broad-band pink noise was used to measure the reverberation times. Where serial measurements were used for level difference, band-pass noise was used at individual third octave bands. Third octave band pass filters were used in real time mode. See appendix for further information.

TEST RESULTS

Weighted Airborne Sound Reduction Index

R_w (C; Ctr) = 65 (-1; -5) dB

For full data see pages 8 – 9.

Test conducted in accordance with BS EN ISO 140-3: 1995

Rated in accordance with BS EN ISO 717/1: 1997

LIMITATIONS

The results only relate to the behaviour of the element of construction under the particular conditions of test; they are not intended to be the sole criteria for assessing the potential acoustic performance of the element in use nor do they reflect the actual behaviour.

The specification and interpretation of test methods are the subject of ongoing development and refinement. Changes in associated legislation may also occur. For these reasons it is recommended that the relevance of test reports over 5 years old should be considered by the user. The laboratory that issued the report will be able to offer, on behalf of the legal owner, a review of the procedures adopted for a particular test to ensure that they are consistent with current practices, and if required may endorse the test report.

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APPENDIX A – TEST DATA

LABORATORY AIRBORNE SOUND INSULATION TEST - BS EN ISO 140-3:1995										
Test Code: H13621A		Test Date: 15/10/04								
Specimen Area, S = 8.64 m ²		Room T2		Room T1						
		Room Volume, m ³ : 98		58.84						
		Temperature, deg.C: 16.4		18.3						
		Rel. Humidity, %RH: 60.1		52.3						
Freq Hz	Test Room T2 to Test Room T1						R dB	U.Dev. dB	R 1/1Oct dB	
	Source dB	Rec. (uc) dB	Bgrnd dB	Rec. (corr) dB	Rev.time Sec	Corr. dB				
50	61.2	30.0	18.5	29.7	0.64	-2.3	29.2			
63	65.8	30.3	16.9	30.1	0.94	-0.6	35.1		32.0	
80	70.1	34.2	11.1	34.2	0.75	-1.6	34.3			
100	75.2	29.3	19.6	28.8	1.08	0.0	46.4			
125	79.2	33.1	12.3	33.1	1.06	-0.1	46.0	3.0	47.3	
160	86.6	36.0	9.2	36.0	1.32	0.8	51.4	0.6		
200	92.5	39.0	11.7	39.0	1.27	0.7	54.2	0.8		
250	95.1	39.6	9.8	39.6	1.41	1.1	56.6	1.4	56.4	
315	95.4	35.9	13.2	35.9	1.30	0.8	60.3	0.7		
400	93.8	33.3	13.9	33.3	1.34	0.9	61.4	2.6		
500	92.0	31.0	11.8	31.0	1.23	0.5	61.5	3.5	61.1	
630	90.6	30.5	13.5	30.5	1.19	0.4	60.5	5.5		
800	91.4	30.9	12.7	30.9	1.41	1.1	61.6	5.4		
1 000	90.9	27.6	11.0	27.6	1.62	1.7	65.0	3.0	64.2	
1 250	91.7	24.3	9.2	24.3	1.66	1.8	69.2			
1 600	94.5	22.5	10.8	22.2	1.71	2.0	74.3			
2 000	96.0	19.4	10.4	18.8	1.70	1.9	79.1		76.5	
2 500	94.4	18.6	8.9	18.1	1.47	1.3	77.6			
3 150	93.2	18.2	9.0	17.6	1.39	1.1	76.7			
4 000	91.9	16.4	10.0	15.3	1.44	1.2	77.8		77.8	
5 000	89.9	12.9	10.2	11.6	1.33	0.9	79.2			
6 300										
8 000										
10 000										
Single Figure Ratings		Rw	C	Ctr	Total U. Dev., dB			26.5		
BS EN ISO 717-1: 1997		dB	dB	dB						
		65	-1	-5						
		(100-5000)	0	-5						
Background Corrected		(50-3150)	-4	-15						
		(50-5000)	-3	-15						
					Test Procedure: 140/3/issue 5					
					Worksheet: 140_3_1.XLS					

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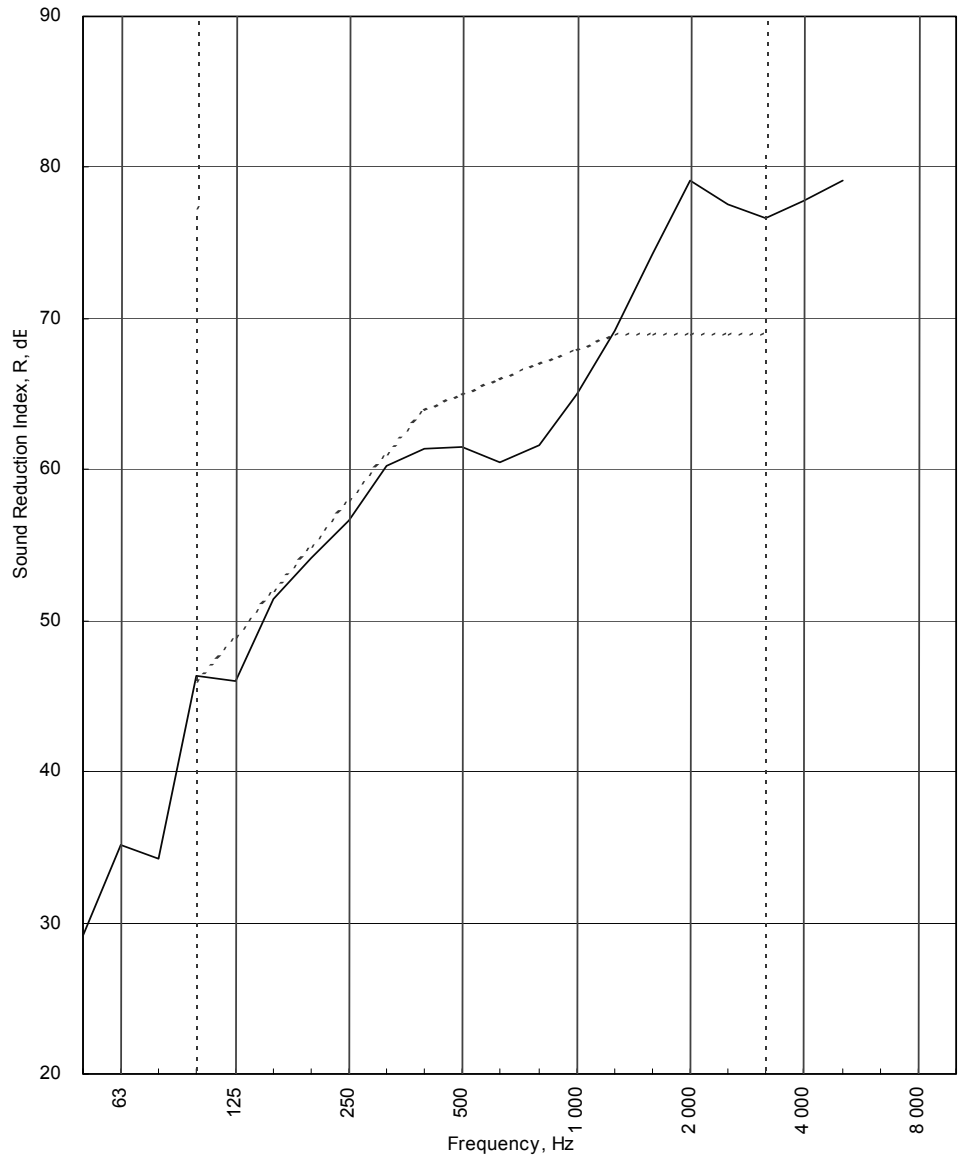
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Test Code:
H13621A
 Test Date:
15/10/04

Freq. Hz	R dB
50	29.2
63	35.1
80	34.3
100	46.4
125	46.0
160	51.4
200	54.2
250	56.6
315	60.3
400	61.4
500	61.5
630	60.5
800	61.6
1 000	65.0
1 250	69.2
1 600	74.3
2 000	79.1
2 500	77.6
3 150	76.7
4 000	77.8
5 000	79.2
6 300	
8 000	
10 000	



----- Curve of reference values (ISO 717-1)

Rating according to BS EN ISO 717-1:1997	R_w (C;Ctr) = 65 (-1;-5) dB		
	Max dev. 5.5 dB at 630 Hz		
Evaluation based on laboratory measurement results obtained by an engineering method:	C₅₀₋₃₁₅₀ = -4 dB	C₅₀₋₅₀₀₀ = -3 dB	C₁₀₀₋₅₀₀₀ = 0 dB
	C_{tr,50-3150} = -15 dB	C_{tr,50-5000} = -15 dB	C_{tr,100-5000} = -5 dB

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APPENDIX B – LABORATORY DETAILS

The source room (T2) was treated with six perspex diffusers of approximately 900mm x 1220mm. An omni-directional loudspeaker sound source is placed near a back corner of the source room (T2), rotating at 1 rpm and at least 0.7m from any room boundary to satisfy Annex C of BS EN ISO 140-3: 1995. A stationary loudspeaker sound source is placed in the corner of the receiving room (T1) opposite the test specimen.

The average sound pressure level in each 1/3 octave band is measured using a rotating microphone boom, positioned such that the minimum distance between microphone and sound source is 1m and between microphone and room boundaries is 0.7m. The rotating microphone has a sweep radius of at least 1m and is inclined in relation to the boundaries at an angle of at least 30° to the horizontal. The microphone has a traverse time of 32 seconds, and the sound pressure levels are averaged over 64 seconds which is equivalent to two complete sweeps of the microphone boom.

The equivalent absorption area of the receiving room is determined by producing the arithmetic average of six reverberation times and applying this to the Sabine formula.

The test specimen is installed in the aperture so that it finishes flush with the last timber in room T2 side to eliminate indirect transmission between rooms. The specimen is not installed so that the aperture depth ratio 2:1 is met as recommended in section 5.2.1 of BS EN ISO 140-3:1995. Laboratory tests have been carried out to prove the insignificance of this installation position on the test results.

The laboratory limit for measurement due to flanking is (BTC 11709A)

Freq. Hz	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
R'max	32	44	39	55	56	59	64	63	70	77	84	88	91	92	94	97	96	98	96	90	87

The figure below show flanking and isolation treatments in the test chamber.

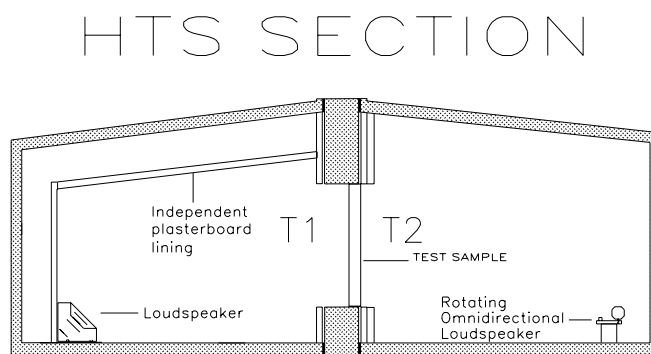


Figure 3. Chamber layout