The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Report Number BTC **13560A**

ACOUSTIC TEST REPORT COVERING AN AIRBORNE SOUND INSULATION TEST TO BS EN ISO 140 – 3: 1995 ON A GANG-NAIL SYSTEMS LIMITED ECOJOIST® INTERNAL FLOOR SYSTEM.

Test Date: 26th August 2004

www.btconline.co.uk

Customer: **Gang – Nail Systems Limited**
Christy Estate
Ivy Road
Aldershot
Hants.
GU 12 4XG

UKAS TESTING
0296

The Building Test Centre
Fire Acoustics Structures

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

ACOUSTIC TEST REPORT COVERING AN AIRBORNE SOUND INSULATION TEST TO BS EN ISO 140 – 3: 1995 ON A GANG-NAIL SYSTEMS LIMITED ECOJOIST® INTERNAL FLOOR SYSTEM.

TABLE OF CONTENTS

UKAS TESTING
0296

The Building Test Centre
Fire Acoustics Structures

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

FOREWORD

This test report details a sound insulation test conducted on an internal timber joist floor. The test sponsor was Gang – Nail Systems Limited.

The test specimen was installed by Mr. Pete Rigley. The construction of the specimen took place on the 26th August 2004. The Building Test Centre played no role in the design or selection of the materials comprising the test specimen.

REPORT AUTHORISATION

Report Author	Authorised by
Sarah J. Wood	
Sarah Wood B.Eng. (Hons.), AMIOA *Section Supervisor*	Eur Ing. **Paul Howard** BSc. (Hons.), C.Eng., MIOA *Head of Laboratory*

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

TEST CONSTRUCTION

219mm (deep) open web Ecojoists® were placed at 600mm centres directly on top of the ring beam of the test aperture and fixed using four Gyproc drywall timber screws per joist. A ceiling consisting of 15mm (deep) Gyproc Wallboard was fixed to the joists at 150mm centres using 38mm Gyproc drywall timber screws. The walking surface, comprising of 22mm tongue and groove moisture resistant chipboard, was fixed to the joists with UniBond No More Nails high strength adhesive, applied in a zigzag fashion down the top flange of each joist, and screw fixed at 300mm centres using 51mm Gyproc drywall timber screws.

All board joints were staggered and taped. The perimeter was taped and sealant was applied around the perimeter on both sides of the separation.

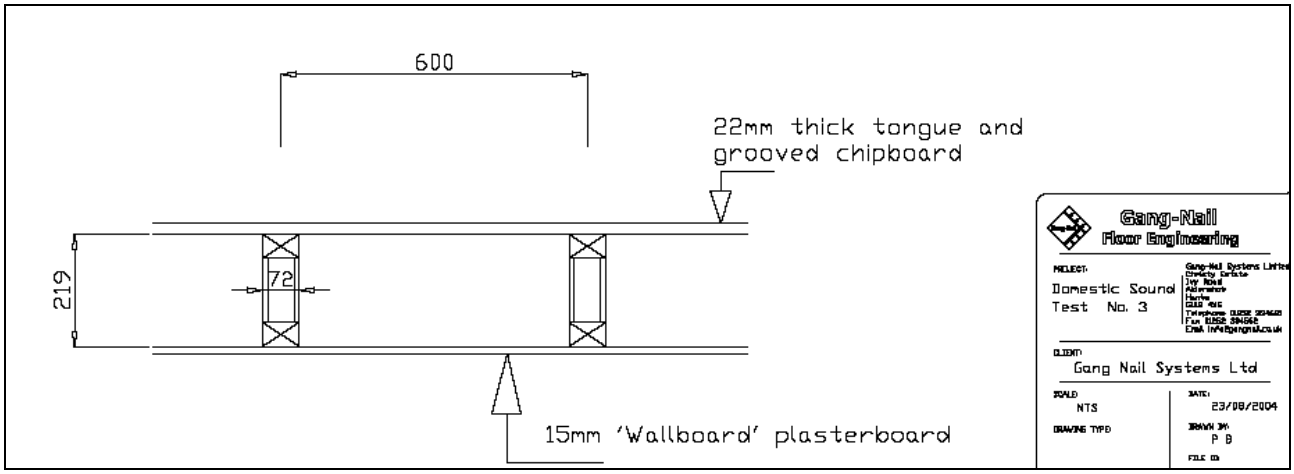


Figure 1. Cross – section through the internal floor

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

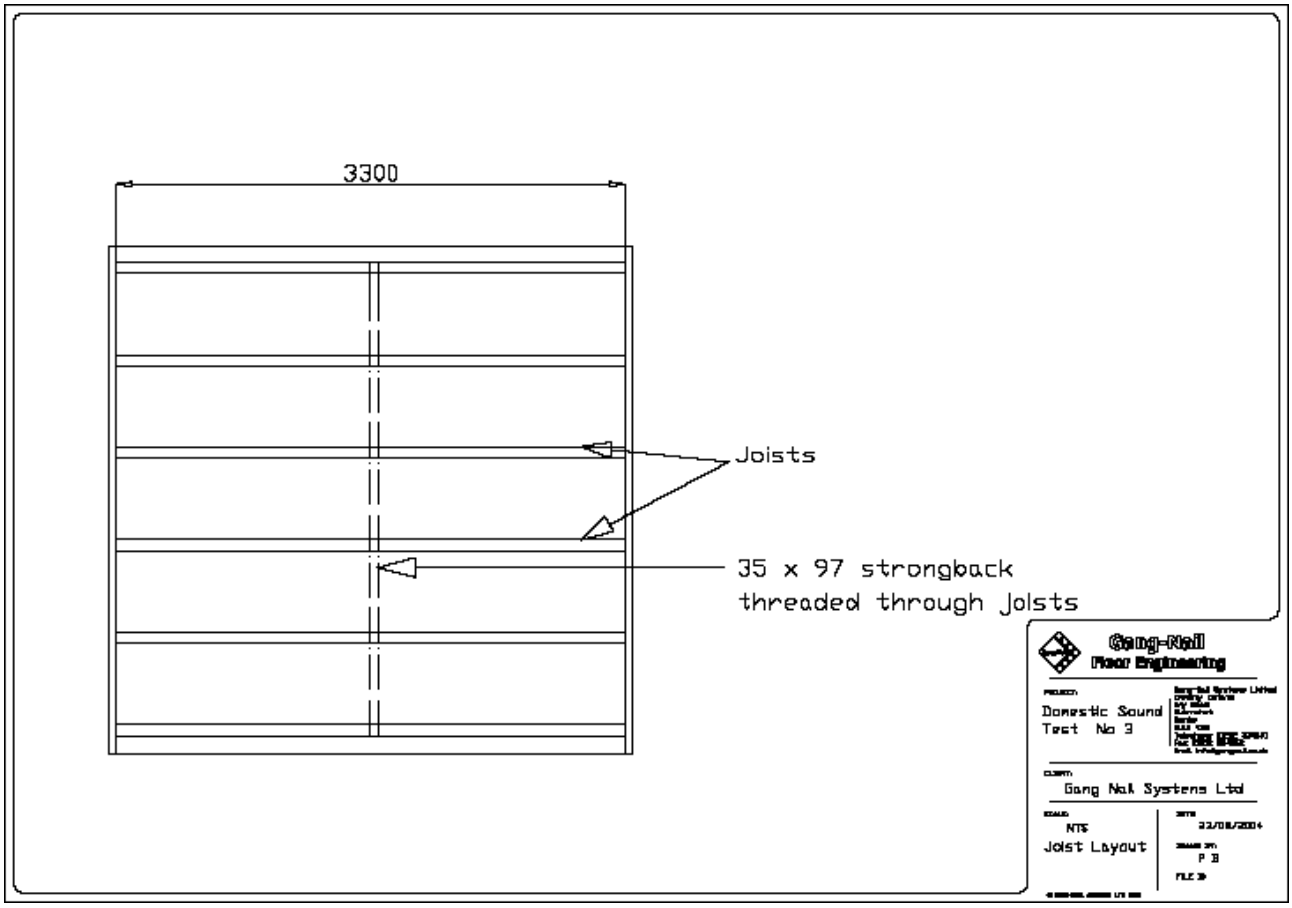


Figure 2. Joist layout

UKAS TESTING
0296

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

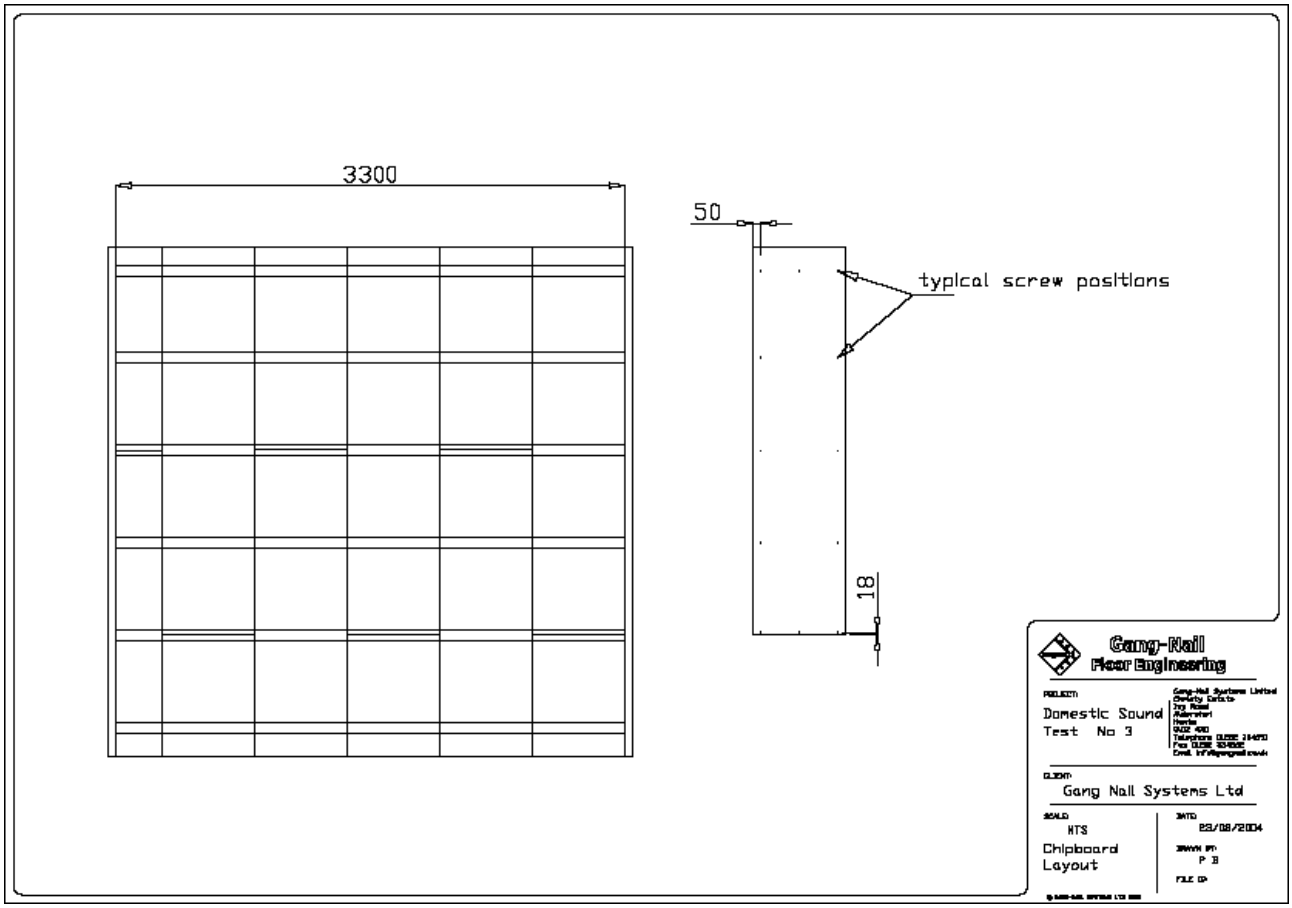


Figure 3. Chipboard layout

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

The Building Test Centre
Fire Acoustics Structures

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

TEST MATERIALS

Ecojoists®

Nominally 3300mm (long) x 219mm (deep) x 72mm (wide) open web joists consisting of parallel stress graded timber flanges joined together with engineered V shaped galvanised steel webs.

Plasterboard

Nominally 3000mm (long) x 1200mm (wide) x 15mm (thick) Gyproc Wallboard manufactured by British Gypsum Limited.

Average thickness:	14.87 mm
Average surface density:	10.60 kg/m^2
Board identification code:	18 143 4 08:29

The surface density and thickness were calculated using the actual weight, size and thickness of a selection of the boards used in the test specimen.

Chipboard

Nominally 2400mm (long) x 600mm (wide) x 22mm (thick) Weyroc Protect tongue and groove moisture resistant chipboard supplied by Gang-Nail Systems Limited.

Average thickness:	22.56 mm
Average surface density:	15.21 kg/m^2
Board identification code:	0765 – CPD - 36603 16:32 17.05.04

The surface density and thickness was calculated using the actual weight, size and thickness of a selection of the boards used in the test specimen.

Adhesive

UniBond No More Nails – Exterior, high strength adhesive, manufactured by Henkel Consumer Adhesives, Winsford, Cheshire CW7 3QY.

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Fasteners

i) 38mm Gyproc Drywall Timber Screws
ii) 51mm Gyproc Drywall Timber Screws

All fasteners supplied by British Gypsum 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

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

TEST PROCEDURE

The test specimen (3.45m x 3.45m) was constructed in a floor dividing two reverberant rooms of approximately 98m^3 and 101m^3. The accuracy of the test method conforms to BS EN 20140-2:1993, the test procedure used was 140/3 issue 5 (airborne). Broadband white noise was used to measure the level differences and broadband pink noise was used to measure the reverberation times. Third octave band pass filters were used in real time mode. See appendix B for further information.

TEST RESULTS

Weighted Airborne Sound Reduction Index R_w (C; Ctr) = 40 (-1; -6) dB

For full data see pages 10 and 11.

Tests were conducted in accordance with BS EN ISO 140-3: 1995 and rated in accordance with BS EN ISO 717-1: 1997.

LIMITATIONS

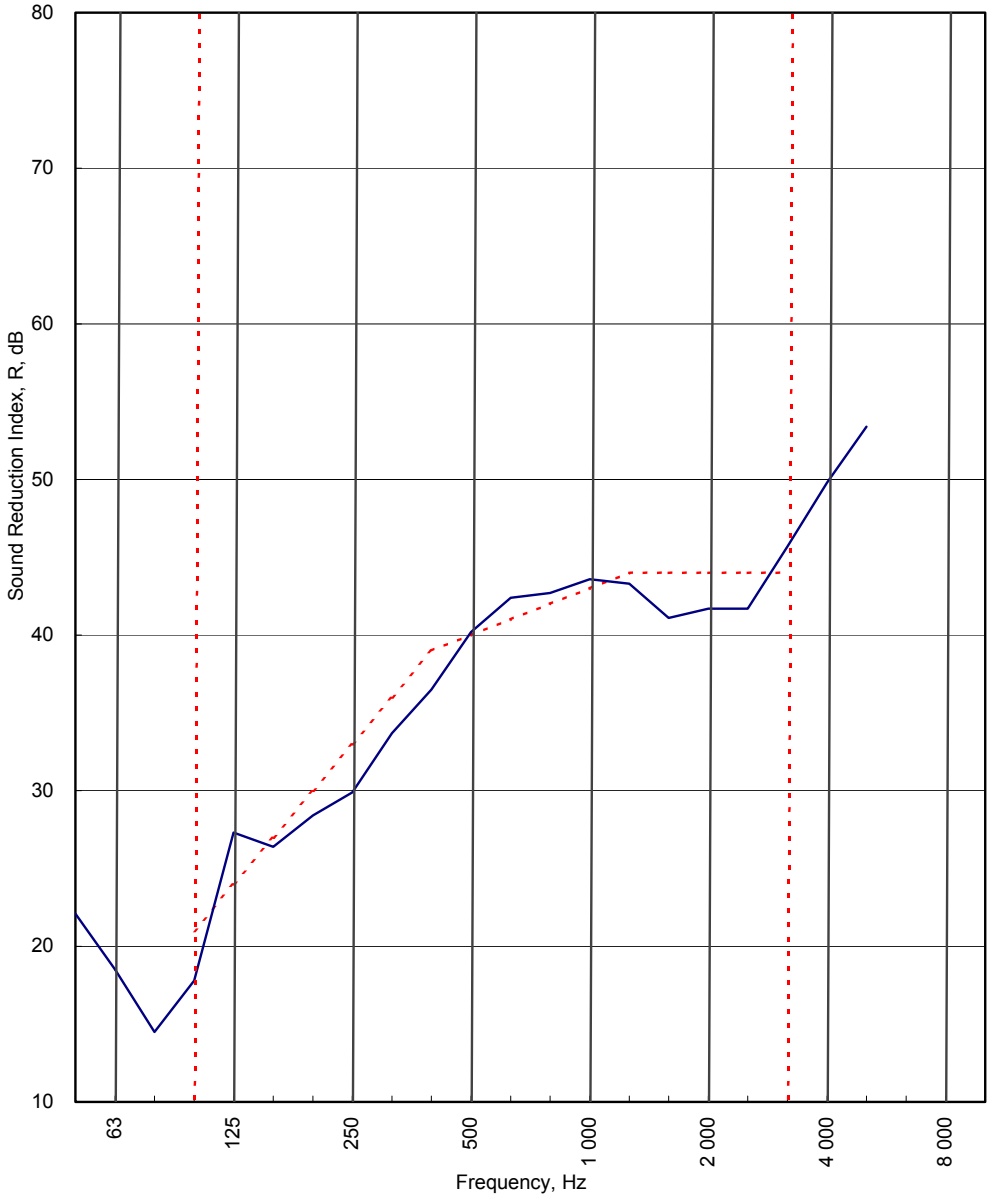
The results only relate to the behaviour of the element of construction under the particular conditions of test; they are not intended to be the sole criteria for assessing the potential acoustic performance of the element in use.

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.

APPENDIX A – TEST DATA

Test Code:
V13560AA
Test Date:
26/08/04

Freq. Hz	R dB
50	22.1
63	18.5
80	14.5
100	17.8
125	27.3
160	26.4
200	28.4
250	29.9
315	33.7
400	36.5
500	40.2
630	42.4
800	42.7
1 000	43.6
1 250	43.3
1 600	41.1
2 000	41.7
2 500	41.7
3 150	45.7
4 000	49.8
5 000	53.4
6 300	
8 000	
10 000	



Rating according to BS EN ISO 717-1:1997	**Rw (C;Ctr) = 40 (-1;-6) dB** **Max dev. 3.2 dB at 100 Hz**		
Evaluation based on laboratory measurement results obtained by an engineering method:	$C_{50\text{-}3150}$= **-2 dB**	$C_{50\text{-}5000}$= **-1 dB**	$C_{100\text{-}5000}$= **0 dB**
	$C_{tr,50\text{-}3150}$= **-9 dB**	$C_{tr,50\text{-}5000}$= **-9 dB**	$C_{tr,100\text{-}5000}$: **-6 dB**

LABORATORY AIRBORNE SOUND INSULATION TEST - BS EN ISO 140-3:1995

Test Code: **V13560AA** Test Date: **26/08/04**

	Room T3	Room T4
Specimen Area, S = **9.99** m^2		
Room Volume, m^3:	**98**	**101**
Temperature, deg.C:	**20.1**	**20.3**
Rel. Humidity, %RH:	**57.9**	**60.4**

Freq	Test Room T3 to Test Room T4						R	U.Dev.	R
	Source	Rec. (uc)	Bgrnd	Rec. (corr)	Rev.time	Corr.			1/1Oct
Hz	dB	dB	dB	dB	Sec	dB	**dB**	dB	dB
50	67.5	46.4	26.5	46.4	2.03	1.0	**22.1**		
63	65.5	48.0	20.8	48.0	**2.05**	1.0	**18.5**		17.3
80	73.5	57.8	19.8	57.8	**1.23**	-1.2	**14.5**		
100	84.1	64.4	20.8	64.4	1.05	-1.9	**17.8**	3.2	
125	90.9	61.0	18.0	61.0	0.88	-2.6	**27.3**		21.6
160	98.0	68.3	22.8	68.3	0.75	-3.3	**26.4**	0.6	
200	100.6	69.7	18.8	69.7	0.92	-2.5	**28.4**	1.6	
250	99.0	66.6	19.1	66.6	0.90	-2.5	**29.9**	3.1	30.2
315	98.1	61.9	15.1	61.9	0.91	-2.5	**33.7**	2.3	
400	98.1	59.1	16.1	59.1	0.91	-2.5	**36.5**	2.5	
500	96.9	54.9	14.4	54.9	1.07	-1.8	**40.2**		39.0
630	96.3	51.8	12.0	51.8	1.00	-2.1	**42.4**		
800	96.9	52.3	10.1	52.3	1.04	-1.9	**42.7**		
1 000	99.1	53.6	10.7	53.6	1.05	-1.9	**43.6**		43.2
1 250	101.1	56.2	9.3	56.2	1.11	-1.6	**43.3**	0.7	
1 600	98.9	56.0	12.6	56.0	1.07	-1.8	**41.1**	2.9	
2 000	101.0	58.1	11.8	58.1	1.22	-1.2	**41.7**	2.3	41.5
2 500	101.8	58.8	8.6	58.8	1.19	-1.3	**41.7**	2.3	
3 150	101.4	54.3	8.3	54.3	1.16	-1.4	**45.7**		
4 000	95.8	44.4	10.2	44.4	1.11	-1.6	**49.8**		48.5
5 000	94.2	38.8	10.4	38.8	1.03	-2.0	**53.4**		
6 300									
8 000									
10 000									

Single Figure Ratings	**Rw**	**C**	**Ctr**	**Total U. Dev., dB**	**21.5**
BS EN ISO 717-1: 1997	**dB**	**dB**	**dB**		
	40	**-1**	**-6**		
	(100-5000)	**0**	**-6**		
	(50-3150)	**-2**	**-9**		
RT's > factor 1.5 apart				Test Procedure: 140/3/issue 5	
Tested Serially[ ] Real Time[ ]	**(50-5000)**	**-1**	**-9**	Worksheet: 140_3_1.XLS	

UKAS TESTING
0296

APPENDIX B – LABORATORY DETAILS

An omnidirectional loudspeaker rotating at 1 rpm is used in the source room satisfying Annex C of BS EN ISO 140-3: 1995. 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 the 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 each room is determined by producing the arithmetic average of six reverberation times and applying this to the Sabine formula.

The laboratory limit for airborne sound insulation measurement due to flanking on a lightweight construction is:

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	26	31	31.9	37.5	49.3	53	55.3	61.9	67.5	70.9	73.8	75.5	76.1	82.6	85.5	86.8	86.5	87.1	87.9	89.9	89.2

The laboratory limit for airborne sound insulation measurement due to flanking on a concrete based construction is:

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	32.5	39	38.1	42.3	52.3	52.7	55.3	60.6	65.8	69.1	74.7	76.8	78.2	80.9	83.8	87.3	88.1	88.7	89.2	90.3	90.8

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

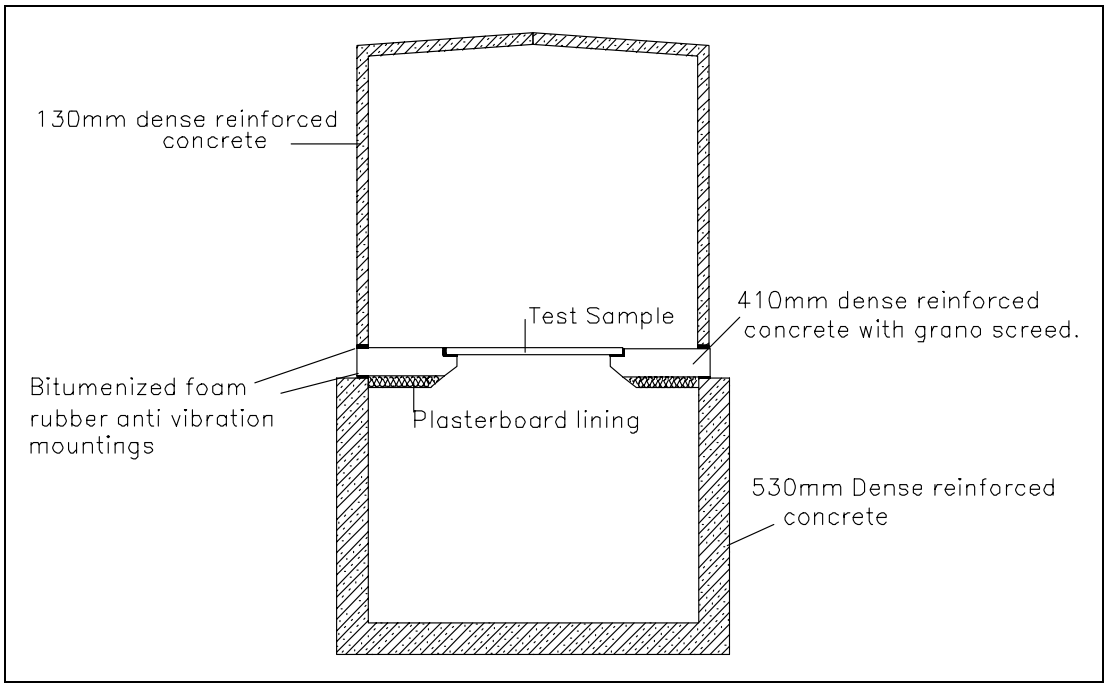


Figure 4. Chamber layout

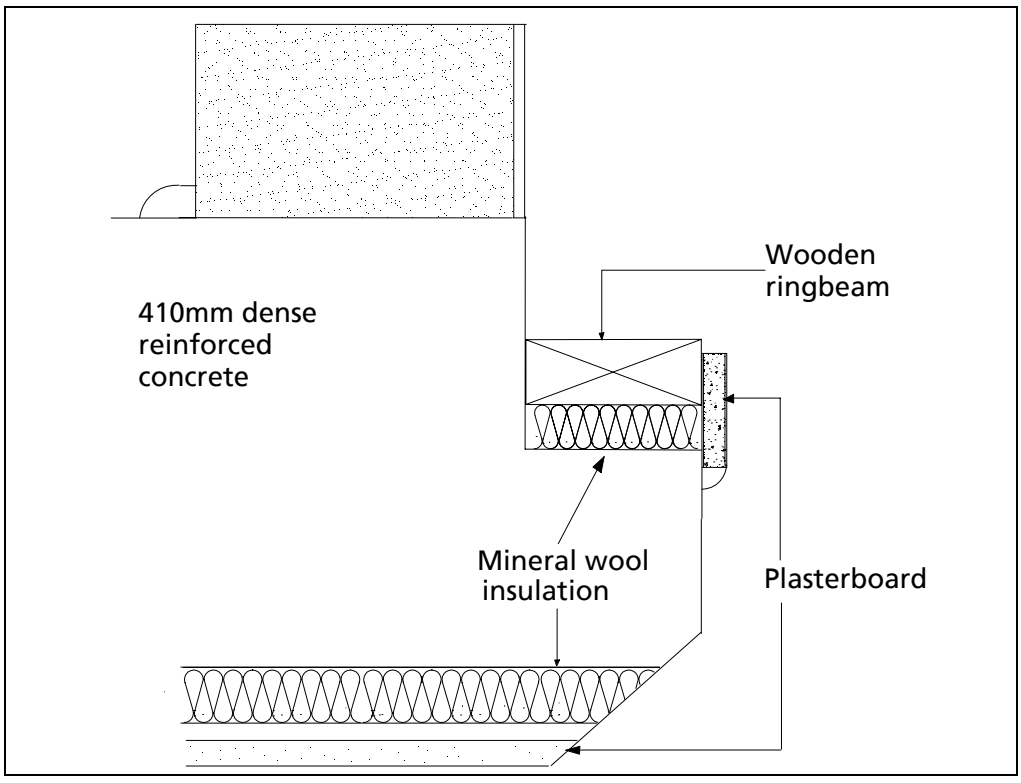


Figure 5. Ring beam construction around test aperture.