



Report Number **BTC 13236A**

ACOUSTIC TEST REPORT COVERING A SERIES OF TESTS TO BS EN ISO 140 – 3: 1995 ON VARIOUS TIMBER JOIST FLOORS INCORPORATING A COMBINATION OF DIFFERENT JOISTS AND WALKING SURFACES, AND WITH A CEILING OF 15mm GYPROC WALLBOARD.

Test Date: 27th–29th January 2004

www.btconline.co.uk

Customer: **Mitek Industries Limited.**
Mitek House
Grazebrook Industrial Park
Peartree Lane
Dudley
DY2 0XW

Customer: Mitek Industries Limited.

BTC 13236A: Page 1 of 31



0296



ACOUSTIC TEST REPORT COVERING A SERIES OF TESTS TO BS EN ISO 140 – 3: 1995 AND BS EN ISO 140 – 6: 1998, ON VARIOUS TIMBER JOIST FLOORS INCORPORATING A COMBINATION OF DIFFERENT JOISTS AND WALKING SURFACES, AND WITH A CEILING OF 15mm GYPROC WALLBOARD.

TABLE OF CONTENTS

<i>FOREWORD</i>	4
<i>REPORT AUTHORISATION</i>	4
<i>TEST CONSTRUCTION</i>	5
BTC 13236A	5
BTC 13247A	5
BTC 13248A	6
BTC 13249A	7
BTC 13250A	7
BTC 13251A	8
BTC 13252A	9
BTC 13253A	9
<i>TEST MATERIALS</i>	11
Plasterboard	11
Chipboard	11
Plywood	11
Fasteners	11
Insulation	12
<i>TEST PROCEDURE</i>	12
<i>TEST RESULTS</i>	12
<i>LIMITATIONS</i>	13
<i>APPENDIX A – TEST DATA</i>	14
BTC 13236A	14





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

BTC 13247A	16
BTC 13248A	18
BTC 13249A	20
BTC 13250A	22
BTC 13251A	24
BTC 13252A	26
BTC 13253A	28
<i>APPENDIX B – LABORATORY DETAILS</i>	30



FOREWORD

This test report details sound insulation tests conducted on various timber joist floors incorporating a combination of different joists and walking surfaces, and with a ceiling of 15mm Gyproc Wallboard. The test sponsor was Mitek Industries Limited.

The test specimen was installed by Alltone. The construction of the specimen took place between the 26th and the 29th January 2004. The Building Test Centre played no role in the design or selection of the materials comprising the test specimen.

REPORT AUTHORISATION

Report Author



Alexandra Chambers
B.Eng.
Technologist

Authorised by



Eur Ing. Paul Howard
BSc. (Hons.), C.Eng., MIOA
Head of Laboratory

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TEST CONSTRUCTION

BTC 13236A

240mm (deep) I-Joists were placed at 600mm centres directly on top of the ring beam of the test aperture and fixed using four x 60mm Gyproc drywall screws per joist. A ceiling consisting of 15mm (deep) Gyproc Wallboard was fixed to the joists at 300mm centres using 38mm Gyproc drywall timber screws. The walking surface comprising of 22mm tongue and groove moisture resistant chipboard was fixed to the joists at 600mm centres using 51mm Gyproc drywall timber screws. 100mm (thick) Isowool (1000) was placed within the joist cavity.

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

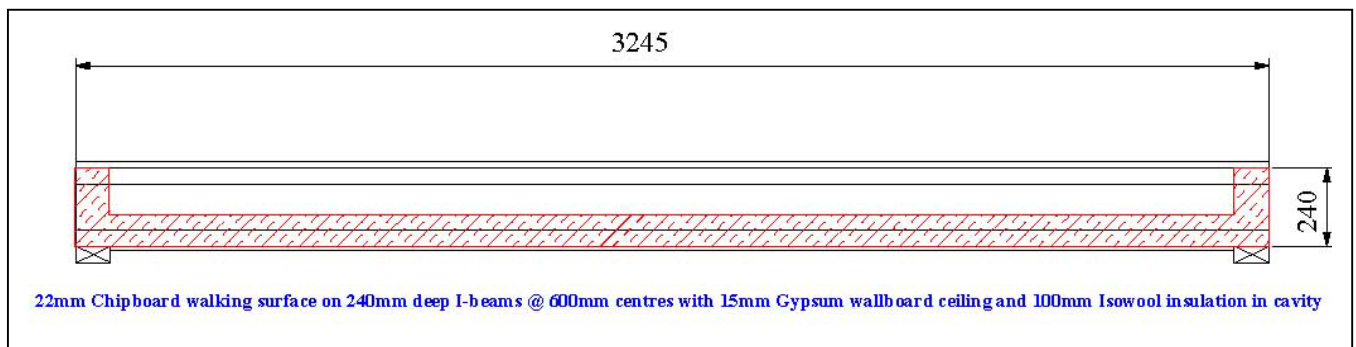


Figure 1. Cross-section through partition.

BTC 13247A

240mm (deep) I-Joists were placed at 600mm centres directly on top of the ring beam of the test aperture and fixed using four x 60mm Gyproc drywall screws per joist. A ceiling consisting of 15mm (deep) Gyproc Wallboard was fixed to the joists at 300mm centres using 38mm Gyproc drywall timber screws. The walking surface comprising of 22mm tongue and groove moisture resistant chipboard was fixed to the joists at 600mm 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

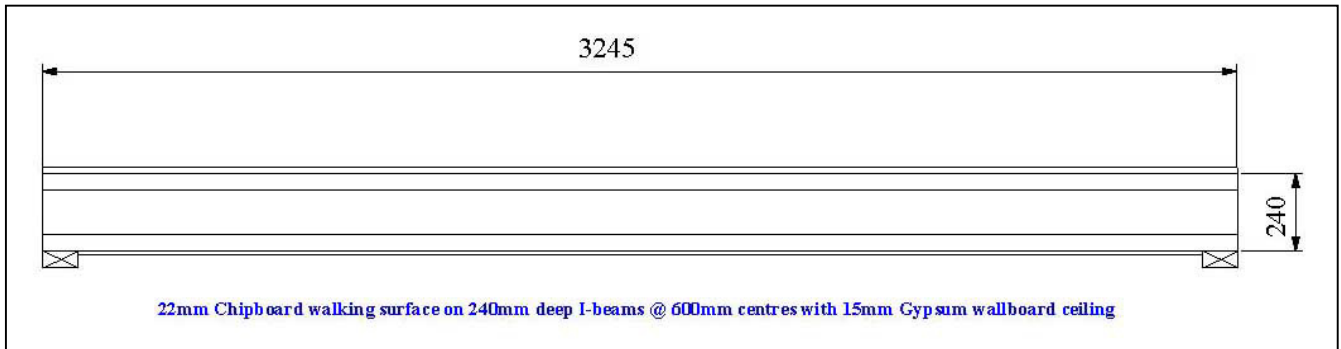


Figure 2. Cross-section through partition.

BTC 13248A

253mm (deep) Posi-Joists were placed at 600mm centres directly on top of the ring beam of the test aperture and fixed using two x 60mm Gyproc drywall screws per joist. A ceiling consisting of 15mm (deep) Gyproc Wallboard was fixed to the joists at 300mm centres using 38mm Gyproc drywall timber screws. The walking surface comprising of 22mm tongue and groove moisture resistant chipboard was fixed to the joists at 600mm centres using 51mm Gyproc drywall timber screws. 100mm (thick) Isowool (1000) was placed within the joist cavity.

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

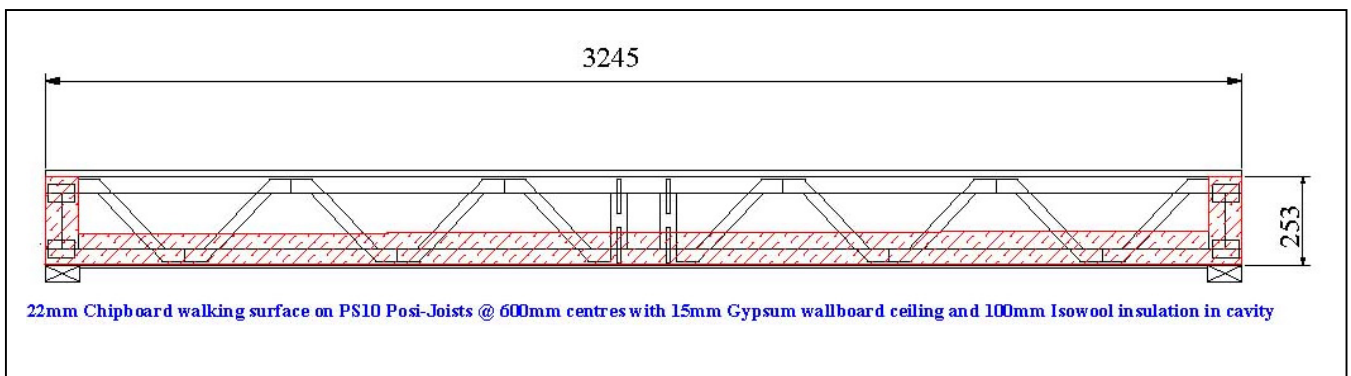


Figure 3. Cross-section through partition.

BTC 13249A

253mm (deep) Posi-Joists were placed at 600mm centres directly on top of the ring beam of the test aperture and fixed using two x 60mm Gyproc drywall screws per joist. A ceiling consisting of 15mm (deep) Gyproc Wallboard was fixed to the joists at 300mm centres using 38mm Gyproc drywall timber screws. The walking surface comprising of 22mm tongue and groove moisture resistant chipboard was fixed to the joists at 600mm 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

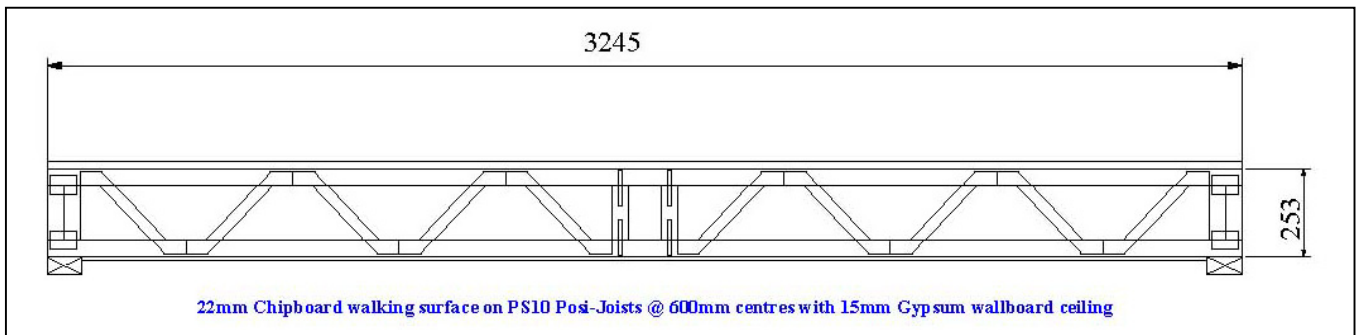


Figure 4. Cross section through partition

BTC 13250A

253mm (deep) Posi-Joists were placed at 600mm centres directly on top of the ring beam of the test aperture and fixed using two x 60mm Gyproc drywall screws per joist. A ceiling consisting of 15mm (deep) Gyproc Wallboard was fixed to the joists at 300mm centres using 38mm Gyproc drywall timber screws. The walking surface comprising of 18mm tongue and groove plywood was fixed to the joists at 600mm centres using 51mm Gyproc drywall timber screws. 100mm (thick) Isowool (1000) was placed within the joist cavity.

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

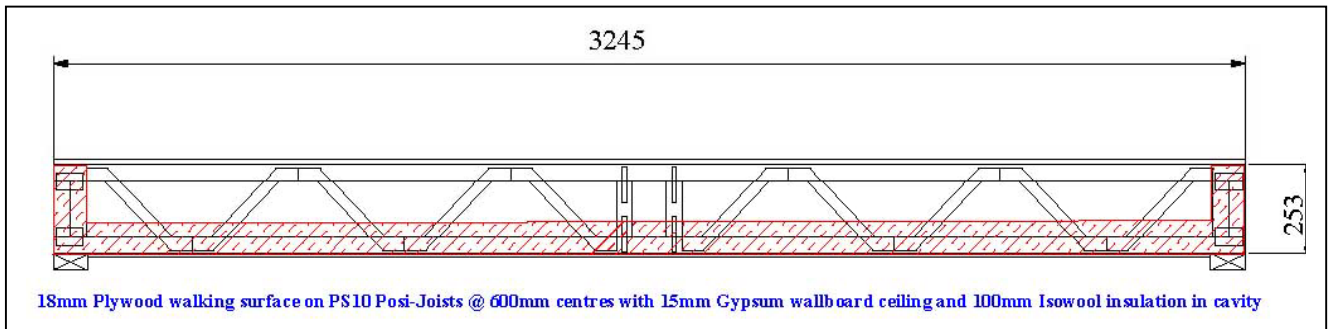


Figure 5. Cross section through partition

BTC 13251A

253mm (deep) Posi-Joists were placed at 600mm centres directly on top of the ring beam of the test aperture and fixed using two x 60mm Gyproc drywall screws per joist. A ceiling consisting of 15mm (deep) Gyproc Wallboard was fixed to the joists at 300mm centres using 38mm Gyproc drywall timber screws. The walking surface comprising of 18mm tongue and groove plywood was fixed to the joists at 600mm 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

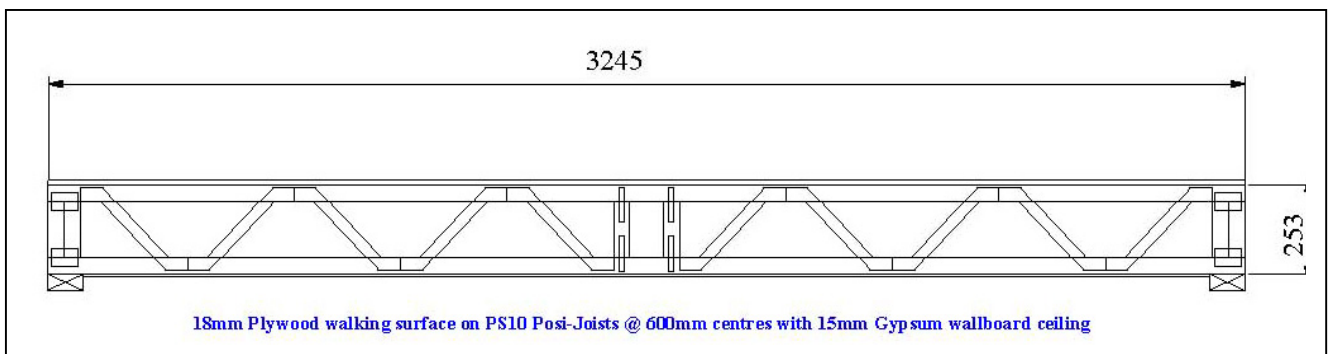


Figure 6. Cross section through partition

BTC 13252A

223mm (deep) Posi-Joists were placed at 600mm centres directly on top of the ring beam of the test aperture and fixed using two x 60mm Gyproc drywall screws per joist. A ceiling consisting of 15mm (deep) Gyproc Wallboard was fixed to the joists at 300mm centres using 38mm Gyproc drywall timber screws. The walking surface comprising of 22mm tongue and groove moisture resistant chipboard was fixed to the joists at 600mm centres using 51mm Gyproc drywall timber screws. 100mm (thick) Isowool (1000) was placed within the joist cavity.

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

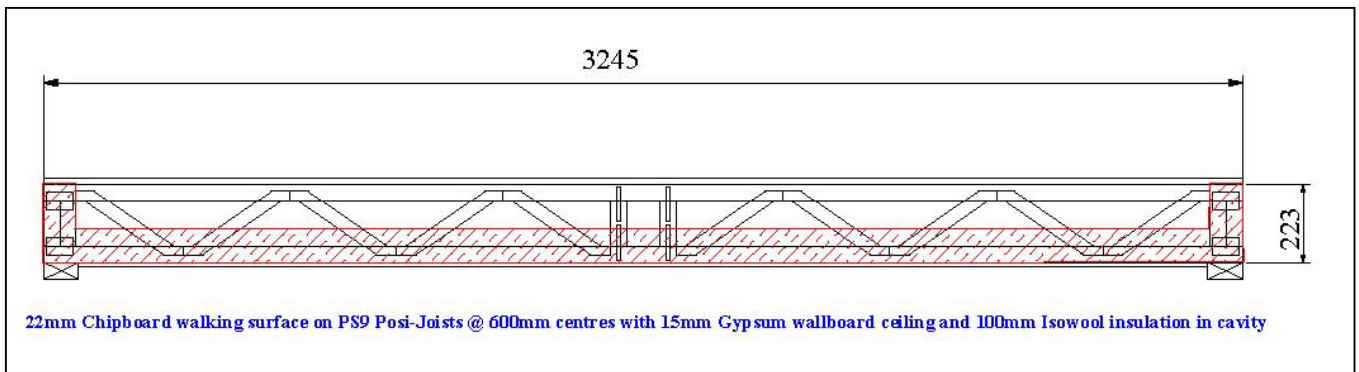


Figure 7. Cross-section through partition.

BTC 13253A

223mm (deep) Posi-Joists were placed at 600mm centres directly on top of the ring beam of the test aperture and fixed using two x 60mm Gyproc drywall screws per joist. A ceiling consisting of 15mm (deep) Gyproc Wallboard was fixed to the joists at 300mm centres using 38mm Gyproc drywall timber screws. The walking surface comprising of 22mm tongue and groove moisture resistant chipboard was fixed to the joists at 600mm 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

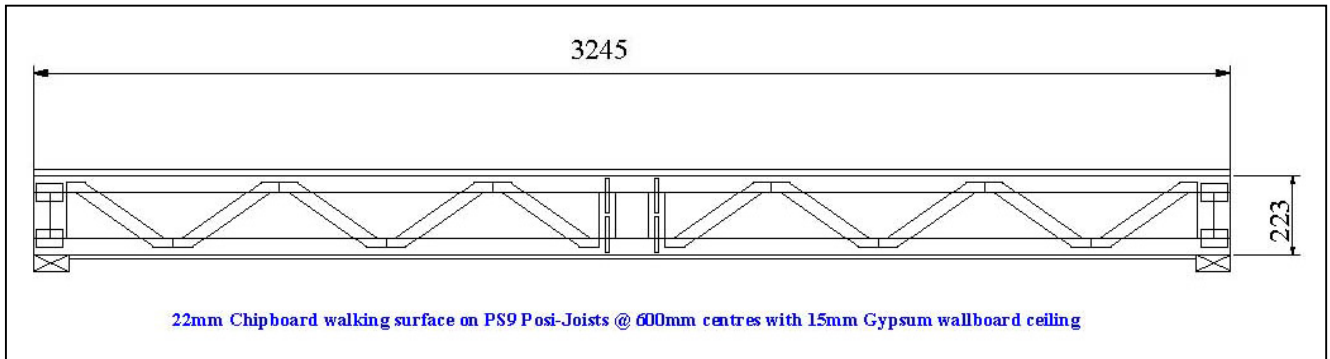


Figure 8. Cross-section through partition.

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

TEST MATERIALS

Plasterboard

Nominally 2400mm (long) x 1200mm (wide) x 15mm (thick) Gyproc Wallboard manufactured by British Gypsum Limited.

Average thickness:	14.85 mm
Average surface density:	9.93 kg/m ²
Board identification numbers:	16 309 3 05:05

Chipboard

Nominally 2400mm (long) x 1200mm (wide) x 22mm (thick) tongue and groove moisture resistant chipboard supplied by Mitek Industries Limited.

Average thickness:	22.01 mm
Average surface density:	14.60 kg/m ²
Board identification numbers:	Caber floor P5 29/09/03 02

Plywood

Nominally 2400mm (long) x 1200mm (wide) x 18mm (thick) tongue and groove plywood supplied by Mitek Industries Limited.

Average thickness:	17.79 mm
Average surface density:	8.33 kg/m ²
Board identification numbers:	2:2002 2780707 1949

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

Fasteners

- i) 38mm Gyproc Drywall Timber Screws
- ii) 51mm Gyproc Drywall Timber Screws
- iii) 60mm Gyproc Drywall Screws

All fasteners supplied by British Gypsum Limited.

Customer: **Mitek Industries Limited.**

Insulation

Isowool General Purpose Roll (1000) nominally 100mm thick supplied by British Gypsum - Isover Limited.

Actual density: 10.43 kg/m³.

Where measurements could not be taken then 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.

TEST PROCEDURE

The test specimens (3.45m x 3.45m) were constructed in a floor dividing two reverberant rooms of approximately 98m³ and 101m³. The accuracy of the test method conforms to BS EN 20140-2:1993, the test procedures used were 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

Test Code	Test Description	Weighted Airborne Sound Reduction Index R _w (C; Ctr)
V13236A	240mm I-Joists, 22mm Chipboard walking surface, 100mm insulation	42 (-1;-4)
V13247A	240mm I-Joists, 22mm Chipboard walking surface	41 (-1;-4)
V13248A	253mm Posi-Joists, 22mm Chipboard, 100mm insulation	44 (-2;-6)
V13249A	253mm Posi-Joists, 22mm Chipboard	43 (-2;-6)
V13250A	253mm Posi-Joists, 18mm Ply walking surface, 100mm insulation	41 (-2;-6)
V13251A	253mm Posi-Joists, 18mm Ply walking surface	39 (-1;-5)

Customer: Mitek Industries Limited.

V13252A	223mm Posi-Joists, 22mm Chipboard walking surface, 100mm insulation	44 (-2;-6)
V13253A	223mm Posi-Joists, 22mm Chipboard walking surface	42 (-1;-6)

For full data see pages 14 - 29.

Tests 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.

Customer: **Mitek Industries Limited.**

BTC 13236A: Page 13 of 31



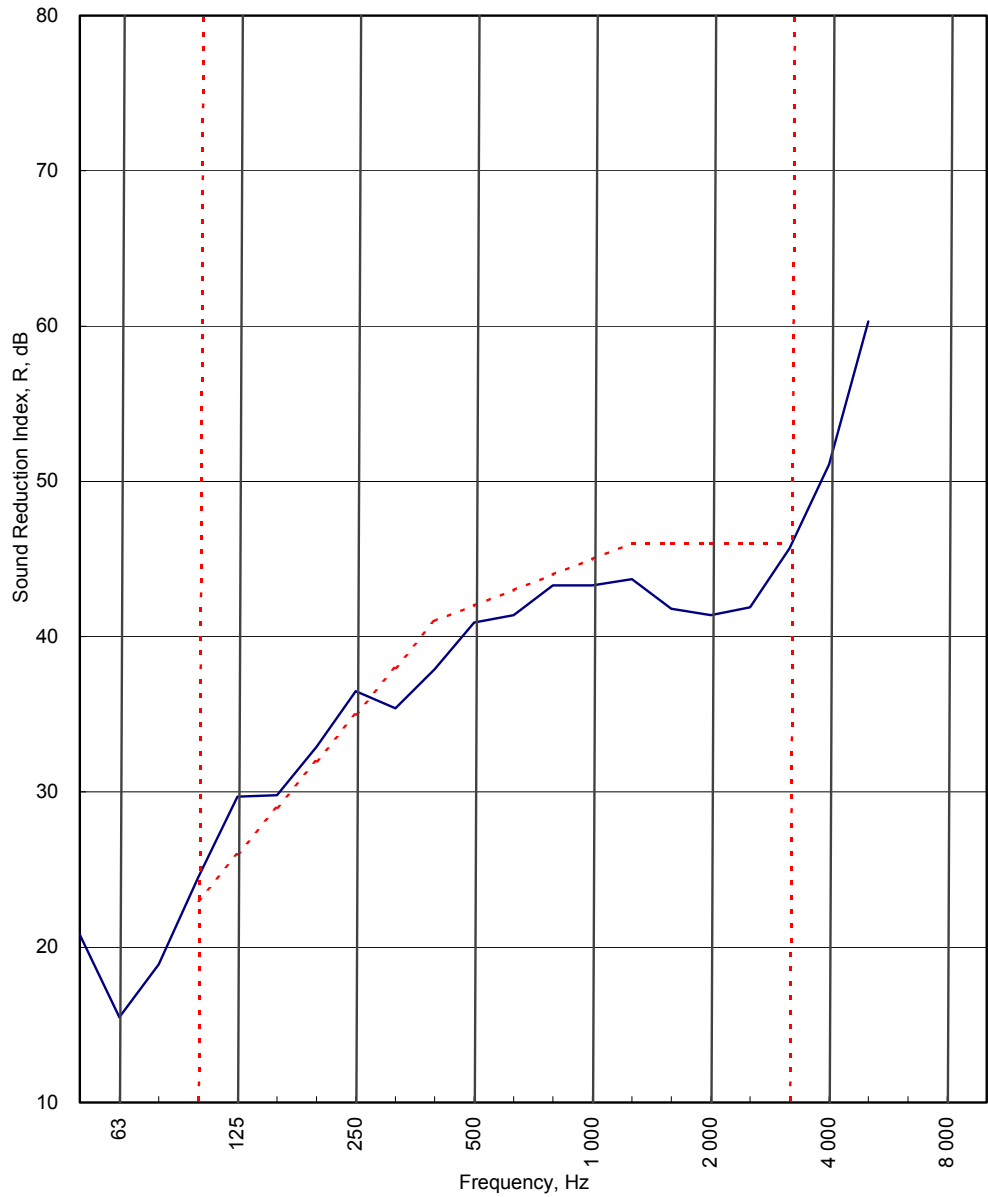
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APPENDIX A – TEST DATA

BTC 13236A

Test Code: V13236AA
Test Date: 27/01/04

Freq. Hz	R dB
50	20.8
63	15.5
80	18.9
100	24.5
125	29.7
160	29.8
200	32.9
250	36.5
315	35.4
400	37.9
500	40.9
630	41.4
800	43.3
1 000	43.3
1 250	43.7
1 600	41.8
2 000	41.4
2 500	41.9
3 150	45.7
4 000	51.1
5 000	60.3
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;C_{tr}) = 42 (-1;-4) dB		
Evaluation based on laboratory measurement results obtained by an engineering method:	Max dev. 4.6 dB at 2 000 Hz		
	C ₅₀₋₃₁₅₀ = -2 dB	C ₅₀₋₅₀₀₀ = -1 dB	C ₁₀₀₋₅₀₀₀ = 0 dB
	C _{tr,50-3150} = -8 dB	C _{tr,50-5000} = -8 dB	C _{tr,100-5000} = -4 dB

Customer: Mitek Industries Limited.



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

Test Code: **V13236AA**

Test Date: **27/01/04**

Specimen Area, S = **9.99** m²

	Room T3	Room T4
Room Volume, m ³ :	98	101
Temperature, deg.C:	15.6	18.1
Rel. Humidity, %RH:	39.4	45.8

Freq Hz	Test Room T3 to Test Room T4						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	67.7	48.2	33.5	48.1	2.15	1.2	20.8		
63	67.8	53.8	31.3	53.8	2.31	1.5	15.5		17.8
80	74.8	55.6	25.5	55.6	1.50	-0.3	18.9		
100	85.7	59.6	29.5	59.6	1.12	-1.6	24.5		
125	90.7	57.9	20.6	57.9	0.79	-3.1	29.7		27.2
160	97.8	64.9	24.8	64.9	0.79	-3.1	29.8		
200	100.3	64.4	23.3	64.4	0.81	-3.0	32.9		
250	99.7	61.6	25.0	61.6	1.11	-1.6	36.5		34.7
315	98.8	62.6	25.0	62.6	1.35	-0.8	35.4	2.6	
400	98.3	59.3	23.2	59.3	1.27	-1.1	37.9	3.1	
500	96.9	54.8	20.1	54.8	1.22	-1.2	40.9	1.1	39.8
630	96.3	54.1	16.8	54.1	1.34	-0.8	41.4	1.6	
800	96.9	53.1	15.6	53.1	1.45	-0.5	43.3	0.7	
1 000	99.2	55.6	13.7	55.6	1.52	-0.3	43.3	1.7	43.4
1 250	100.8	57.2	11.6	57.2	1.64	0.1	43.7	2.3	
1 600	98.1	56.6	11.7	56.6	1.72	0.3	41.8	4.2	
2 000	100.7	59.6	13.0	59.6	1.74	0.3	41.4	4.6	41.7
2 500	101.2	59.6	8.4	59.6	1.74	0.3	41.9	4.1	
3 150	101.5	55.7	8.9	55.7	1.57	-0.1	45.7	0.3	
4 000	96.9	45.1	8.7	45.1	1.38	-0.7	51.1		49.3
5 000	94.4	33.0	8.8	33.0	1.27	-1.1	60.3		
6 300									
8 000									
10 000									

Single Figure Ratings	Rw	C	Ctr	Total U. Dev., dB	26.3
BS EN ISO 717-1: 1997	dB	dB	dB		
	42	-1	-4		
	(100-5000)	0	-4		
Background Corrected					
	(50-3150)	-2	-8		
RT's > factor 1.5 apart					
Tested Serially[] Real Time[]	(50-5000)	-1	-8		
				Test Procedure: 140/3/issue 5	
				Worksheet: 140_3_1.XLS	

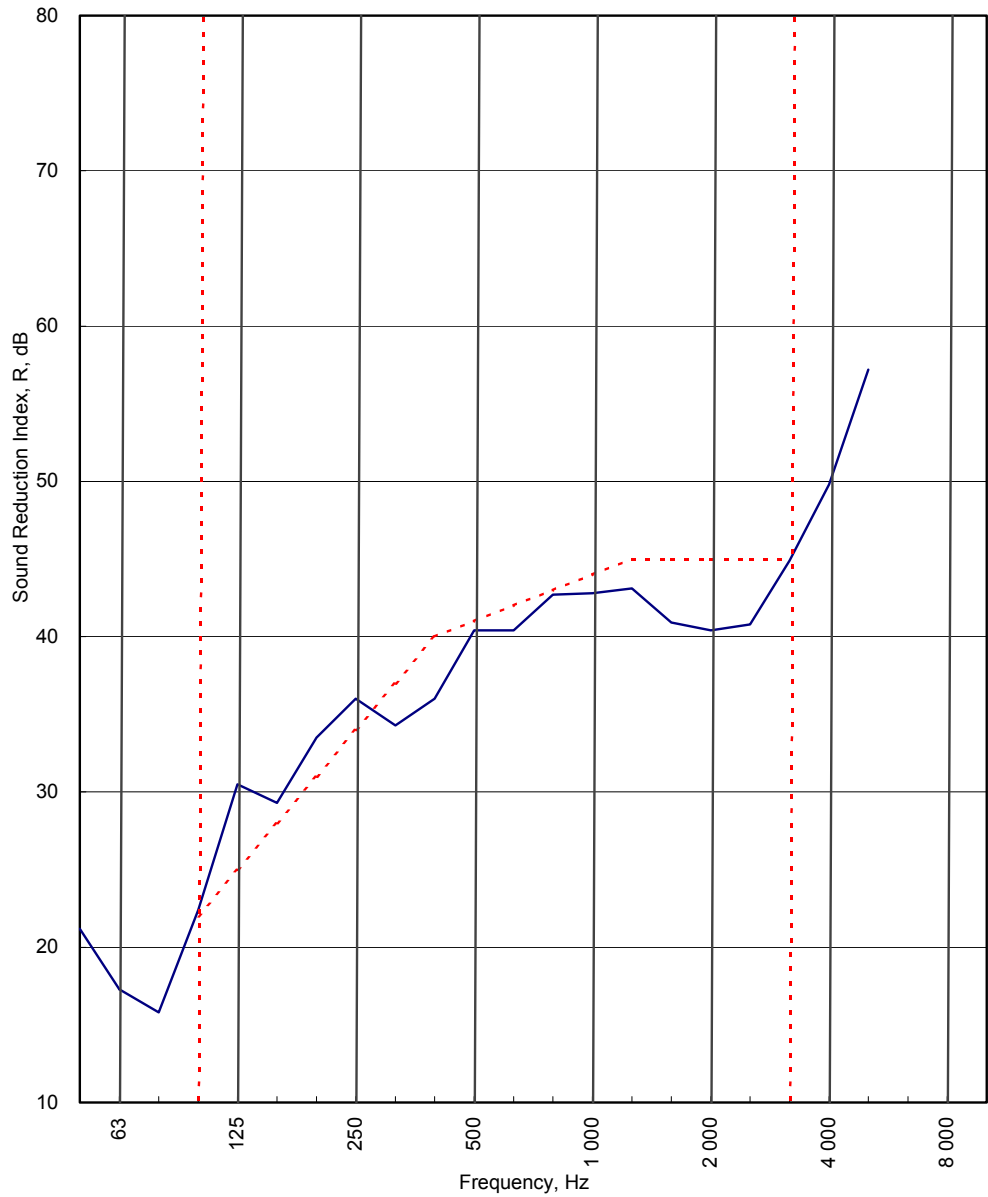
Customer: **Mitek Industries Limited.**



BTC 13247A

Test Code: V13247AA
Test Date: 27/01/04

Freq. Hz	R dB
50	21.2
63	17.3
80	15.8
100	22.4
125	30.5
160	29.3
200	33.5
250	36.0
315	34.3
400	36.0
500	40.4
630	40.4
800	42.7
1 000	42.8
1 250	43.1
1 600	40.9
2 000	40.4
2 500	40.8
3 150	44.9
4 000	49.8
5 000	57.2
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) = 41 (-1;-4) dB		
	Max dev. 4.6 dB at 2 000 Hz		
Evaluation based on laboratory measurement results obtained by an engineering method:	C ₅₀₋₃₁₅₀ = -2 dB	C ₅₀₋₅₀₀₀ = -1 dB	C ₁₀₀₋₅₀₀₀ = 0 dB
	C _{tr,50-3150} = -8 dB	C _{tr,50-5000} = -8 dB	C _{tr,100-5000} = -4 dB

Customer: Mitek Industries Limited.



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

Test Code: **V13247AA**

Test Date: **27/01/04**

Specimen Area, S = **9.99** m²

	Room T3	Room T4
Room Volume, m ³ :	98	101
Temperature, deg.C:	15.2	15.9
Rel. Humidity, %RH:	32.7	45.3

Freq Hz	Test Room T3 to Test Room T4						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	68.1	48.4	31.7	48.4	2.31	1.5	21.2		
63	67.2	51.6	30.3	51.6	2.41	1.7	17.3		17.6
80	74.6	57.6	22.7	57.6	1.22	-1.2	15.8		
100	85.6	61.3	23.7	61.3	1.05	-1.9	22.4		
125	90.9	58.9	20.0	58.9	1.14	-1.5	30.5		25.8
160	98.3	66.3	23.3	66.3	0.87	-2.7	29.3		
200	100.4	65.4	22.0	65.4	1.14	-1.5	33.5		
250	99.6	62.7	18.8	62.7	1.32	-0.9	36.0		34.5
315	98.7	63.5	19.6	63.5	1.30	-0.9	34.3	2.7	
400	98.3	60.9	17.6	60.9	1.16	-1.4	36.0	4.0	
500	97.0	55.7	15.0	55.7	1.33	-0.9	40.4	0.6	38.4
630	96.4	54.9	12.8	54.9	1.26	-1.1	40.4	1.6	
800	96.7	53.7	14.7	53.7	1.52	-0.3	42.7	0.3	
1 000	99.2	56.2	14.7	56.2	1.53	-0.2	42.8	1.2	42.9
1 250	100.8	57.8	13.7	57.8	1.65	0.1	43.1	1.9	
1 600	98.2	57.4	13.9	57.4	1.67	0.1	40.9	4.1	
2 000	100.7	60.4	12.2	60.4	1.67	0.1	40.4	4.6	40.7
2 500	101.1	60.3	13.8	60.3	1.60	0.0	40.8	4.2	
3 150	101.5	56.5	14.5	56.5	1.58	-0.1	44.9	0.1	
4 000	96.8	46.1	17.8	46.1	1.33	-0.9	49.8		48.3
5 000	94.1	35.7	13.4	35.7	1.22	-1.2	57.2		
6 300									
8 000									
10 000									

Single Figure Ratings	Rw	C	Ctr	Total U. Dev., dB	25.3
BS EN ISO 717-1: 1997	dB	dB	dB		
	41	-1	-4		
	(100-5000)	0	-4		
	(50-3150)	-2	-8		
RT's > factor 1.5 apart					
Tested Serially[] Real Time[]	(50-5000)	-1	-8	Test Procedure: 140/3/issue 5	
				Worksheet: 140_3_1.XLS	

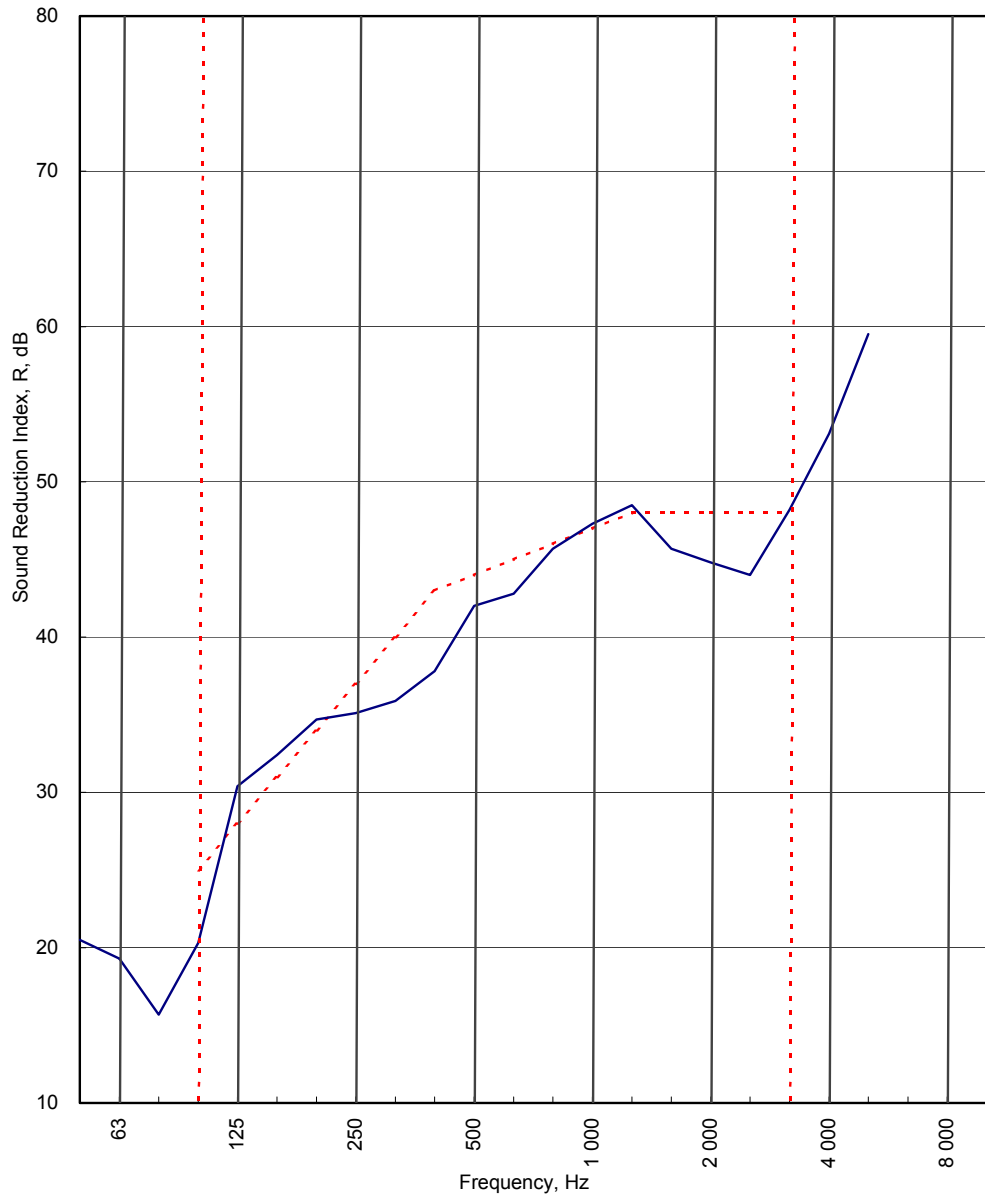
Customer: Mitek Industries Limited.



BTC 13248A

Test Code: V13248AA
Test Date: 27/01/04

Freq. Hz	R dB
50	20.5
63	19.3
80	15.7
100	20.3
125	30.4
160	32.4
200	34.7
250	35.1
315	35.9
400	37.8
500	42.0
630	42.8
800	45.7
1 000	47.3
1 250	48.5
1 600	45.7
2 000	44.8
2 500	44.0
3 150	48.2
4 000	53.1
5 000	59.5
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) = 44 (-2;-6) dB		
	Max dev. 5.2 dB at 400 Hz		
Evaluation based on laboratory measurement results obtained by an engineering method:	C₅₀₋₃₁₅₀ = -3 dB	C₅₀₋₅₀₀₀ = -2 dB	C₁₀₀₋₅₀₀₀ = -1 dB
	C_{tr,50-3150} = -11 dB	C_{tr,50-5000} = -11 dB	C_{tr,100-5000} = -6 dB

Customer: Mitek Industries Limited.



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

Test Code: **V13248AA**

Test Date: **27/01/04**

Specimen Area, S = **9.99** m²

	Room T3	Room T4
Room Volume, m ³ :	98	101
Temperature, deg.C:	15	16.7
Rel. Humidity, %RH:	38.7	39.3

Freq Hz	Test Room T3 to Test Room T4						R dB	U.Dev. dB	R 1/10Oct dB
	Source dB	Rec. (uc) dB	Bgrnd dB	Rec. (corr) dB	Rev.time Sec	Corr. dB			
50	68.1	48.6	31.7	48.6	2.06	1.0	20.5		
63	68.0	50.2	26.7	50.2	2.27	1.5	19.3		18.0
80	74.4	58.4	21.4	58.4	1.50	-0.3	15.7		
100	84.7	62.6	21.8	62.6	1.08	-1.8	20.3	4.7	
125	90.9	58.9	18.9	58.9	1.13	-1.6	30.4		24.4
160	98.1	63.9	19.9	63.9	1.08	-1.8	32.4		
200	100.0	63.7	19.1	63.7	1.11	-1.6	34.7		
250	99.9	63.6	15.2	63.6	1.24	-1.2	35.1	1.9	35.2
315	99.0	62.2	19.0	62.2	1.30	-0.9	35.9	4.1	
400	98.0	59.3	17.0	59.3	1.31	-0.9	37.8	5.2	
500	96.7	53.7	13.7	53.7	1.29	-1.0	42.0	2.0	40.3
630	96.2	52.4	10.4	52.4	1.29	-1.0	42.8	2.2	
800	96.8	50.9	12.8	50.9	1.54	-0.2	45.7	0.3	
1 000	99.3	51.9	12.0	51.9	1.58	-0.1	47.3		47.0
1 250	100.7	52.6	9.6	52.6	1.79	0.4	48.5		
1 600	98.1	52.7	9.9	52.7	1.74	0.3	45.7	2.3	
2 000	100.6	56.1	8.8	56.1	1.72	0.3	44.8	3.2	44.8
2 500	101.0	57.2	7.6	57.2	1.70	0.2	44.0	4.0	
3 150	101.4	53.0	8.0	53.0	1.55	-0.2	48.2		
4 000	96.8	42.9	8.7	42.9	1.35	-0.8	53.1		51.5
5 000	94.3	33.5	8.7	33.5	1.20	-1.3	59.5		
6 300									
8 000									
10 000									

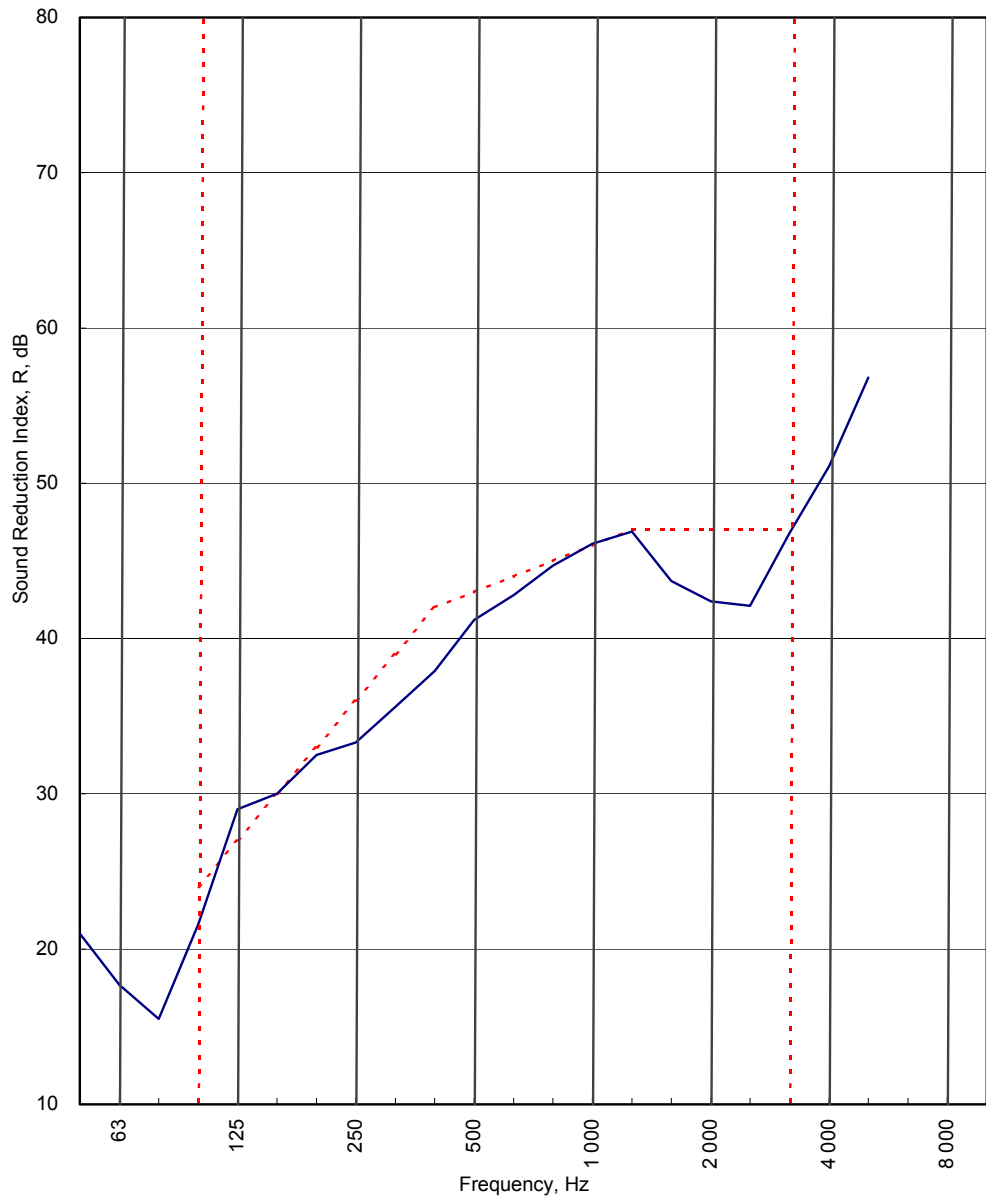
Single Figure Ratings	Rw	C	Ctr	Total U. Dev., dB	29.9
BS EN ISO 717-1: 1997	dB	dB	dB		
	44	-2	-6		
	(100-5000)	-1	-6		
	(50-3150)	-3	-11		
RT's > factor 1.5 apart				Test Procedure: 140/3/issue 5	
Tested Serially[] Real Time[]	(50-5000)	-2	-11	Worksheet: 140_3_1.XLS	



BTC 13249A

Test Code: V13249AA
Test Date: 28/01/04

Freq. Hz	R dB
50	21.0
63	17.7
80	15.5
100	21.6
125	29.0
160	30.0
200	32.5
250	33.3
315	35.6
400	37.9
500	41.2
630	42.8
800	44.7
1 000	46.1
1 250	46.9
1 600	43.7
2 000	42.4
2 500	42.1
3 150	46.8
4 000	51.1
5 000	56.8
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) = 43 (-2;-6) dB		
Evaluation based on laboratory measurement results obtained by an engineering method:	Max dev. 4.9 dB at 2 500 Hz		
	C₅₀₋₃₁₅₀ = -3 dB	C₅₀₋₅₀₀₀ = -2 dB	C₁₀₀₋₅₀₀₀ = -1 dB
	C_{tr,50-3150} = -10 dB	C_{tr,50-5000} = -10 dB	C_{tr,100-5000} = -6 dB

Customer: Mitek Industries Limited.



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

Test Code: **V13249AA**

Test Date: **28/01/04**

Specimen Area, S = **9.99 m²**

	Room T3	Room T4
Room Volume, m ³ :	98	101
Temperature, deg.C:	15.3	16.5
Rel. Humidity, %RH:	34.2	51.1

Freq Hz	Test Room T3 to Test Room T4						R dB	U.Dev. dB	R 1/10Oct dB
	Source dB	Rec. (uc) dB	Bgrnd dB	Rec. (corr) dB	Rev.time Sec	Corr. dB			
50	67.6	47.8	34.5	47.6	2.02	1.0	21.0		
63	68.0	51.9	25.4	51.9	2.35	1.6	17.7		17.5
80	74.6	58.7	19.8	58.7	1.48	-0.4	15.5		
100	85.9	62.6	20.6	62.6	1.09	-1.7	21.6	2.4	
125	91.5	60.3	18.9	60.3	0.98	-2.2	29.0		25.1
160	98.3	66.1	25.2	66.1	0.98	-2.2	30.0		
200	100.7	67.0	21.7	67.0	1.23	-1.2	32.5	0.5	
250	100.0	65.4	27.0	65.4	1.20	-1.3	33.3	2.7	33.6
315	99.0	63.2	28.3	63.2	1.54	-0.2	35.6	3.4	
400	98.4	60.1	26.1	60.1	1.47	-0.4	37.9	4.1	
500	96.8	54.7	20.7	54.7	1.33	-0.9	41.2	1.8	40.1
630	96.6	52.9	17.5	52.9	1.32	-0.9	42.8	1.2	
800	97.1	51.8	15.0	51.8	1.40	-0.6	44.7	0.3	
1 000	99.3	53.0	12.4	53.0	1.53	-0.2	46.1		45.8
1 250	101.0	54.3	10.8	54.3	1.71	0.2	46.9	0.1	
1 600	98.2	54.7	10.8	54.7	1.70	0.2	43.7	3.3	
2 000	100.7	58.7	9.5	58.7	1.78	0.4	42.4	4.6	42.7
2 500	101.1	59.2	8.9	59.2	1.68	0.2	42.1	4.9	
3 150	101.6	55.0	9.1	55.0	1.68	0.2	46.8	0.2	
4 000	97.0	45.5	9.1	45.5	1.46	-0.4	51.1		49.9
5 000	94.3	36.6	9.1	36.6	1.30	-0.9	56.8		
6 300									
8 000									
10 000									

Single Figure Ratings	Rw	C	Ctr	Total U. Dev., dB	29.5
BS EN ISO 717-1: 1997	dB	dB	dB		
	43	-2	-6		
	(100-5000)	-1	-6		
Background Corrected					
	(50-3150)	-3	-10		
RT's > factor 1.5 apart					
Tested Serially[] Real Time[]	(50-5000)	-2	-10		
				Test Procedure: 140/3/issue 5	
				Worksheet: 140_3_1.XLS	

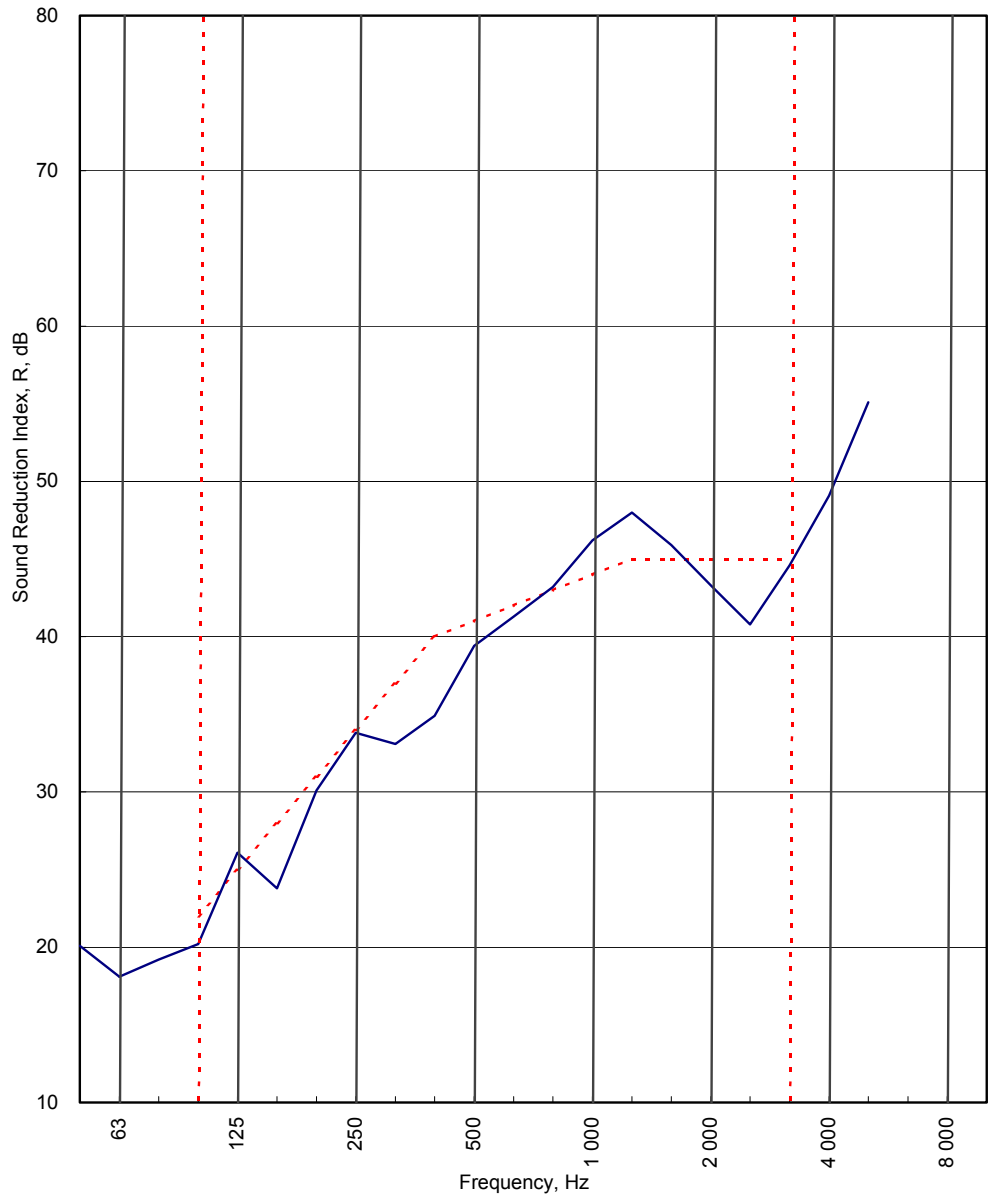
Customer: **Mitek Industries Limited.**



BTC 13250A

Test Code: V13250AA
Test Date: 28/01/04

Freq. Hz	R dB
50	20.1
63	18.1
80	19.2
100	20.2
125	26.1
160	23.8
200	30.1
250	33.8
315	33.1
400	34.9
500	39.4
630	41.3
800	43.2
1 000	46.2
1 250	48.0
1 600	45.9
2 000	43.3
2 500	40.8
3 150	44.6
4 000	49.1
5 000	55.1
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;C_{tr}) = 41 (-2;-6) dB		
Evaluation based on laboratory measurement results obtained by an engineering method:	Max dev. 5.1 dB at 400 Hz		
	C ₅₀₋₃₁₅₀ = -2 dB	C ₅₀₋₅₀₀₀ = -1 dB	C ₁₀₀₋₅₀₀₀ = -1 dB
	C _{tr,50-3150} = -8 dB	C _{tr,50-5000} = -8 dB	C _{tr,100-5000} = -6 dB

Customer: Mitek Industries Limited.



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

Test Code: **V13250AA** Test Date: **28/01/04**

Specimen Area, S = 9.99 m ²	Room T3	Room T4
	Room Volume, m ³ :	98 101
	Temperature, deg.C:	15.1 16.8
	Rel. Humidity, %RH:	38.9 42.9

Freq Hz	Test Room T3 to Test Room T4						R dB	U.Dev. dB	R 1/10Oct dB
	Source dB	Rec. (uc) dB	Bgrnd dB	Rec. (corr) dB	Rev.time Sec	Corr. dB			
50	66.9	48.1	31.0	48.1	2.19	1.3	20.1		
63	67.5	50.9	25.9	50.9	2.27	1.5	18.1		19.1
80	76.0	59.5	19.6	59.5	3.03	2.7	19.2		
100	86.0	65.0	20.8	65.0	1.34	-0.8	20.2	1.8	
125	91.9	62.8	20.5	62.8	0.81	-3.0	26.1		22.7
160	98.4	71.6	30.5	71.6	0.82	-3.0	23.8	4.2	
200	100.5	68.6	20.5	68.6	1.06	-1.8	30.1	0.9	
250	100.0	65.2	19.9	65.2	1.28	-1.0	33.8	0.2	32.0
315	99.1	64.7	30.8	64.7	1.20	-1.3	33.1	3.9	
400	98.3	62.2	18.3	62.2	1.24	-1.2	34.9	5.1	
500	97.0	56.7	12.9	56.7	1.30	-0.9	39.4	1.6	37.7
630	96.4	54.6	11.0	54.6	1.45	-0.5	41.3	0.7	
800	96.9	53.2	12.1	53.2	1.45	-0.5	43.2		
1 000	99.4	53.4	11.7	53.4	1.70	0.2	46.2		45.3
1 250	100.9	53.4	9.6	53.4	1.80	0.5	48.0		
1 600	98.2	52.7	9.7	52.7	1.79	0.4	45.9		
2 000	100.8	57.5	8.3	57.5	1.60	0.0	43.3	1.7	42.8
2 500	101.1	60.3	7.2	60.3	1.63	0.0	40.8	4.2	
3 150	101.6	56.8	7.9	56.8	1.56	-0.2	44.6	0.4	
4 000	96.9	47.3	8.7	47.3	1.44	-0.5	49.1		47.8
5 000	94.6	38.2	8.8	38.2	1.21	-1.3	55.1		
6 300									
8 000									
10 000									

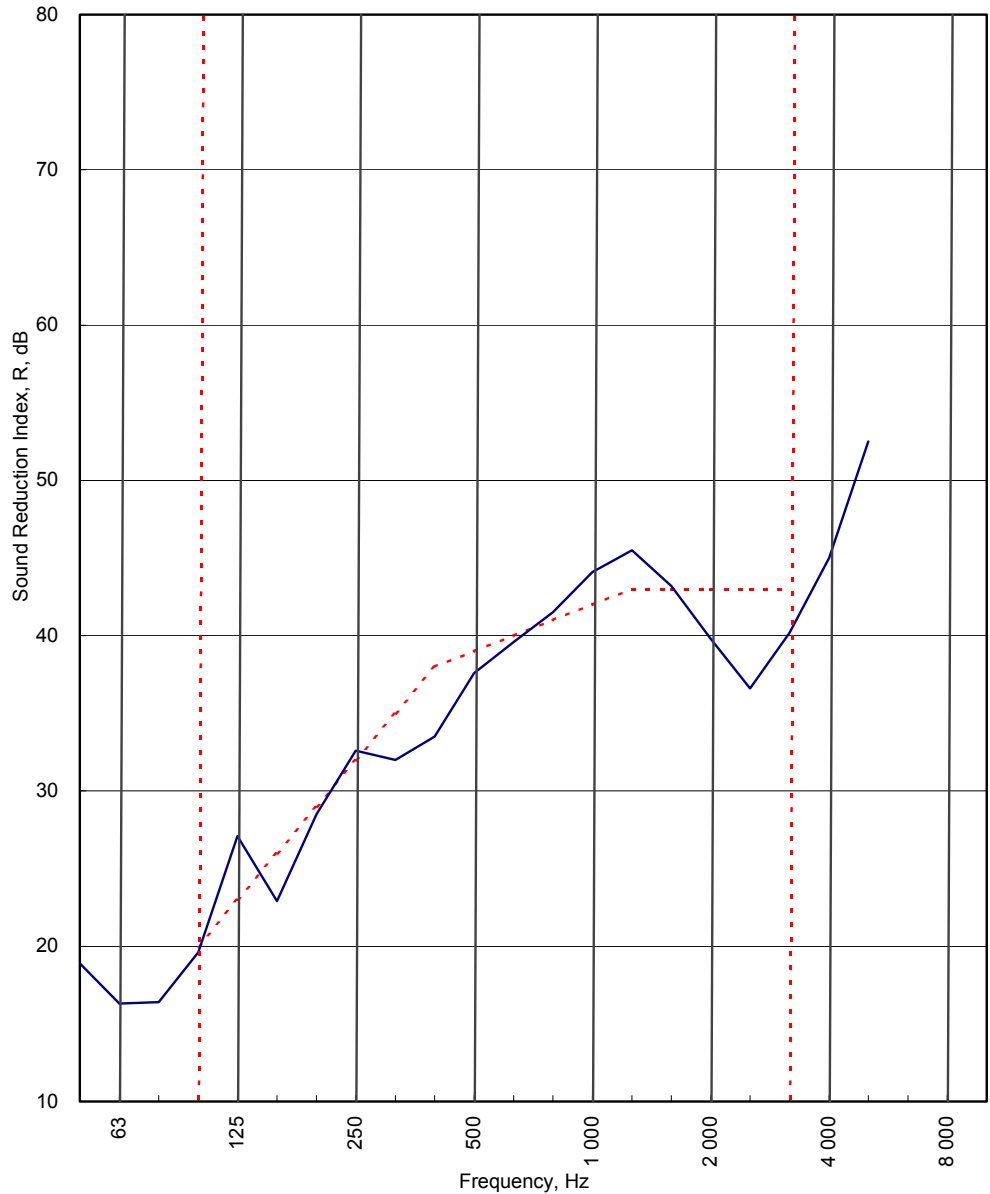
Single Figure Ratings	Rw	C	Ctr	Total U. Dev., dB	24.7
BS EN ISO 717-1: 1997	dB	dB	dB		
	41	-2	-6		
	(100-5000)	-1	-6		
	(50-3150)	-2	-8		
RT's > factor 1.5 apart				Test Procedure: 140/3/issue 5	
Tested Serially[] Real Time[]	(50-5000)	-1	-8	Worksheet: 140_3_1.XLS	



BTC 13251A

Test Code: V13251AA
Test Date: 28/01/04

Freq. Hz	R dB
50	18.9
63	16.3
80	16.4
100	19.6
125	27.1
160	22.9
200	28.5
250	32.6
315	32.0
400	33.5
500	37.6
630	39.6
800	41.5
1 000	44.1
1 250	45.5
1 600	43.2
2 000	39.8
2 500	36.6
3 150	40.2
4 000	45.0
5 000	52.5
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;C_{tr}) = 39 (-1;-5) dB		
	Max dev. 6.4 dB at 2 500 Hz		
Evaluation based on laboratory measurement results obtained by an engineering method:	C ₅₀₋₃₁₅₀ = -2 dB	C ₅₀₋₅₀₀₀ = -1 dB	C ₁₀₀₋₅₀₀₀ = -1 dB
	C _{tr,50-3150} = -8 dB	C _{tr,50-5000} = -8 dB	C _{tr,100-5000} = -5 dB

Customer: Mitek Industries Limited.



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

Test Code: **V13251AA**

Test Date: **28/01/04**

Specimen Area, S = **9.99** m²

	Room T3	Room T4
Room Volume, m ³ :	98	101
Temperature, deg.C:	16	18.9
Rel. Humidity, %RH:	35.2	35.5

Freq Hz	Test Room T3 to Test Room T4						R dB	U.Dev. dB	R 1/10Oct dB
	Source dB	Rec. (uc) dB	Bgrnd dB	Rec. (corr) dB	Rev.time Sec	Corr. dB			
50	67.1	49.5	29.9	49.5	2.17	1.3	18.9		
63	67.1	52.3	27.3	52.3	2.30	1.5	16.3		17.0
80	75.6	60.1	21.5	60.1	2.00	0.9	16.4		
100	85.4	65.9	23.1	65.9	1.64	0.1	19.6	0.4	
125	91.4	63.5	20.3	63.5	1.35	-0.8	27.1		22.2
160	98.7	72.4	29.0	72.4	0.74	-3.4	22.9	3.1	
200	100.5	70.6	21.6	70.6	1.16	-1.4	28.5	0.5	
250	99.8	66.1	21.4	66.1	1.26	-1.1	32.6		30.6
315	99.1	66.2	31.1	66.2	1.33	-0.9	32.0	3.0	
400	98.2	63.5	18.5	63.5	1.24	-1.2	33.5	4.5	
500	96.6	58.0	14.6	58.0	1.28	-1.0	37.6	1.4	36.1
630	96.4	55.9	11.2	55.9	1.30	-0.9	39.6	0.4	
800	96.9	55.0	12.5	55.0	1.49	-0.4	41.5		
1 000	99.2	55.1	12.0	55.1	1.62	0.0	44.1		43.4
1 250	100.9	55.6	9.4	55.6	1.68	0.2	45.5		
1 600	98.1	55.1	9.6	55.1	1.69	0.2	43.2		
2 000	100.8	61.2	8.4	61.2	1.68	0.2	39.8	3.2	39.1
2 500	101.1	64.4	7.3	64.4	1.57	-0.1	36.6	6.4	
3 150	101.5	61.1	8.3	61.1	1.54	-0.2	40.2	2.8	
4 000	96.8	51.1	8.8	51.1	1.37	-0.7	45.0		43.5
5 000	94.4	40.8	8.9	40.8	1.26	-1.1	52.5		
6 300									
8 000									
10 000									

Single Figure Ratings	Rw	C	Ctr	Total U. Dev., dB	25.7
BS EN ISO 717-1: 1997	dB	dB	dB		
	39	-1	-5		
	(100-5000)	-1	-5		
	(50-3150)	-2	-8		
RT's > factor 1.5 apart				Test Procedure: 140/3/issue 5	
Tested Serially[] Real Time[]	(50-5000)	-1	-8	Worksheet: 140_3_1.XLS	

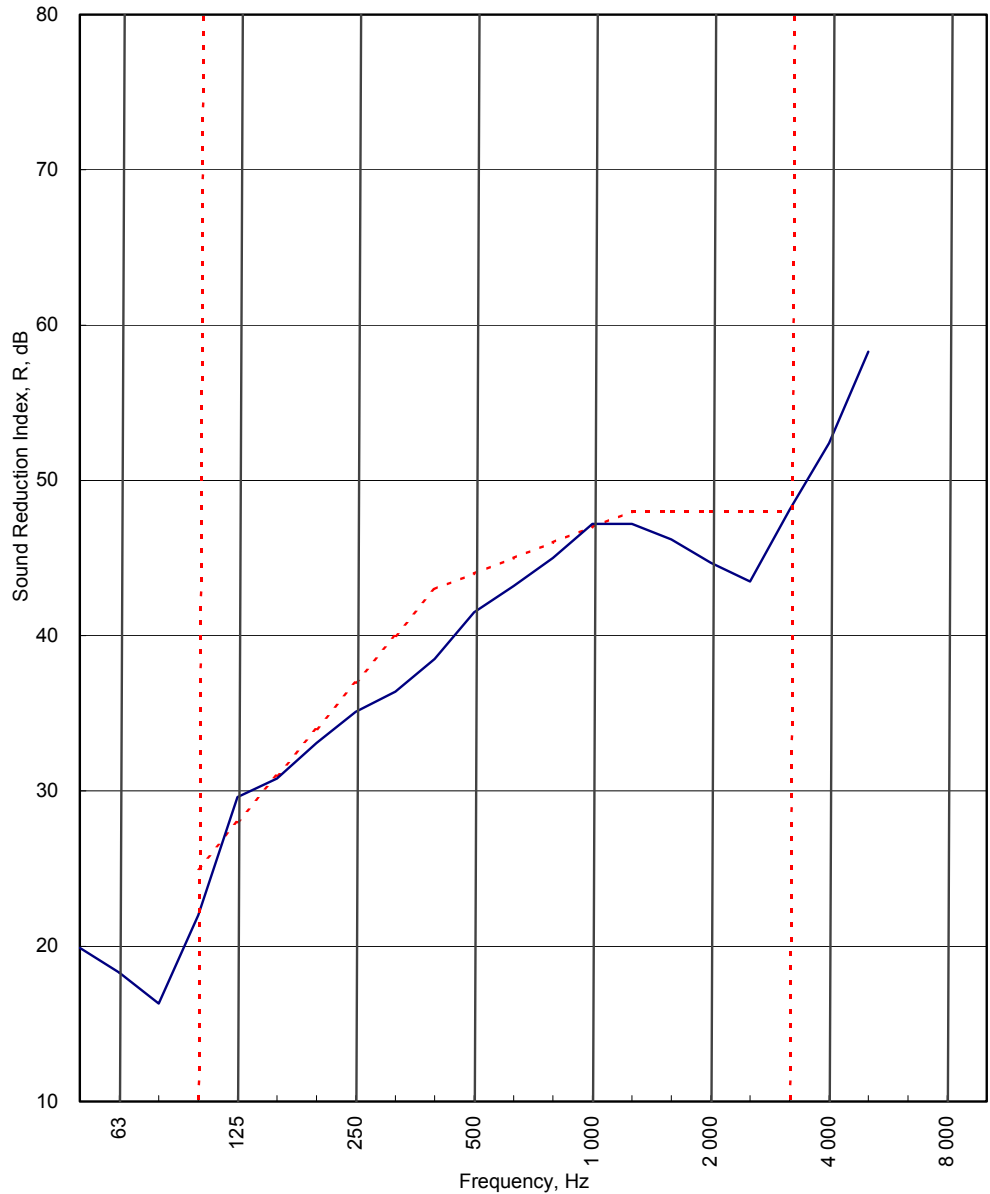
Customer: **Mitek Industries Limited.**



BTC 13252A

Test Code: V13252AA
Test Date: 29/01/04

Freq. Hz	R dB
50	19.9
63	18.3
80	16.3
100	22.0
125	29.6
160	30.8
200	33.1
250	35.1
315	36.4
400	38.5
500	41.5
630	43.2
800	45.0
1 000	47.2
1 250	47.2
1 600	46.2
2 000	44.7
2 500	43.5
3 150	48.1
4 000	52.4
5 000	58.3
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) = 44 (-2;-6) dB		
	Max dev. 4.5 dB at 2 500 Hz		
Evaluation based on laboratory measurement results obtained by an engineering method:	C ₅₀₋₃₁₅₀ = -3 dB	C ₅₀₋₅₀₀₀ = -2 dB	C ₁₀₀₋₅₀₀₀ = -1 dB
	C _{tr,50-3150} = -10 dB	C _{tr,50-5000} = -10 dB	C _{tr,100-5000} = -6 dB

Customer: Mitek Industries Limited.



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

Test Code: **V13252AA**

Test Date: **29/01/04**

Specimen Area, S = **9.99** m²

Room T3 Room T4

Room Volume, m³: **98** **101**
 Temperature, deg.C: **15.4** **15.8**
 Rel. Humidity, %RH: **30.6** **42.8**

Freq Hz	Test Room T3 to Test Room T4						R dB	U.Dev. dB	R 1/10Oct dB
	Source dB	Rec. (uc) dB	Bgrnd dB	Rec. (corr) dB	Rev.time Sec	Corr. dB			
50	67.3	48.7	33.7	48.6	2.15	1.2	19.9		
63	66.6	50.2	27.8	50.2	2.48	1.9	18.3		17.9
80	75.4	58.4	21.9	58.4	1.39	-0.7	16.3		
100	86.0	62.5	20.6	62.5	1.14	-1.5	22.0	3.0	
125	90.9	58.6	19.2	58.6	0.86	-2.7	29.6		25.6
160	98.1	65.0	25.1	65.0	0.96	-2.3	30.8	0.2	
200	100.6	66.0	23.5	66.0	1.14	-1.5	33.1	0.9	
250	99.8	63.4	22.5	63.4	1.19	-1.3	35.1	1.9	34.7
315	99.3	62.4	25.4	62.4	1.43	-0.5	36.4	3.6	
400	98.4	59.0	23.2	59.0	1.32	-0.9	38.5	4.5	
500	97.0	54.6	19.9	54.6	1.33	-0.9	41.5	2.5	40.6
630	96.6	52.5	17.7	52.5	1.32	-0.9	43.2	1.8	
800	97.0	51.3	15.9	51.3	1.39	-0.7	45.0	1.0	
1 000	99.4	52.2	13.5	52.2	1.63	0.0	47.2		46.3
1 250	101.0	54.0	12.6	54.0	1.69	0.2	47.2	0.8	
1 600	98.1	52.2	15.4	52.2	1.75	0.3	46.2	1.8	
2 000	100.8	56.3	16.3	56.3	1.69	0.2	44.7	3.3	44.7
2 500	101.1	57.7	13.5	57.7	1.64	0.1	43.5	4.5	
3 150	101.5	53.1	12.0	53.1	1.51	-0.3	48.1		
4 000	96.8	43.7	10.3	43.7	1.39	-0.7	52.4		51.2
5 000	94.1	34.4	9.2	34.4	1.17	-1.4	58.3		
6 300									
8 000									
10 000									

Single Figure Ratings	Rw	C	Ctr	Total U. Dev., dB	29.8
BS EN ISO 717-1: 1997	dB	dB	dB		
	44	-2	-6		
	(100-5000)	-1	-6		
Background Corrected					
	(50-3150)	-3	-10		
RT's > factor 1.5 apart					
Tested Serially[] Real Time[]	(50-5000)	-2	-10		

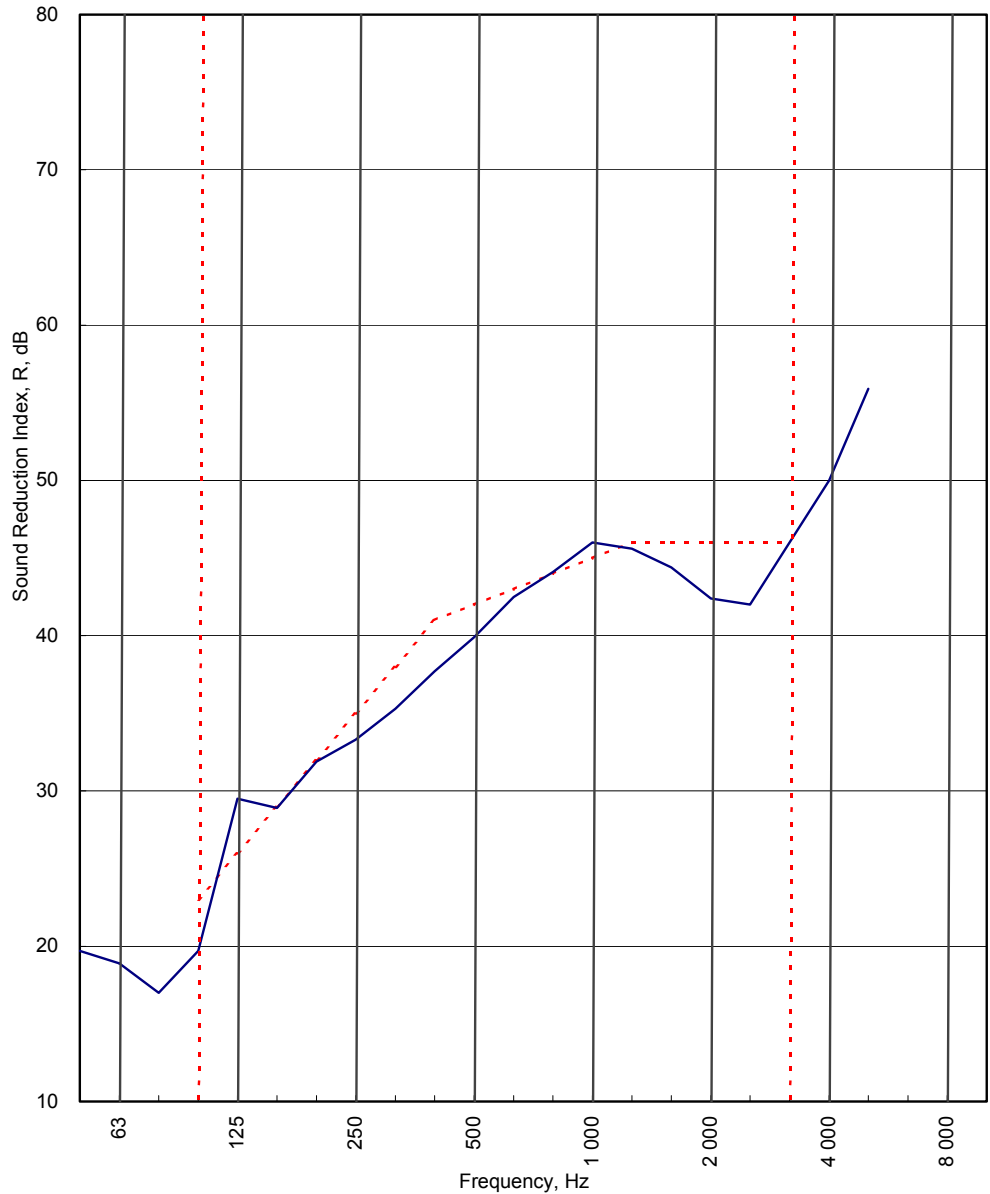
Test Procedure: 140/3/issue 5
 Worksheet: 140_3_1.XLS



BTC 13253A

Test Code: V13253AA
Test Date: 29/01/04

Freq. Hz	R dB
50	19.7
63	18.9
80	17.0
100	19.7
125	29.5
160	28.9
200	31.9
250	33.3
315	35.3
400	37.7
500	39.9
630	42.5
800	44.1
1 000	46.0
1 250	45.6
1 600	44.4
2 000	42.4
2 500	42.0
3 150	46.0
4 000	50.0
5 000	55.9
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) = 42 (-1;-6) dB		
	Max dev. 4 dB at 2 500 Hz		
Evaluation based on laboratory measurement results obtained by an engineering method:	C ₅₀₋₃₁₅₀ = -2 dB	C ₅₀₋₅₀₀₀ = -1 dB	C ₁₀₀₋₅₀₀₀ = 0 dB
	C _{tr,50-3150} = -9 dB	C _{tr,50-5000} = -9 dB	C _{tr,100-5000} = -6 dB

Customer: Mitek Industries Limited.



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

Test Code: **V13253AA** Test Date: **29/01/04**

Specimen Area, S = **9.99 m²**

	Room T3	Room T4
Room Volume, m ³ :	98	101
Temperature, deg.C:	15.4	15.7
Rel. Humidity, %RH:	29.4	41.8

Freq Hz	Test Room T3 to Test Room T4						R dB	U.Dev. dB	R 1/10Oct dB
	Source dB	Rec. (uc) dB	Bgrnd dB	Rec. (corr) dB	Rev.time Sec	Corr. dB			
50	66.7	48.4	31.9	48.4	2.23	1.4	19.7		
63	66.1	49.2	28.7	49.2	2.57	2.0	18.9		18.4
80	75.5	58.6	23.4	58.6	1.66	0.1	17.0		
100	85.3	64.0	22.2	64.0	1.12	-1.6	19.7	3.3	
125	90.9	59.4	19.3	59.4	1.01	-2.0	29.5		23.6
160	98.4	67.0	26.0	67.0	0.91	-2.5	28.9	0.1	
200	100.7	67.9	22.0	67.9	1.33	-0.9	31.9	0.1	
250	99.6	65.4	17.5	65.4	1.33	-0.9	33.3	1.7	33.3
315	99.2	63.8	19.4	63.8	1.59	-0.1	35.3	2.7	
400	98.7	60.1	16.8	60.1	1.30	-0.9	37.7	3.3	
500	96.7	55.9	12.7	55.9	1.30	-0.9	39.9	2.1	39.6
630	96.5	53.3	11.2	53.3	1.38	-0.7	42.5	0.5	
800	97.0	52.5	12.6	52.5	1.48	-0.4	44.1		
1 000	99.6	53.6	11.8	53.6	1.63	0.0	46.0		45.2
1 250	101.0	55.4	9.8	55.4	1.63	0.0	45.6	0.4	
1 600	98.2	54.1	10.5	54.1	1.72	0.3	44.4	1.6	
2 000	100.7	58.3	9.5	58.3	1.62	0.0	42.4	3.6	42.8
2 500	101.1	59.2	8.6	59.2	1.67	0.1	42.0	4.0	
3 150	101.5	54.9	10.5	54.9	1.41	-0.6	46.0		
4 000	96.8	45.7	11.2	45.7	1.27	-1.1	50.0		49.0
5 000	94.1	36.8	11.1	36.8	1.16	-1.4	55.9		
6 300									
8 000									
10 000									

Single Figure Ratings	Rw	C	Ctr	Total U. Dev., dB	23.4
BS EN ISO 717-1: 1997	dB	dB	dB		
	42	-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	



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.

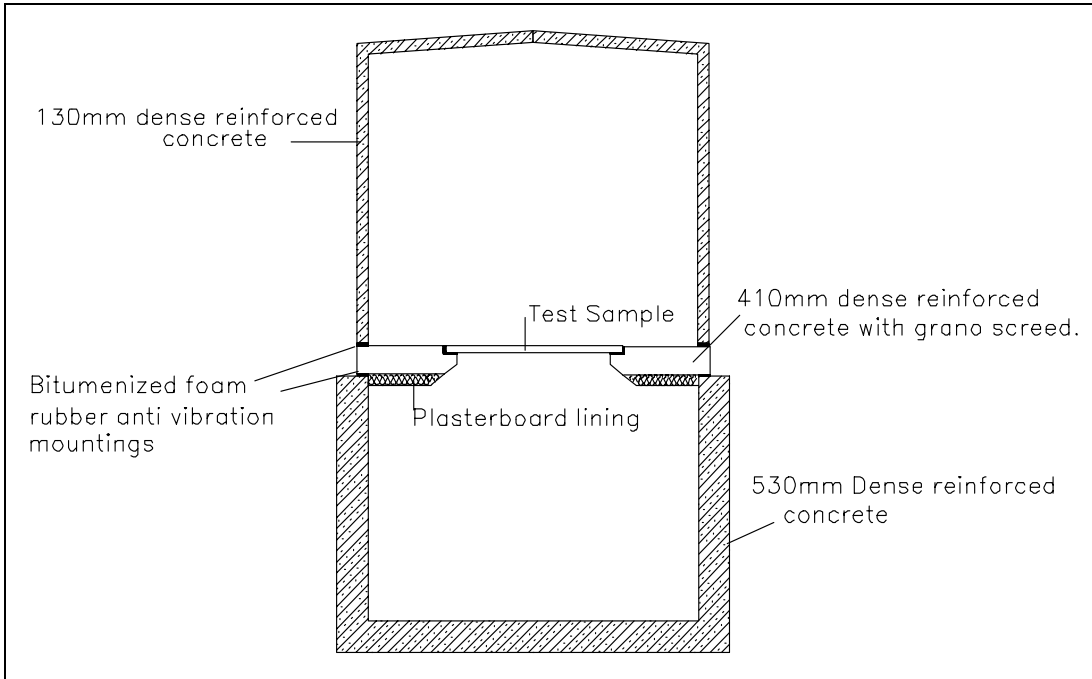


Figure 9. Chamber layout

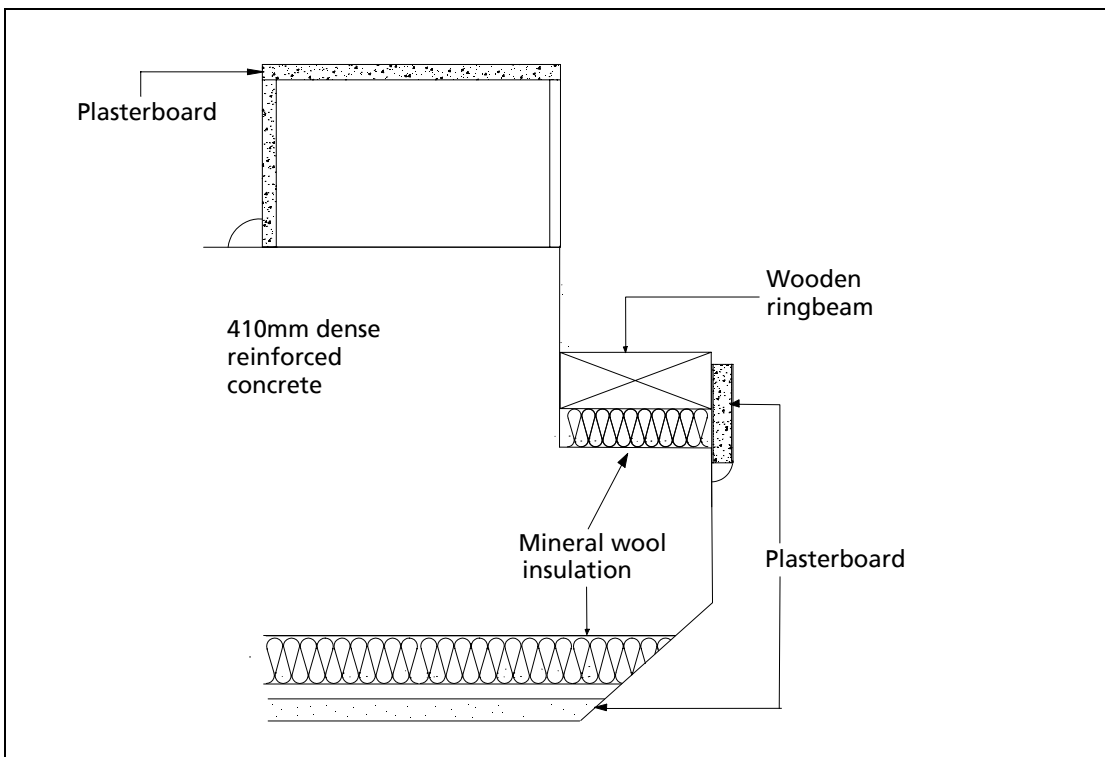


Figure 10. Ring beam construction around test aperture