



# **The Building Test Centre**

**Fire Acoustics Structures**

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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: 27<sup>th</sup>–29<sup>th</sup> January 2004

[www.btconline.co.uk](http://www.btconline.co.uk)

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

**Customer:** **Mitek Industries Limited.**

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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.

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Customer: Mitek Industries Limited.

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## 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 26<sup>th</sup> and the 29<sup>th</sup> 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

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B.Eng.  
Technologist

Authorised by

**Eur Ing. Paul Howard**  
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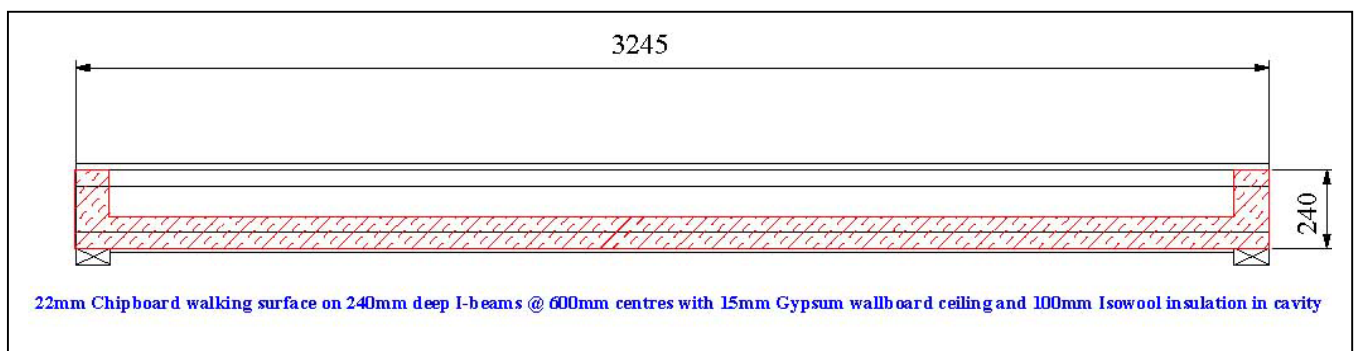
*The Building Test Centre will not discuss the content of this report without written permission from the test sponsor. The Building Test Centre retains ownership of the test report content but authorises the test sponsor to reproduce the report as necessary in its entirety only.*

## 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

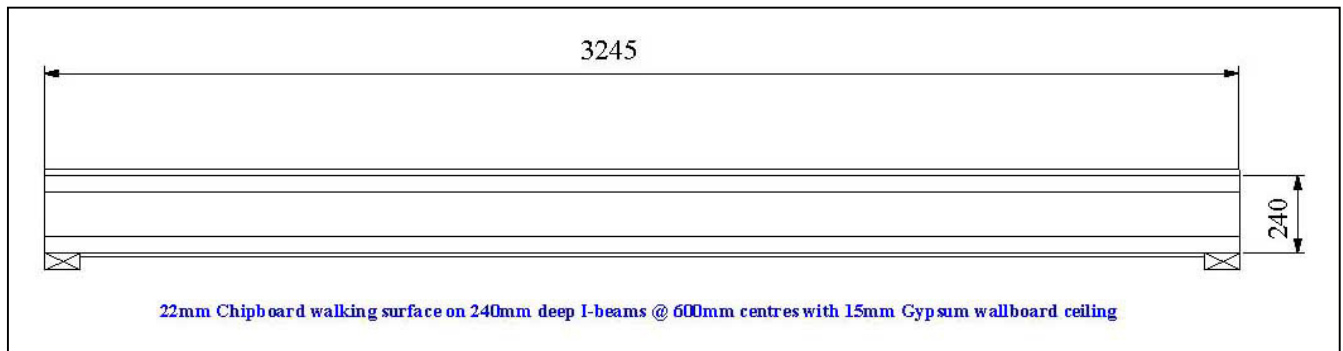


Figure 2. Cross-section through partition.

#### 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

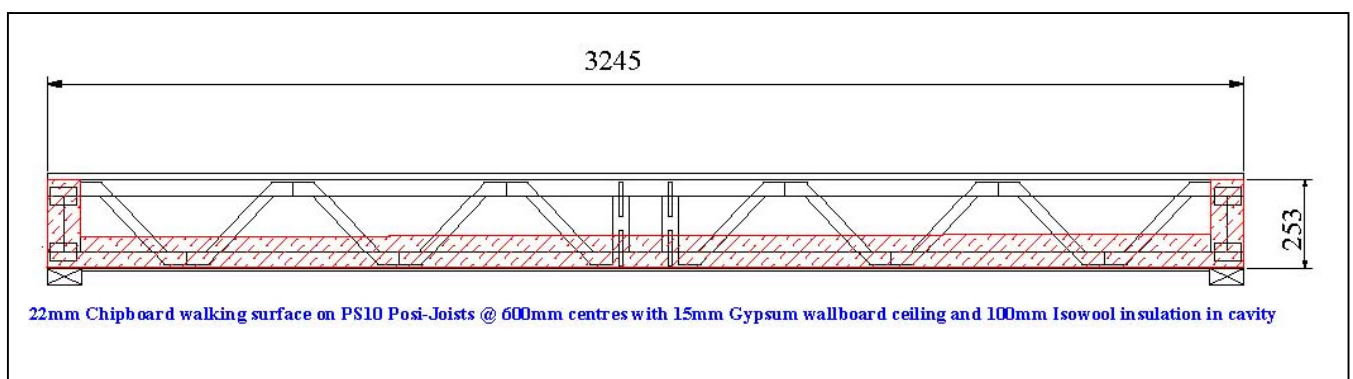


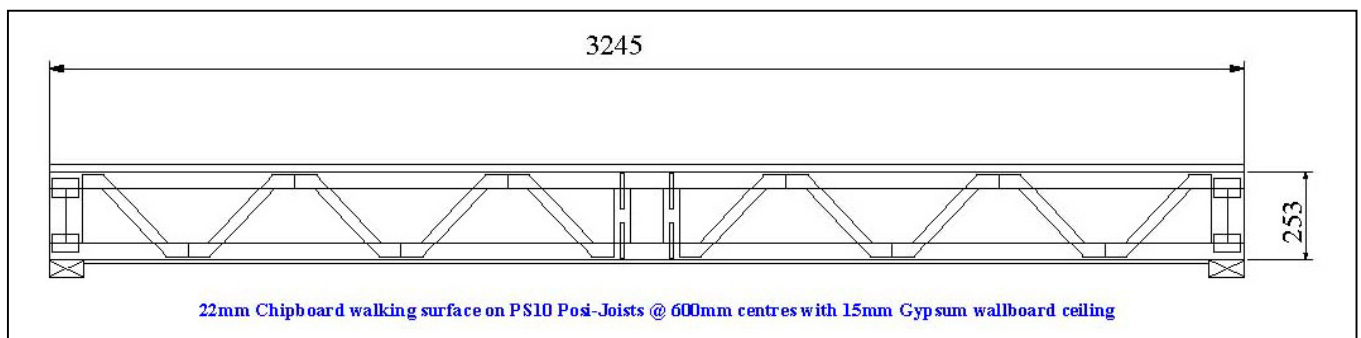
Figure 3. Cross-section through partition.

Customer: Mitek Industries Limited.

#### 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

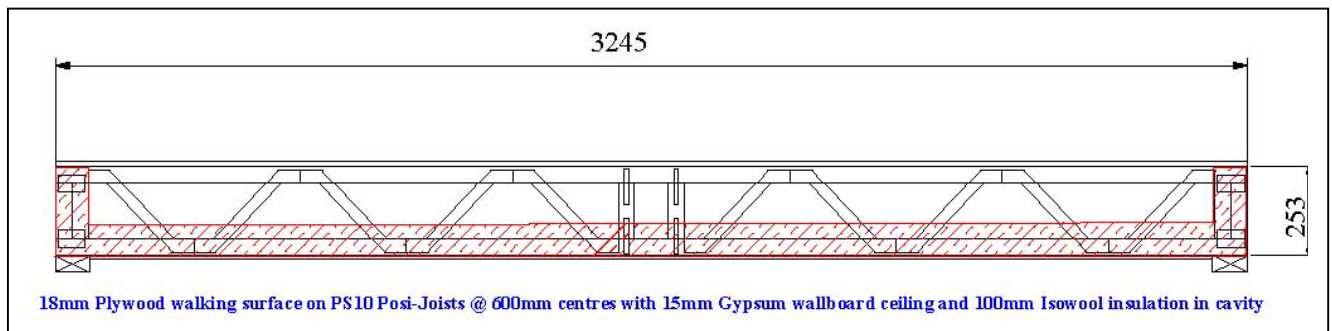


**Figure 4.** Cross section through partition

#### 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

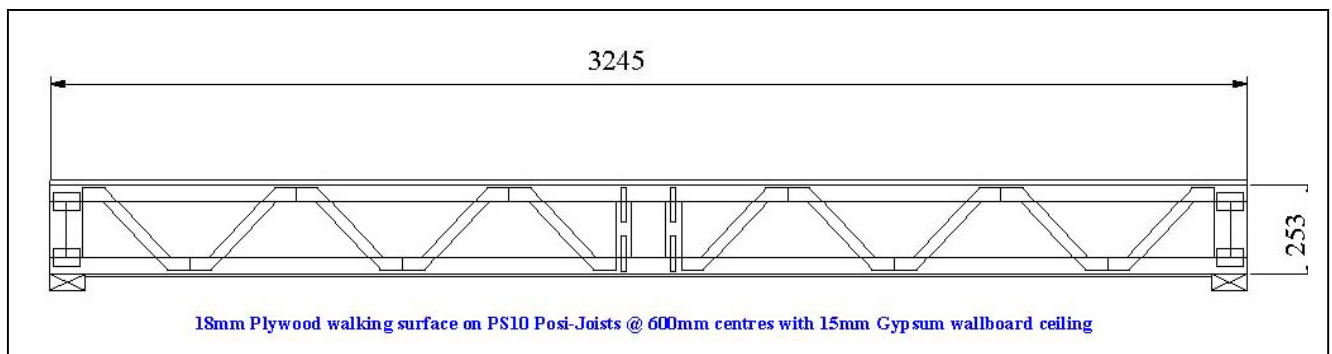


**Figure 5.** Cross section through partition

**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



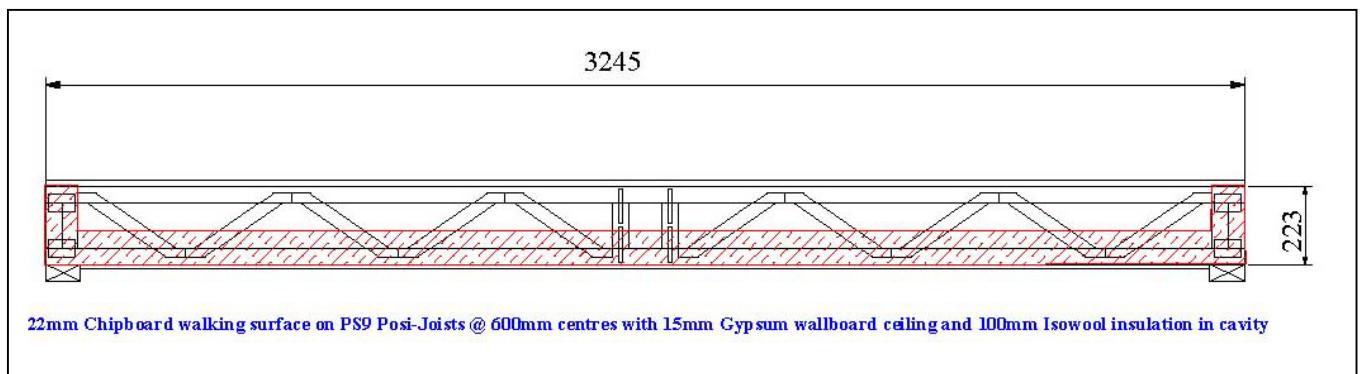
**Figure 6.** Cross section through partition



### 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

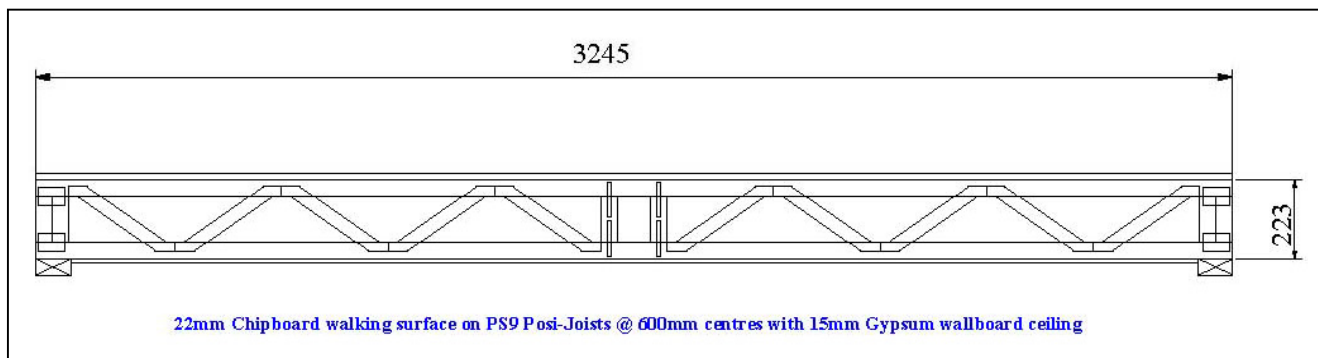


**Figure 7.** Cross-section through partition.

### 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 <sup>2</sup> |
| 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 <sup>2</sup>    |
| 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 <sup>2</sup> |
| 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/m<sup>3</sup>.

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 98m<sup>3</sup> and 101m<sup>3</sup>. 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 <sub>w</sub> (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.

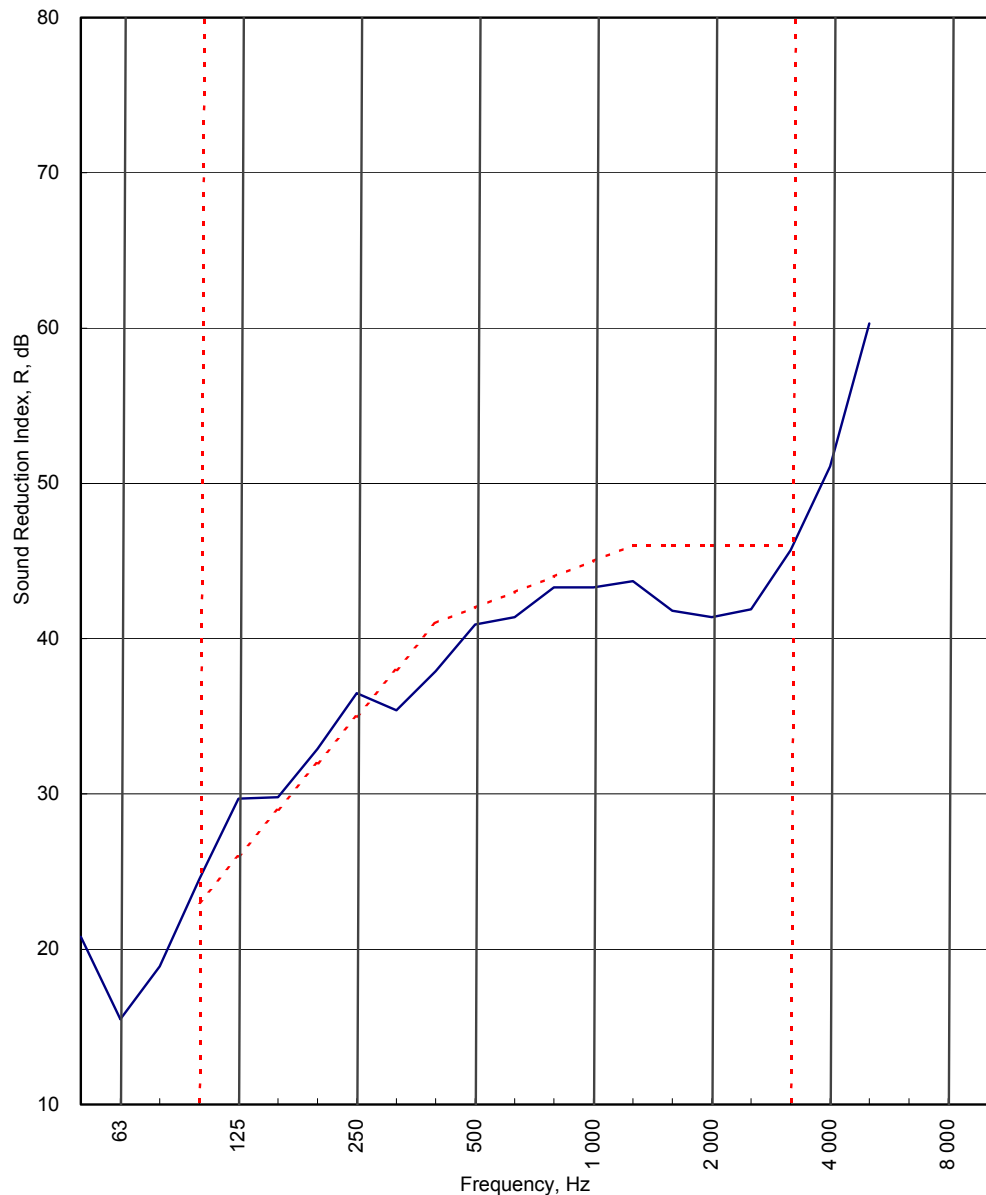
Customer: **Mitek Industries Limited.**

## APPENDIX A – TEST DATA

BTC 13236A

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

| Freq.<br>Hz | R<br>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

Evaluation based on laboratory  
measurement results obtained by  
an engineering method:

**R<sub>w</sub> (C;C<sub>tr</sub>) = 42 (-1;-4) dB**

Max dev. 4.6 dB at 2 000 Hz

C<sub>50-3150</sub> = -2 dB

C<sub>50-5000</sub> = -1 dB

C<sub>100-5000</sub> = 0 dB

C<sub>tr,50-3150</sub> = -8 dB

C<sub>tr,50-5000</sub> = -8 dB

C<sub>tr,100-5000</sub> = -4 dB

Customer: Mitek Industries Limited.

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| LABORATORY AIRBORNE SOUND INSULATION TEST - BS EN ISO 140-3:1995 |                              |                 |                               |                   |                               |             |             |                                                                           |                   |  |
|------------------------------------------------------------------|------------------------------|-----------------|-------------------------------|-------------------|-------------------------------|-------------|-------------|---------------------------------------------------------------------------|-------------------|--|
| Test Code: <b>V13236AA</b>                                       |                              |                 | Test Date: <b>27/01/04</b>    |                   |                               |             |             |                                                                           |                   |  |
| Specimen Area, S = <b>9.99</b> m <sup>2</sup>                    |                              |                 | Room T3                       |                   | Room T4                       |             |             |                                                                           |                   |  |
|                                                                  |                              |                 | Room Volume, m <sup>3</sup> : |                   | <b>98</b>                     | <b>101</b>  |             |                                                                           |                   |  |
|                                                                  |                              |                 | Temperature, deg.C:           |                   | <b>15.6</b>                   | <b>18.1</b> |             |                                                                           |                   |  |
|                                                                  |                              |                 | Rel. Humidity, %RH:           |                   | <b>39.4</b>                   | <b>45.8</b> |             |                                                                           |                   |  |
| Freq<br>Hz                                                       | Test Room T3 to Test Room T4 |                 |                               |                   |                               |             | R<br>dB     | U.Dev.<br>dB                                                              | R<br>1/1Oct<br>dB |  |
|                                                                  | Source<br>dB                 | Rec. (uc)<br>dB | Bgrnd<br>dB                   | Rec. (corr)<br>dB | Rev.time<br>Sec               | Corr.<br>dB |             |                                                                           |                   |  |
| 50                                                               | 67.7                         | 48.2            | 33.5                          | <b>48.1</b>       | 2.15                          | 1.2         | <b>20.8</b> | 2.6<br>3.1<br>1.1<br>1.6<br>0.7<br>1.7<br>2.3<br>4.2<br>4.6<br>4.1<br>0.3 | 17.8              |  |
| 63                                                               | 67.8                         | 53.8            | 31.3                          | 53.8              | <b>2.31</b>                   | 1.5         | <b>15.5</b> |                                                                           |                   |  |
| 80                                                               | 74.8                         | 55.6            | 25.5                          | 55.6              | <b>1.50</b>                   | -0.3        | <b>18.9</b> |                                                                           |                   |  |
| 100                                                              | 85.7                         | 59.6            | 29.5                          | 59.6              | 1.12                          | -1.6        | <b>24.5</b> |                                                                           |                   |  |
| 125                                                              | 90.7                         | 57.9            | 20.6                          | 57.9              | 0.79                          | -3.1        | <b>29.7</b> |                                                                           | 27.2              |  |
| 160                                                              | 97.8                         | 64.9            | 24.8                          | 64.9              | 0.79                          | -3.1        | <b>29.8</b> |                                                                           | 34.7              |  |
| 200                                                              | 100.3                        | 64.4            | 23.3                          | 64.4              | 0.81                          | -3.0        | <b>32.9</b> |                                                                           |                   |  |
| 250                                                              | 99.7                         | 61.6            | 25.0                          | 61.6              | 1.11                          | -1.6        | <b>36.5</b> |                                                                           |                   |  |
| 315                                                              | 98.8                         | 62.6            | 25.0                          | 62.6              | 1.35                          | -0.8        | <b>35.4</b> |                                                                           |                   |  |
| 400                                                              | 98.3                         | 59.3            | 23.2                          | 59.3              | 1.27                          | -1.1        | <b>37.9</b> |                                                                           | 39.8              |  |
| 500                                                              | 96.9                         | 54.8            | 20.1                          | 54.8              | 1.22                          | -1.2        | <b>40.9</b> | 43.4                                                                      |                   |  |
| 630                                                              | 96.3                         | 54.1            | 16.8                          | 54.1              | 1.34                          | -0.8        | <b>41.4</b> |                                                                           |                   |  |
| 800                                                              | 96.9                         | 53.1            | 15.6                          | 53.1              | 1.45                          | -0.5        | <b>43.3</b> |                                                                           |                   |  |
| 1 000                                                            | 99.2                         | 55.6            | 13.7                          | 55.6              | 1.52                          | -0.3        | <b>43.3</b> |                                                                           |                   |  |
| 1 250                                                            | 100.8                        | 57.2            | 11.6                          | 57.2              | 1.64                          | 0.1         | <b>43.7</b> | 41.7                                                                      |                   |  |
| 1 600                                                            | 98.1                         | 56.6            | 11.7                          | 56.6              | 1.72                          | 0.3         | <b>41.8</b> |                                                                           |                   |  |
| 2 000                                                            | 100.7                        | 59.6            | 13.0                          | 59.6              | 1.74                          | 0.3         | <b>41.4</b> |                                                                           |                   |  |
| 2 500                                                            | 101.2                        | 59.6            | 8.4                           | 59.6              | 1.74                          | 0.3         | <b>41.9</b> |                                                                           |                   |  |
| 3 150                                                            | 101.5                        | 55.7            | 8.9                           | 55.7              | 1.57                          | -0.1        | <b>45.7</b> | 49.3                                                                      |                   |  |
| 4 000                                                            | 96.9                         | 45.1            | 8.7                           | 45.1              | 1.38                          | -0.7        | <b>51.1</b> |                                                                           |                   |  |
| 5 000                                                            | 94.4                         | 33.0            | 8.8                           | 33.0              | 1.27                          | -1.1        | <b>60.3</b> |                                                                           |                   |  |
| 6 300                                                            |                              |                 |                               |                   |                               |             |             |                                                                           |                   |  |
| 8 000                                                            |                              |                 |                               |                   |                               |             |             |                                                                           |                   |  |
| 10 000                                                           |                              |                 |                               |                   |                               |             |             |                                                                           |                   |  |
| Single Figure Ratings                                            |                              | <b>Rw</b>       | <b>C</b>                      | <b>Ctr</b>        | Total U. Dev., dB             |             |             | <b>26.3</b>                                                               |                   |  |
| BS EN ISO 717-1: 1997                                            |                              | <b>dB</b>       | <b>dB</b>                     | <b>dB</b>         |                               |             |             |                                                                           |                   |  |
|                                                                  |                              | <b>42</b>       | <b>-1</b>                     | <b>-4</b>         |                               |             |             |                                                                           |                   |  |
|                                                                  |                              | (100-5000)      | <b>0</b>                      | <b>-4</b>         |                               |             |             |                                                                           |                   |  |
| Background Corrected                                             |                              | (50-3150)       | <b>-2</b>                     | <b>-8</b>         |                               |             |             |                                                                           |                   |  |
| RT's > factor 1.5 apart                                          |                              | (50-5000)       | <b>-1</b>                     | <b>-8</b>         |                               |             |             |                                                                           |                   |  |
| Tested Serially[ ] Real Time[ ]                                  |                              | (50-5000)       | <b>-1</b>                     | <b>-8</b>         |                               |             |             |                                                                           |                   |  |
|                                                                  |                              |                 |                               |                   | Test Procedure: 140/3/issue 5 |             |             |                                                                           |                   |  |
|                                                                  |                              |                 |                               |                   | Worksheet: 140_3_1.XLS        |             |             |                                                                           |                   |  |

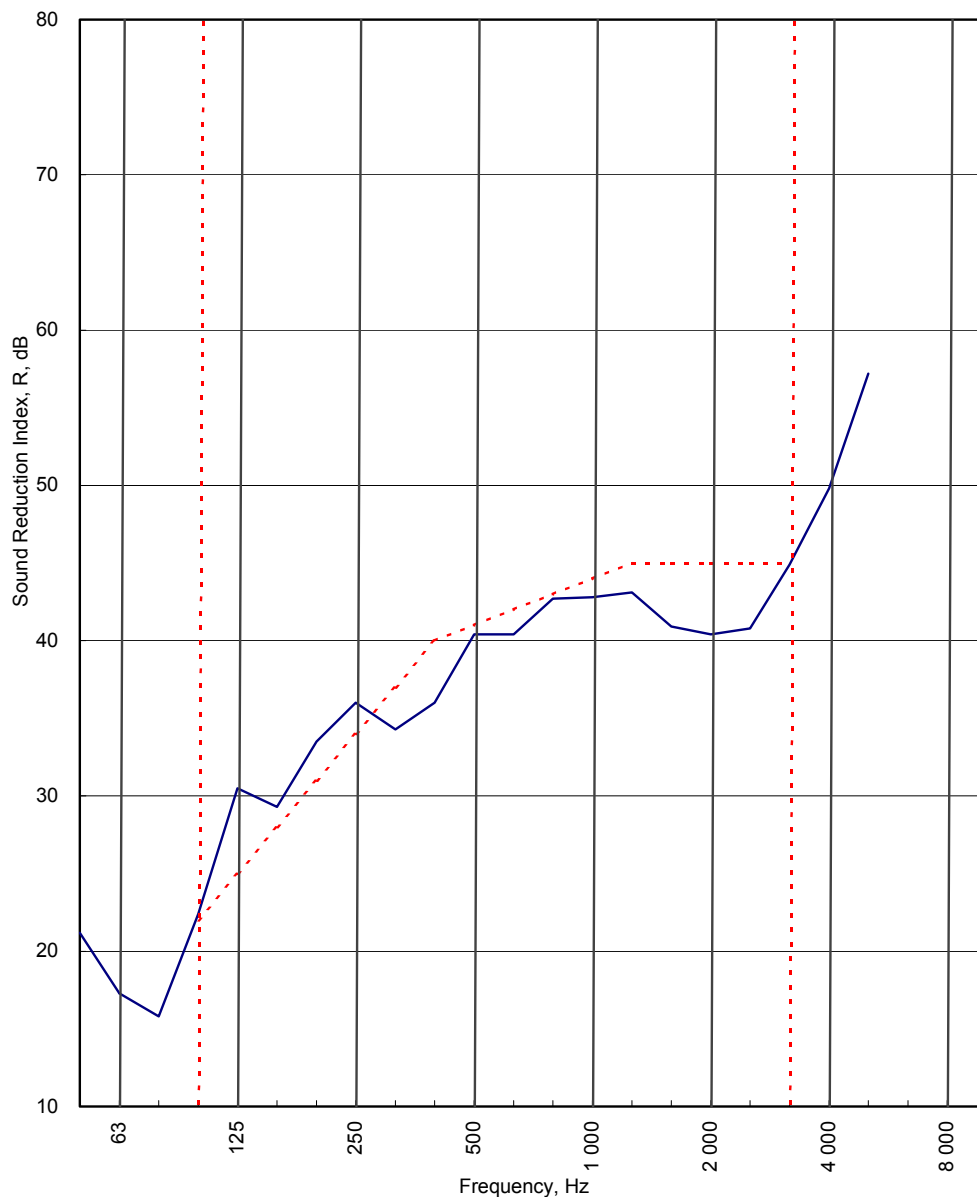
Customer: Mitek Industries Limited.



BTC 13247A

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

| Freq.<br>Hz | R<br>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

Evaluation based on laboratory  
measurement results obtained by  
an engineering method:

**R<sub>w</sub> (C;C<sub>tr</sub>) = 41 (-1;-4) dB**

Max dev. 4.6 dB at 2 000 Hz

C<sub>50-3150</sub> = -2 dB

C<sub>50-5000</sub> = -1 dB

C<sub>100-5000</sub> = 0 dB

C<sub>tr,50-3150</sub> = -8 dB

C<sub>tr,50-5000</sub> = -8 dB

C<sub>tr,100-5000</sub> = -4 dB

Customer: Mitek Industries Limited.

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

Test Code: **V13247AA**

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

Specimen Area, S = **9.99** m<sup>2</sup>

Room Volume, m<sup>3</sup>:  
Temperature, deg.C:  
Rel. Humidity, %RH:

|                               | Room T3     | Room T4     |
|-------------------------------|-------------|-------------|
| Room Volume, m <sup>3</sup> : | <b>98</b>   | <b>101</b>  |
| Temperature, deg.C:           | <b>15.2</b> | <b>15.9</b> |
| Rel. Humidity, %RH:           | <b>32.7</b> | <b>45.3</b> |

| Freq<br>Hz | Test Room T3 to Test Room T4 |                 |             |                   |                 |             | R<br>dB | U.Dev.<br>dB | R<br>1/1Oct<br>dB |
|------------|------------------------------|-----------------|-------------|-------------------|-----------------|-------------|---------|--------------|-------------------|
|            | Source<br>dB                 | Rec. (uc)<br>dB | Bgrnd<br>dB | Rec. (corr)<br>dB | Rev.time<br>Sec | Corr.<br>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           | <b>Rw</b>  | <b>C</b>  | <b>Ctr</b> | Total U. Dev., dB             | <b>25.3</b> |
| BS EN ISO 717-1: 1997           | <b>dB</b>  | <b>dB</b> | <b>dB</b>  |                               |             |
|                                 | <b>41</b>  | <b>-1</b> | <b>-4</b>  |                               |             |
|                                 | (100-5000) | <b>0</b>  | <b>-4</b>  |                               |             |
|                                 | (50-3150)  | <b>-2</b> | <b>-8</b>  |                               |             |
| RT's > factor 1.5 apart         |            |           |            | Test Procedure: 140/3/issue 5 |             |
| Tested Serially[ ] Real Time[ ] | (50-5000)  | <b>-1</b> | <b>-8</b>  | Worksheet: 140_3_1.XLS        |             |

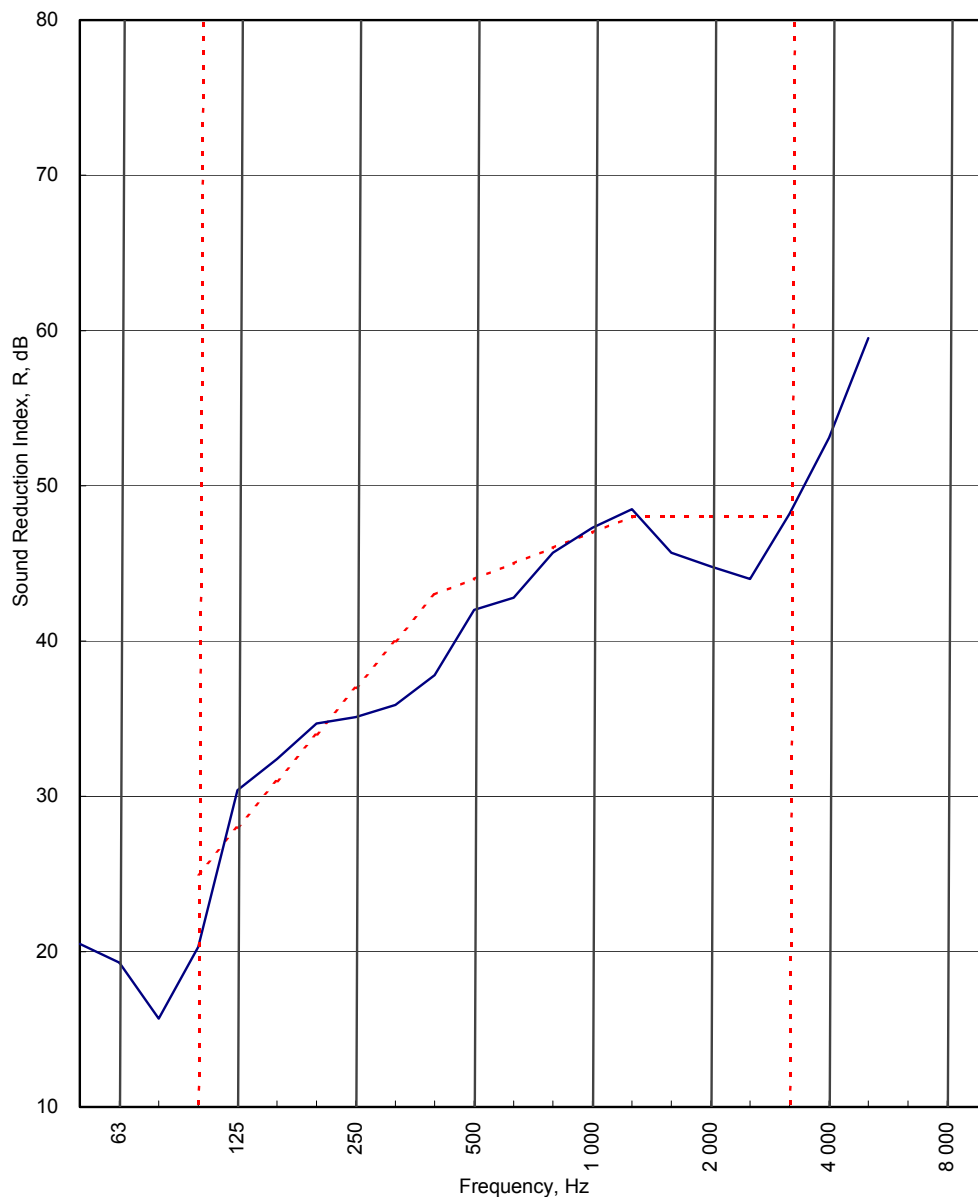
Customer: **Mitek Industries Limited.**



BTC 13248A

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

| Freq.<br>Hz | R<br>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

Evaluation based on laboratory  
measurement results obtained by  
an engineering method:

**R<sub>w</sub> (C;C<sub>tr</sub>) = 44 (-2;-6) dB**

Max dev. 5.2 dB at 400 Hz

C<sub>50-3150</sub> = -3 dB

C<sub>50-5000</sub> = -2 dB

C<sub>100-5000</sub> = -1 dB

C<sub>tr,50-3150</sub> = -11 dB

C<sub>tr,50-5000</sub> = -11 dB

C<sub>tr,100-5000</sub> = -6 dB

Customer: Mitek Industries Limited.

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

Test Code: **V13248AA**

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

Specimen Area, S = **9.99** m<sup>2</sup>

|                               |             |             |
|-------------------------------|-------------|-------------|
|                               | Room T3     | Room T4     |
| Room Volume, m <sup>3</sup> : | <b>98</b>   | <b>101</b>  |
| Temperature, deg.C:           | <b>15</b>   | <b>16.7</b> |
| Rel. Humidity, %RH:           | <b>38.7</b> | <b>39.3</b> |

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

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

Customer: **Mitek Industries Limited.**

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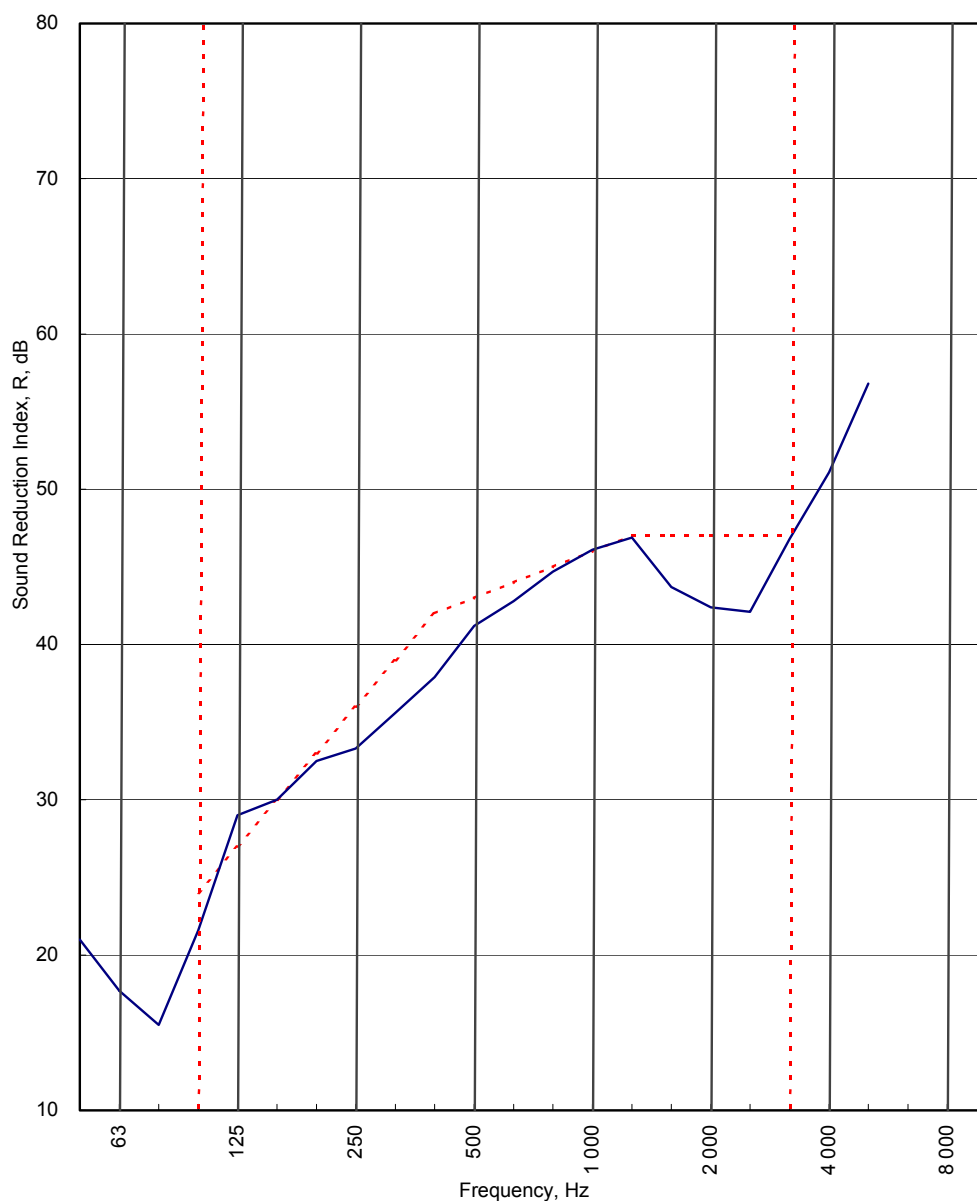


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BTC 13249A

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

| Freq.<br>Hz | R<br>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

**$R_w (C; C_{tr}) = 43 \text{ (-2; -6) dB}$**

Max dev. 4.9 dB at 2 500 Hz

Evaluation based on laboratory  
measurement results obtained by  
an engineering method:

$C_{50-3150} = -3 \text{ dB}$

$C_{50-5000} = -2 \text{ dB}$

$C_{100-5000} = -1 \text{ dB}$

$C_{tr, 50-3150} = -10 \text{ dB}$

$C_{tr, 50-5000} = -10 \text{ dB}$

$C_{tr, 100-5000} = -6 \text{ dB}$

Customer: Mitek Industries Limited.



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

Test Code: **V13249AA**

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

Specimen Area, S = **9.99** m<sup>2</sup>

Room Volume, m<sup>3</sup>:  
Temperature, deg.C:  
Rel. Humidity, %RH:

|                               | Room T3     | Room T4     |
|-------------------------------|-------------|-------------|
| Room Volume, m <sup>3</sup> : | <b>98</b>   | <b>101</b>  |
| Temperature, deg.C:           | <b>15.3</b> | <b>16.5</b> |
| Rel. Humidity, %RH:           | <b>34.2</b> | <b>51.1</b> |

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

|                                        |                   |           |            |                          |             |
|----------------------------------------|-------------------|-----------|------------|--------------------------|-------------|
| <b>Single Figure Ratings</b>           | <b>Rw</b>         | <b>C</b>  | <b>Ctr</b> | <b>Total U. Dev., dB</b> | <b>29.5</b> |
| <b>BS EN ISO 717-1: 1997</b>           | <b>dB</b>         | <b>dB</b> | <b>dB</b>  |                          |             |
|                                        | <b>43</b>         | <b>-2</b> | <b>-6</b>  |                          |             |
|                                        | <b>(100-5000)</b> | <b>-1</b> | <b>-6</b>  |                          |             |
| <b>Background Corrected</b>            |                   |           |            |                          |             |
|                                        | <b>(50-3150)</b>  | <b>-3</b> | <b>-10</b> |                          |             |
| <b>RT's &gt; factor 1.5 apart</b>      |                   |           |            |                          |             |
| <b>Tested Serially[ ] Real Time[ ]</b> | <b>(50-5000)</b>  | <b>-2</b> | <b>-10</b> |                          |             |

Test Procedure: 140/3/issue 5

Worksheet: 140\_3\_1.XLS



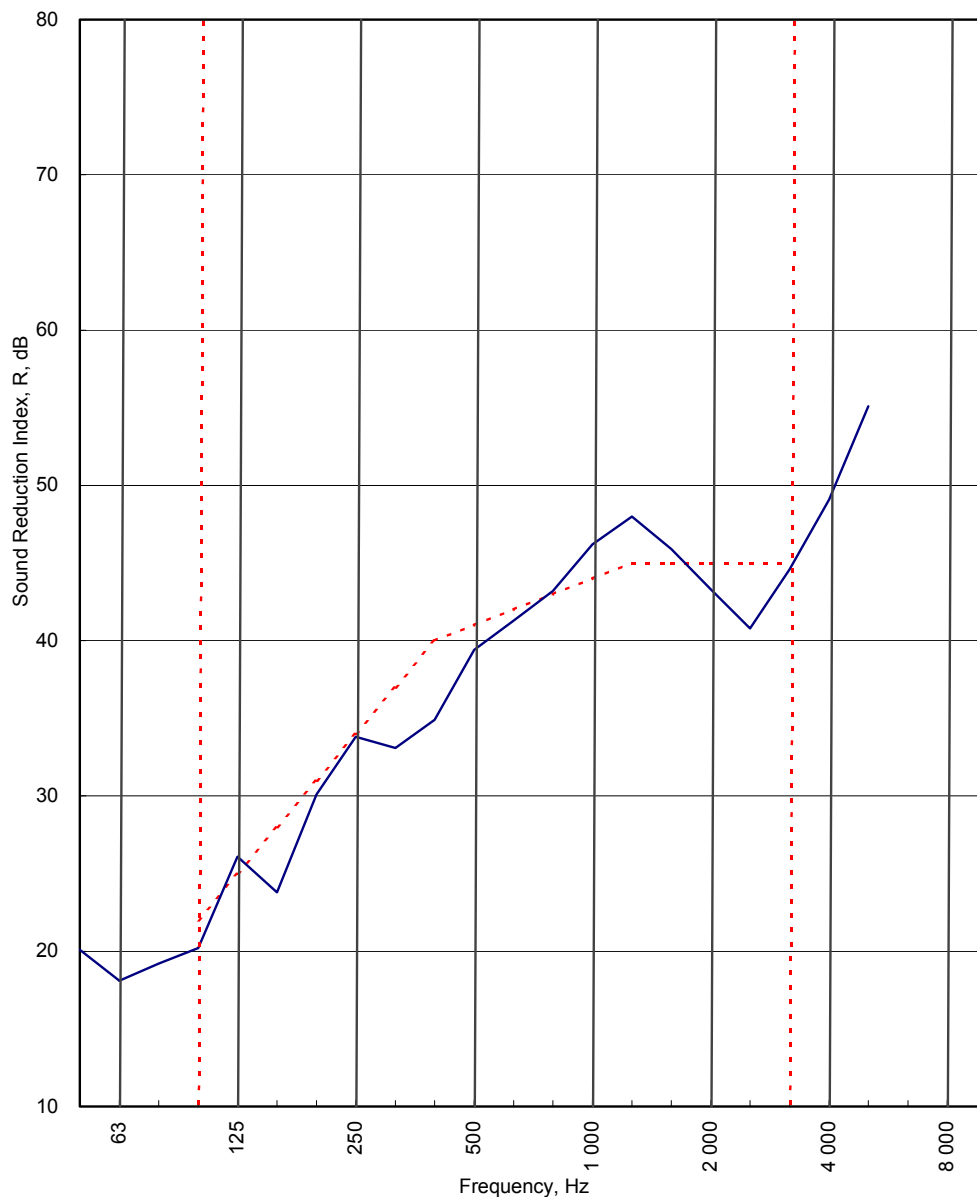
0296

Customer: **Mitek Industries Limited.**

# BTC 13250A

|                        |
|------------------------|
| Test Code:<br>V13250AA |
| Test Date:<br>28/01/04 |

| Freq.<br>Hz | R<br>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<br>BS EN ISO 717-1:1997                                                 | <b>R<sub>w</sub> (C;C<sub>tr</sub>) = 41 (-2;-6) dB</b> |                                        |                                         |
|                                                                                             | <b>Max dev. 5.1 dB at 400 Hz</b>                        |                                        |                                         |
| Evaluation based on laboratory<br>measurement results obtained by<br>an engineering method: | C <sub>50-3150</sub> = <b>-2 dB</b>                     | C <sub>50-5000</sub> = <b>-1 dB</b>    | C <sub>100-5000</sub> = <b>-1 dB</b>    |
|                                                                                             | C <sub>tr,50-3150</sub> = <b>-8 dB</b>                  | C <sub>tr,50-5000</sub> = <b>-8 dB</b> | C <sub>tr,100-5000</sub> = <b>-6 dB</b> |

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<sup>2</sup>

|                               |             |             |
|-------------------------------|-------------|-------------|
|                               | Room T3     | Room T4     |
| Room Volume, m <sup>3</sup> : | <b>98</b>   | <b>101</b>  |
| Temperature, deg.C:           | <b>15.1</b> | <b>16.8</b> |
| Rel. Humidity, %RH:           | <b>38.9</b> | <b>42.9</b> |

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

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

Customer: **Mitek Industries Limited.**

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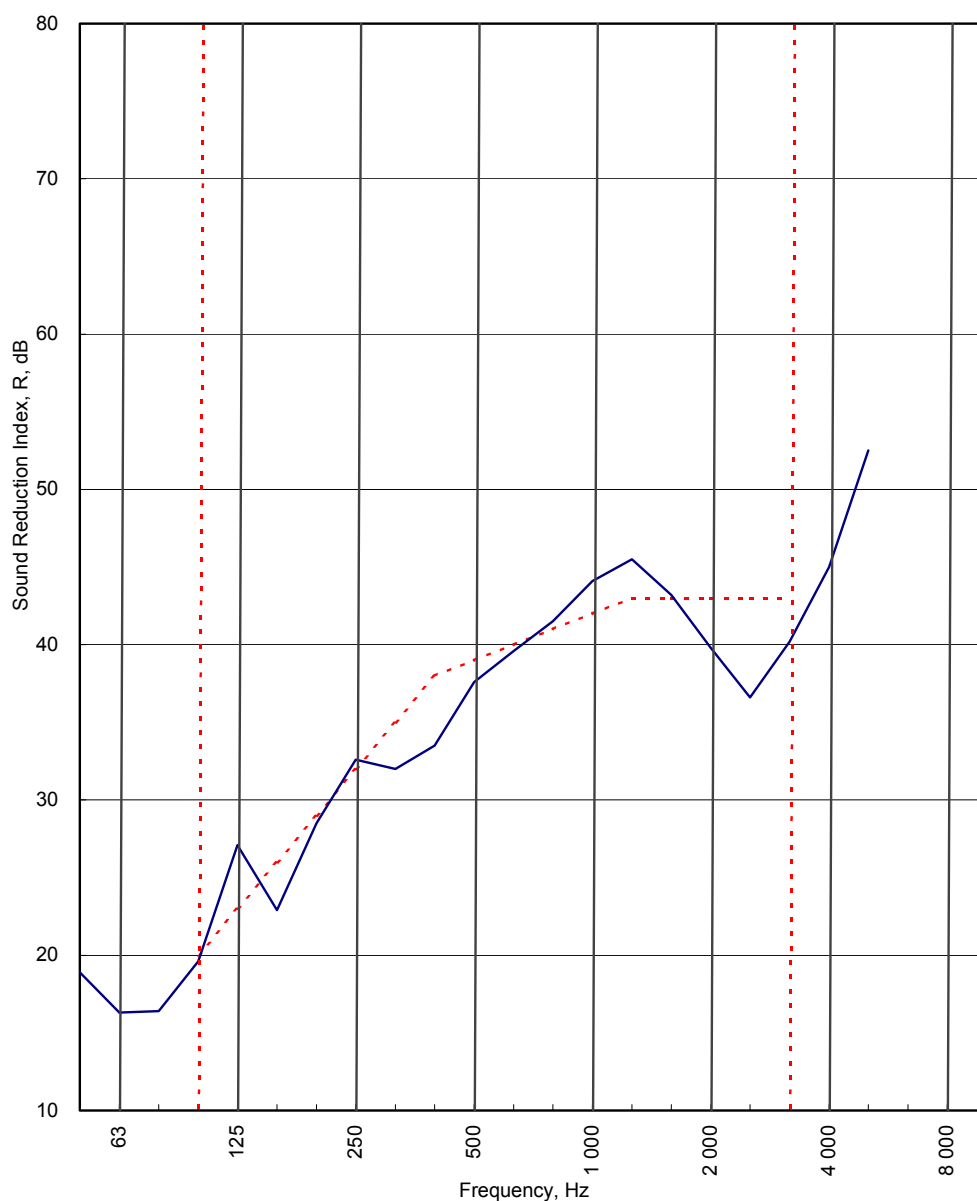


0296

# BTC 13251A

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

| Freq.<br>Hz | R<br>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<sub>w</sub> (C;C<sub>tr</sub>) = 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<sub>50-3150</sub> = **-2 dB**

C<sub>50-5000</sub> = **-1 dB**

C<sub>100-5000</sub> = **-1 dB**

C<sub>tr,50-3150</sub> = **-8 dB**

C<sub>tr,50-5000</sub> = **-8 dB**

C<sub>tr,100-5000</sub> = **-5 dB**

Customer: **Mitek Industries Limited.**



0296



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

Test Code: **V13251AA**

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

Specimen Area, S = **9.99** m<sup>2</sup>

|                               |             |             |
|-------------------------------|-------------|-------------|
|                               | Room T3     | Room T4     |
| Room Volume, m <sup>3</sup> : | <b>98</b>   | <b>101</b>  |
| Temperature, deg.C:           | <b>16</b>   | <b>18.9</b> |
| Rel. Humidity, %RH:           | <b>35.2</b> | <b>35.5</b> |

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

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

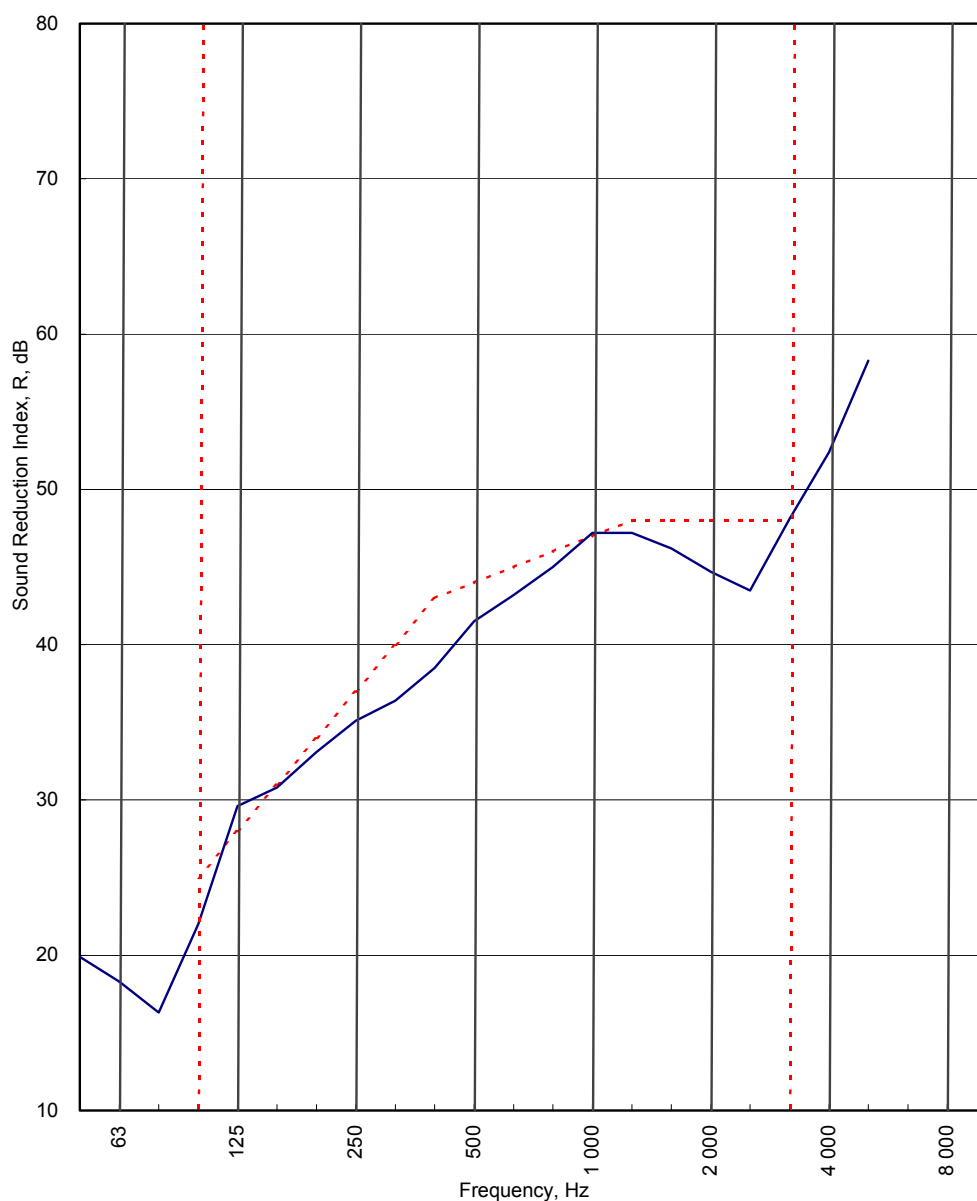
Customer: **Mitek Industries Limited.**



BTC 13252A

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

| Freq.<br>Hz | R<br>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

**$R_w (C;C_{tr}) = 44 (-2;-6) \text{ dB}$**

Max dev. 4.5 dB at 2 500 Hz

Evaluation based on laboratory  
measurement results obtained by  
an engineering method:

$C_{50-3150} = -3 \text{ dB}$

$C_{50-5000} = -2 \text{ dB}$

$C_{100-5000} = -1 \text{ dB}$

$C_{tr,50-3150} = -10 \text{ dB}$

$C_{tr,50-5000} = -10 \text{ dB}$

$C_{tr,100-5000} = -6 \text{ dB}$

Customer: Mitek Industries Limited.



0296

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

Test Code: **V13252AA**

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

Specimen Area, S = **9.99** m<sup>2</sup>

|                               |             |             |
|-------------------------------|-------------|-------------|
|                               | Room T3     | Room T4     |
| Room Volume, m <sup>3</sup> : | <b>98</b>   | <b>101</b>  |
| Temperature, deg.C:           | <b>15.4</b> | <b>15.8</b> |
| Rel. Humidity, %RH:           | <b>30.6</b> | <b>42.8</b> |

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

|                                        |                   |           |            |                                                         |             |
|----------------------------------------|-------------------|-----------|------------|---------------------------------------------------------|-------------|
| <b>Single Figure Ratings</b>           | <b>Rw</b>         | <b>C</b>  | <b>Ctr</b> | <b>Total U. Dev., dB</b>                                | <b>29.8</b> |
| <b>BS EN ISO 717-1: 1997</b>           | <b>dB</b>         | <b>dB</b> | <b>dB</b>  |                                                         |             |
|                                        | <b>44</b>         | <b>-2</b> | <b>-6</b>  |                                                         |             |
|                                        | <b>(100-5000)</b> | <b>-1</b> | <b>-6</b>  |                                                         |             |
| <b>Background Corrected</b>            |                   |           |            |                                                         |             |
|                                        | <b>(50-3150)</b>  | <b>-3</b> | <b>-10</b> |                                                         |             |
| <b>RT's &gt; factor 1.5 apart</b>      |                   |           |            |                                                         |             |
| <b>Tested Serially[ ] Real Time[ ]</b> | <b>(50-5000)</b>  | <b>-2</b> | <b>-10</b> | Test Procedure: 140/3/issue 5<br>Worksheet: 140_3_1.XLS |             |

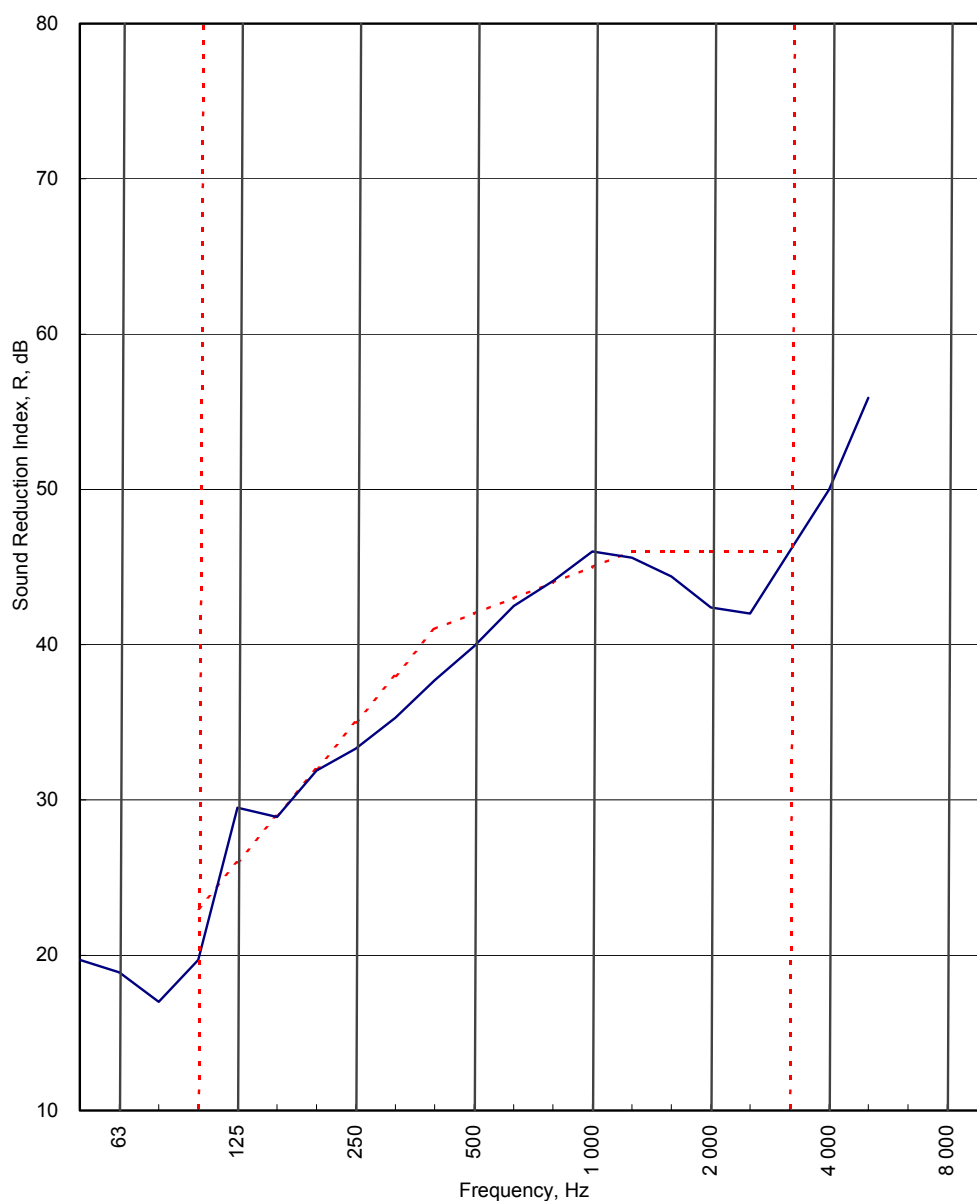
Customer: **Mitek Industries Limited.**



BTC 13253A

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

| Freq.<br>Hz | R<br>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<sub>w</sub> (C;C<sub>tr</sub>) = 42 (-1;-6) dB**

Max dev. 4 dB at 2 500 Hz

Evaluation based on laboratory  
measurement results obtained by  
an engineering method:

C<sub>50-3150</sub> = **-2 dB**

C<sub>50-5000</sub> = **-1 dB**

C<sub>100-5000</sub> = **0 dB**

C<sub>tr,50-3150</sub> = **-9 dB**

C<sub>tr,50-5000</sub> = **-9 dB**

C<sub>tr,100-5000</sub> = **-6 dB**

Customer: **Mitek Industries Limited.**



0296

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

Test Code: **V13253AA**

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

Specimen Area, S = **9.99** m<sup>2</sup>

Room Volume, m<sup>3</sup>:  
Temperature, deg.C:  
Rel. Humidity, %RH:

Room T3      Room T4  
**98**            **101**  
**15.4**        **15.7**  
**29.4**        **41.8**

| Freq<br>Hz | Test Room T3 to Test Room T4 |                 |             |                   |                 |             | R<br>dB | U.Dev.<br>dB | R<br>1/10Oct<br>dB |
|------------|------------------------------|-----------------|-------------|-------------------|-----------------|-------------|---------|--------------|--------------------|
|            | Source<br>dB                 | Rec. (uc)<br>dB | Bgrnd<br>dB | Rec. (corr)<br>dB | Rev.time<br>Sec | Corr.<br>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           |  | <b>Rw</b>  | <b>C</b>  | <b>Ctr</b> | Total U. Dev., dB             | <b>23.4</b> |
| BS EN ISO 717-1: 1997           |  | <b>dB</b>  | <b>dB</b> | <b>dB</b>  |                               |             |
|                                 |  | <b>42</b>  | <b>-1</b> | <b>-6</b>  |                               |             |
|                                 |  | (100-5000) | <b>0</b>  | <b>-6</b>  |                               |             |
|                                 |  | (50-3150)  | <b>-2</b> | <b>-9</b>  |                               |             |
| RT's > factor 1.5 apart         |  |            |           |            | Test Procedure: 140/3/issue 5 |             |
| Tested Serially[ ] Real Time[ ] |  | (50-5000)  | <b>-1</b> | <b>-9</b>  | Worksheet: 140_3_1.XLS        |             |

Customer: **Mitek Industries Limited.**



## **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:

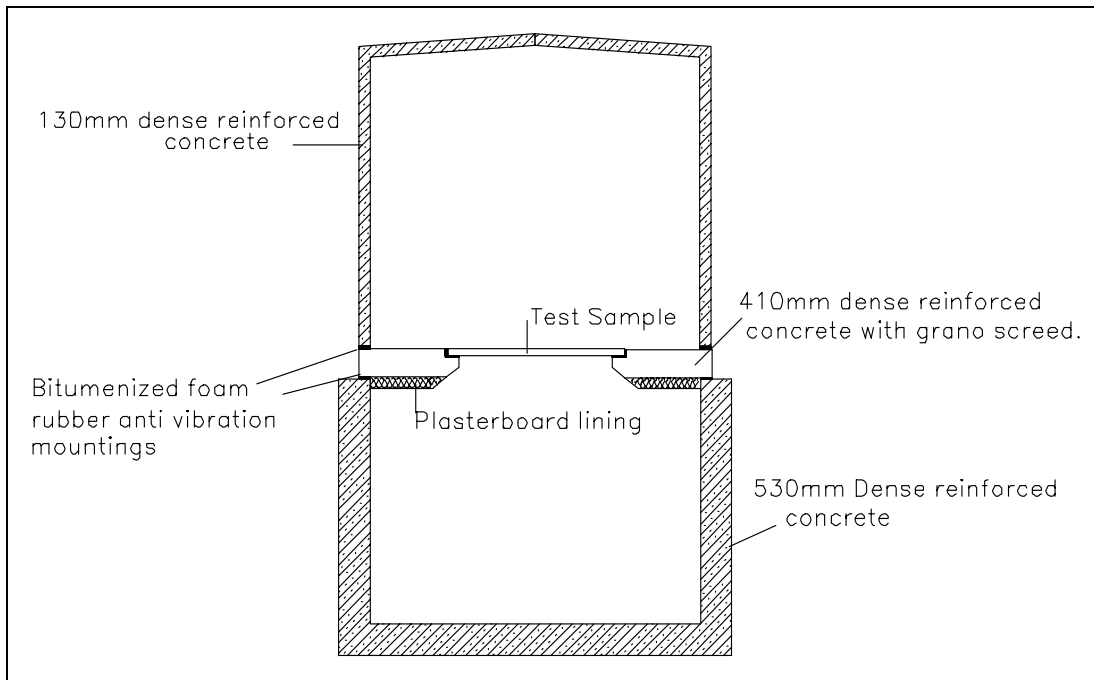
|         |    |    |      |      |      |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|---------|----|----|------|------|------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 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:

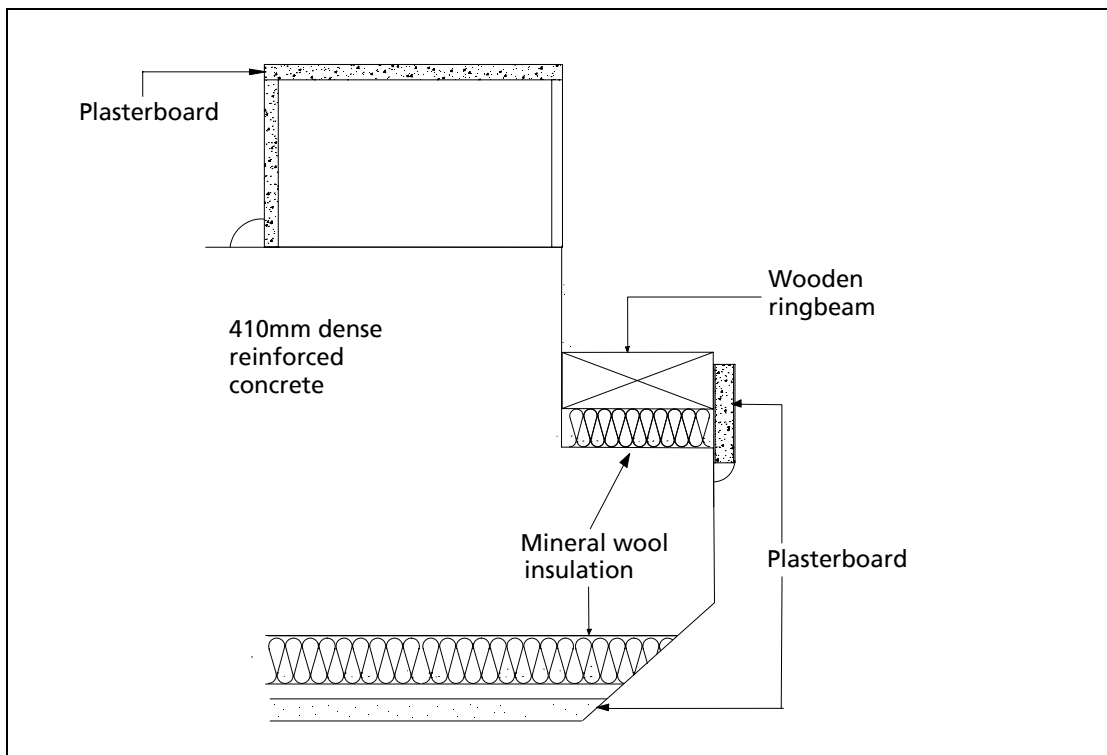
|         |      |    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|---------|------|----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 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.

Customer: **Mitek Industries Limited.**



**Figure 9. Chamber layout**



**Figure 10. Ring beam construction around test aperture**