The Building Test Centre
Fire Acoustics Structures

The Building Test Centre
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Report Number **BTC 18711A**

An acoustic test report covering laboratory sound insulation testing to BS EN ISO 10140-2:2010 on a twin frame partition incorporating Hadley 50mm studs at 600mm centres with a combination of double and single layers of 15mm Gyproc SoundBloc and 15mm Gyproc DuraLine, with 25mm and 50mm APR within the cavity.

Test Dates: 13th and 14th May 2014

Report issued date: 19th May 2014

www.btconline.co.uk

Customer: **Hadley Group/Hadley Industries FZE (Dubai)**
Downing Street
Smethwick
West Midlands
B66 2PA

UKAS TESTING
0296

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TABLE OF CONTENTS

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FOREWORD

The test sponsor was Hadley Group/Hadley Industries FZE (Dubai).

Chris Hobbs of CMH Design and Consultancy Services Limited witnessed the test and was acting on behalf of the test sponsor/customer.

The test specimen was installed by AllTone and Chris Hobbs between the 13th and 14th May 2014.

The Building Test Centre played no role in the design or selection of the materials comprising the test specimen.

REPORT AUTHORISATION

Report Author	Authorised by
Anisha Patel BEng. MSc *Scientist*	**Christopher Mutton** M.Phys Dip Math MInstP AMIMA *Supervisor*

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.

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TEST CONSTRUCTION

H18711AA

The test specimen was constructed in an aperture having an overall opening of 2400mm (high) x 3600mm (wide).

A twin frame partition was constructed with an overall width of 200mm.

Two Hadley HRP5305 52mm tracks spaced 36mm apart were fixed to the head and base of the aperture using 25mm British Gypsum drywall screws spaced at 600mm centres.

Hadley HRP5927 50mm 'C' studs were positioned between the head and base channels at each end of the aperture and fixed using 25mm British Gypsum drywall screws spaced at 600mm centres.

Hadley HRP5927 50mm 'C' studs were positioned between the head and base channels at 600mm centres.

A single layer of 25mm Isover APR was placed in the stud cavity on the receiving room side.

The framework was clad with a double layer of 15mm Gyproc SoundBloc on the both sides.

The inner layer of boards were fixed around the perimeter at 300mm centres using 25mm British Gypsum drywall screws.

The outer layer of boards were fixed around the perimeter and the intermediate stud positions at 300mm centres using 42mm British Gypsum drywall screws.

All vertical joints were staggered between layers. All joints and screw heads were taped. The perimeter was taped and sealed with Gyproc Sealant.

H18711BA

Same as H18711AA with the layer of 25mm Isover APR removed and replaced with a layer of 50mm Isover APR within stud cavity on the receiving room side.

H18711CA

Same as H18711BA with an additional layer of 50mm Isover APR positioned within stud cavity on the source room side.

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H18711DA

Same as H18711CA with an outer layer of 15mm Gyproc DuraLine, replacing the 15mm Gyproc SoundBloc each side.

H18711EA

Same as H18711DA with the double layer of 50mm Isover APR removed and replaced with a layer of 25mm Isover APR within stud cavity on the receiving room side.

H18711FA

Same as H18711EA with the layer of 25mm Isover APR removed and replaced with a double layer of 50mm Isover APR within stud cavity on the receiving and source room side. The partition construction overall width was increased from 200mm to 250mm.

H18711GA

Same as H18711FA with an outer layer of 15mm Gyproc SoundBloc, replacing the 15mm Gyproc DuraLine each side.

H18711HA

Same as H18711GA, with both frameworks braced together by a 190mm strap at 1200mm (high) at each corresponding stud position using four 13mm British Gypsum Wafer-head Jack-point screws.

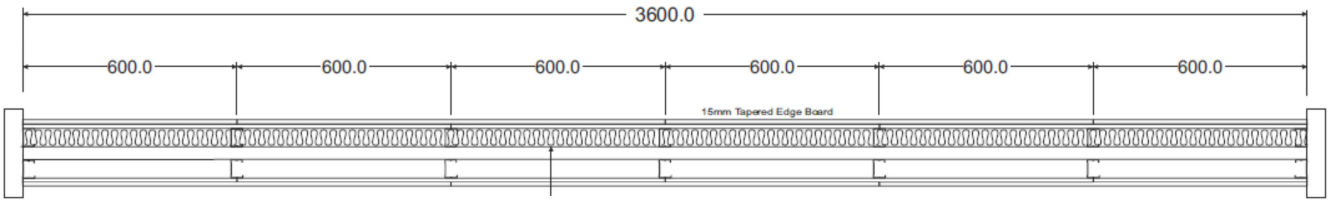

Figure 1. Horizontal cross section of partition of H18711BA.

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

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TEST MATERIALS

Plasterboard

i) Nominally 2400mm (long) x 1200mm (wide) x 15mm (thick) Gyproc SoundBloc manufactured by British Gypsum, ex Sherburn.

Surface density:	14.2kg/m^2
Average thickness:	15.1mm
Board Code:	31 121 14 16:01

ii) Nominally 2400mm (long) x 1200mm (wide) x 15mm (thick) Gyproc DuraLine manufactured by British Gypsum, ex Kirkby Thore.

Surface density:	14.9kg/m^2
Average thickness:	15.4mm
Board Code:	26 263 31 05:12

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

Insulation

i) Nominally 25mm thick Isover APR 1200 insulation supplied by Hadley Group/Hadley Industries FZE (Dubai).

Average area	24.00 m^2
Average weight	10.95 kg
Density	18.25 kg/m^3

ii) Nominally 50mm thick Isover APR 1200 insulation supplied by Hadley Group/Hadley Industries FZE (Dubai).

Average area	15.60 m^2
Average weight	9.62 kg
Density	12.33 kg/m^3

The density was calculated using the actual weight and size of the insulation used in the test specimen.

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Metal Components

i) 0.5mm thick Hadley HRP5927 50mm 'C' studs
ii) 0.5mm thick Hadley HRP5305 52mm tracks
iii) 0.6mm thick Hadley fixing strap.

All metal components are supplied by Hadley Group/Hadley Industries FZE (Dubai).

Fasteners

i) 25mm British Gypsum drywall screws.
ii) 42mm British Gypsum drywall screws.
iii) 13mm British Gypsum Wafer-head Jack-point screws.

All fasteners supplied by The Building Test Centre.

Miscellaneous Components

i) Gyproc Sealant
ii) Joint tape

All miscellaneous components supplied by The Building Test Centre.

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.

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TEST RESULTS

Test Code	Description	Weighted Airborne Sound Reduction Index R_w (C; Ctr)
H18711AA	Twin frame Hadley 50mm 'C' stud partition incorporating a double layer of 15mm Gyproc SoundBloc each side and a single layer of 25mm Isover APR within the cavity on the receiving room side.	66 (-4;-9) dB
H18711BA	Twin frame Hadley 50mm 'C' stud partition incorporating a double layer of 15mm Gyproc SoundBloc each side and a single layer of 50mm Isover APR within the cavity on the receiving room side.	67 (-3;-8) dB
H18711CA	Twin frame Hadley 50mm 'C' stud partition incorporating a double layer of 15mm Gyproc SoundBloc each side and a double layer of 50mm Isover APR within the cavity.	69 (-3;-9) dB
H18711DA	Twin frame Hadley 50mm 'C' stud partition incorporating an inner layer of 15mm Gyproc SoundBloc and an outer layer of 15mm Gyproc DuraLine each side and a double layer of 50mm Isover APR within the cavity.	69 (-3;-9) dB
H18711EA	Twin frame Hadley 50mm 'C' stud partition incorporating an inner layer of 15mm Gyproc SoundBloc and an outer layer of 15mm Gyproc DuraLine each side and a single layer of 25mm Isover APR within the cavity.	66 (-3;-8) dB
H18711FA	Twin frame Hadley 50mm 'C' stud partition incorporating an inner layer of 15mm Gyproc SoundBloc and an outer layer of 15mm Gyproc DuraLine each side and a double layer of 50mm Isover APR within the cavity. Partition overall width increased to 250mm.	69 (-2;-7) dB
H18711GA	Twin frame Hadley 50mm 'C' stud partition incorporating a double layer of 15mm Gyproc SoundBloc each side and a double layer of 50mm Isover APR within the cavity. Partition overall width increased to 250mm.	69 (-3;-8) dB
H18711HA	Twin frame Hadley 50mm 'C' stud partition incorporating a double layer of 15mm Gyproc SoundBloc each side and a double layer of 50mm Isover APR within the cavity. Partition overall width increased to 250mm. Both frameworks braced together by a 190mm strap at 1200mm (high).	64 (-2;-7) dB

For full data see Appendix A of this report.

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Test conducted in accordance with BS EN ISO 10140-2:2010 except for Clause A.2 in BS EN ISO 10140-4:2010 where minimum distances for measurements at frequencies under 100Hz can not be met.

Rated in accordance with BS EN ISO 717-1: 2013.

No visible damage of the test specimen occurred during test.

Testing to BS EN ISO 10140-2:2010 conforms to the requirements of BS EN ISO 140-3:1995 (withdrawn).

Where the uncertainty of measured values is stated, (e.g. temperature, relative humidity and static pressure) the reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

TEST PROCEDURE

The test specimen (3.6 m x 2.4 m) was constructed in a wall dividing two reverberant rooms of approximately 98m^3 and 62m^3. The accuracy of the test method conforms to BS EN 20140-2:1993, the test procedure used is detailed in the test data in Appendix A of this report. Broad-band white noise was used to measure the level differences and broad-band 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.

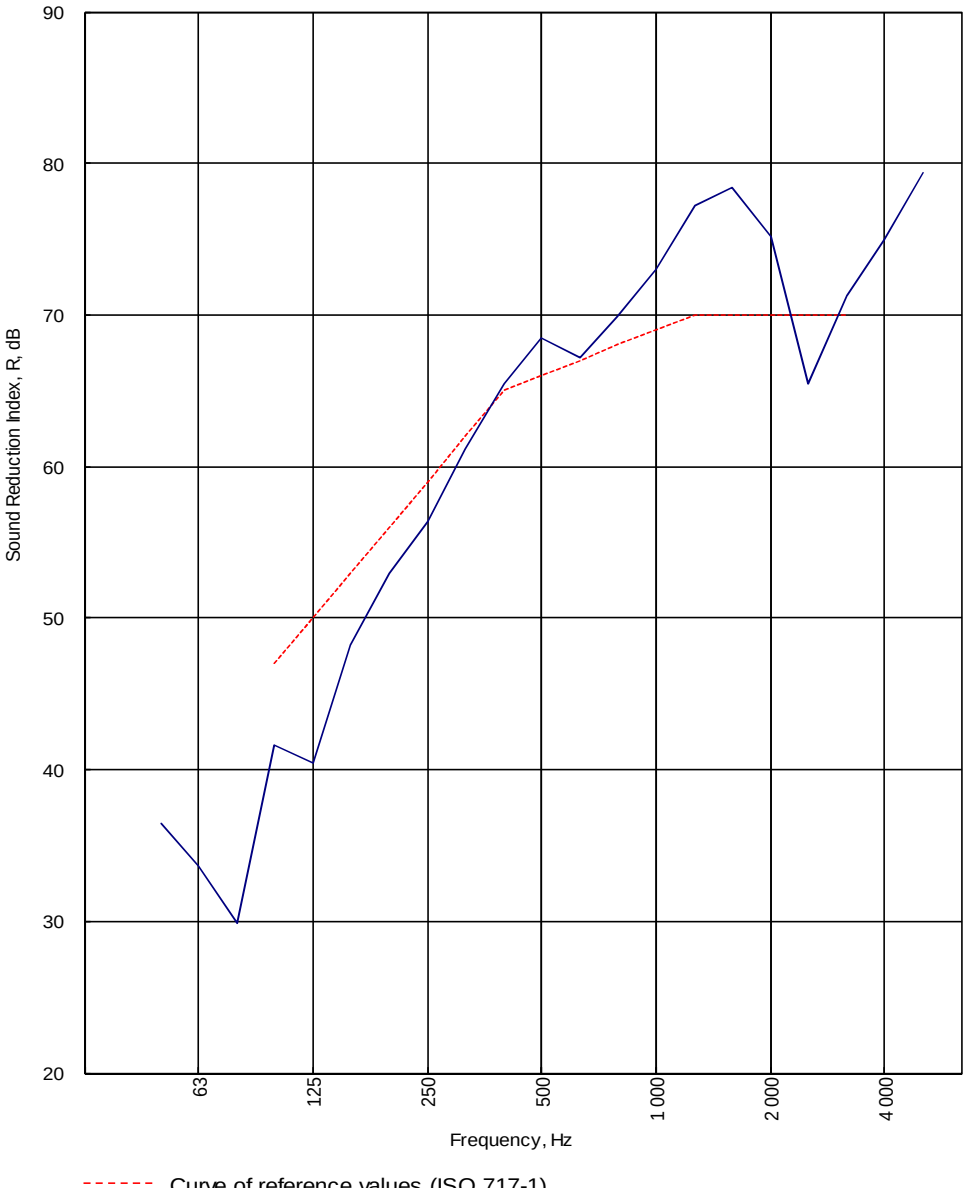
LIMITATIONS

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

APPENDIX A - TEST DATA

Test Code:
H18711AA
Test Date:
13/05/2014

Freq. Hz	R dB
50	36.5
63	33.6
80	29.9
100	41.6
125	40.4
160	48.2
200	53.0
250	56.4
315	61.1
400	65.5
500	68.5
630	67.2
800	69.9
1 000	73.0
1 250	77.2
1 600	78.4
2 000	75.2
2 500	65.5
3 150	71.3
4 000	74.9
5 000	79.4



Rating according to BS EN ISO 717-1:2013	**Rw (C;Ctr) = 66 (-4;-9) dB**		
	Max dev. 9.6 dB at 125 Hz		
Evaluation based on laboratory measurement results obtained by an engineering method:	$C_{50\text{-}3150}$= **-7 dB**	$C_{50\text{-}5000}$= **-6 dB**	$C_{100\text{-}5000}$= **-3 dB**
	$C_{tr,50\text{-}3150}$= **-17 dB**	$C_{tr,50\text{-}5000}$= **-17 dB**	$C_{tr,100\text{-}5000}$: **-9 dB**

Customer**: Hadley Group/Hadley Industries FZE (Dubai)**

UKAS TESTING
0296

LABORATORY AIRBORNE SOUND INSULATION TEST - BS EN ISO 10140-2:2010

Test Code: **H18711AA** Test Date: **13/05/2014**

Specimen Area, S = **8.64** m^2

	Room T2	Room T1	
Room Volume, m^3:	**98**	**59.28**	
Temperature, deg.C:	**16.8**	**16.2**	**± 0.3**
Rel. Humidity, %RH:	**50.3**	**50.7**	**± 1.6**
Static Pressure, Pa:	**101200**	**101200**	**± 65**

	Test Room T2 to Test Room T1								
Freq	Source	Rec. (uc)	Bgrnd	Rec. (corr)	Rev.time	Corr.	**R**	U.Dev.	R 1/1Oct
Hz	dB	dB	dB	dB	Sec	dB	**dB**	dB	dB
50	92.1	53.4	17.3	53.4	0.66	-2.2	**36.5**		
63	93.7	59.2	18.3	59.2	0.90	-0.9	**33.6**		32.5
80	102.3	71.2	16.3	71.2	0.84	-1.2	**29.9**		
100	106.4	64.1	15.5	64.1	0.94	-0.7	**41.6**	5.4	
125	104.7	64.2	10.2	64.2	1.07	-0.1	**40.4**	9.6	42.3
160	111.3	63.9	5.8	63.9	1.33	0.8	**48.2**	4.8	
200	114.0	62.4	15.7	62.4	1.50	1.4	**53.0**	3.0	
250	115.1	60.5	1.3	60.5	1.66	1.8	**56.4**	2.6	55.7
315	114.4	55.4	7.0	55.4	1.77	2.1	**61.1**	0.9	
400	112.0	47.9	21.1	47.9	1.50	1.4	**65.5**		
500	110.1	42.9	4.5	42.9	1.49	1.3	**68.5**		66.9
630	107.8	41.7	3.7	41.7	1.42	1.1	**67.2**		
800	107.2	38.6	5.1	38.6	1.48	1.3	**69.9**		
1 000	106.1	34.6	13.6	34.6	1.55	1.5	**73.0**		72.4
1 250	105.3	29.8	4.5	29.8	1.62	1.7	**77.2**		
1 600	107.8	31.1	4.6	31.1	1.63	1.7	**78.4**		
2 000	108.9	35.5	5.2	35.5	1.66	1.8	**75.2**		69.6
2 500	106.6	42.3	5.4	42.3	1.46	1.2	**65.5**	4.5	
3 150	104.7	34.4	6.4	34.4	1.37	1.0	**71.3**		
4 000	103.7	29.7	9.0	29.7	1.34	0.9	**74.9**		74.1
5 000	105.8	27.0	11.8	27.0	1.26	0.6	**79.4**		
6 300									
8 000									
10 000									

Single Figure Ratings	**Rw**	**C**	**Ctr**	**Total U. Dev., dB**	**30.8**
BS EN ISO 717-1: 2013	**dB**	**dB**	**dB**		
	66	**-4**	**-9**		
	(100-5000)	**-3**	**-9**		
	(50-3150)	**-7**	**-17**		
	(50-5000)	**-6**	**-17**		

Procedure: AP 046 vs 5.1

Worksheet: 140_3_1.XLS

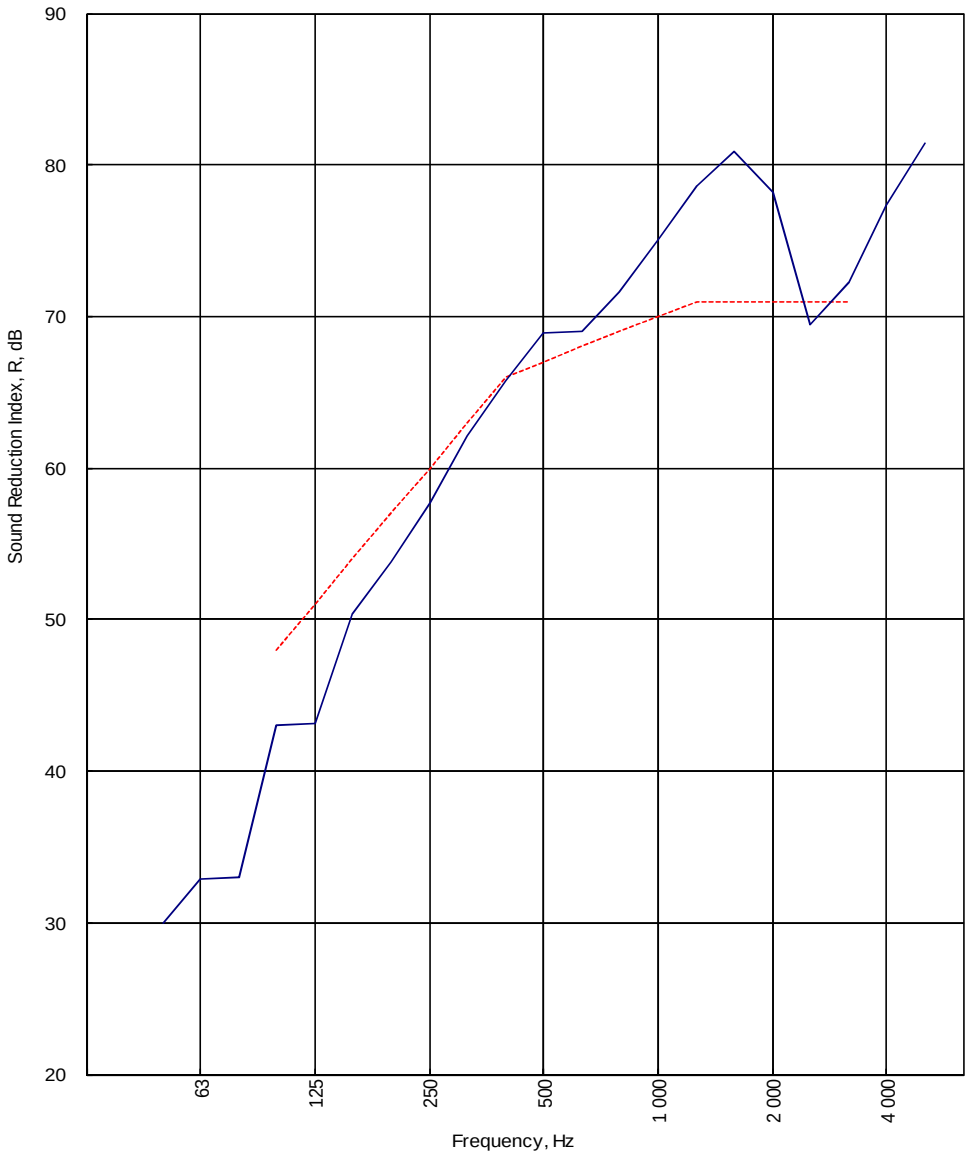
Customer**: Hadley Group/Hadley Industries FZE (Dubai)**

UKAS TESTING

0296

Test Code:
H18711BA
Test Date:
13/05/2014

Freq. Hz	R dB
50	30.0
63	32.9
80	33.0
100	43.0
125	43.1
160	50.4
200	53.8
250	57.7
315	62.1
400	65.8
500	68.9
630	69.0
800	71.6
1 000	75.1
1 250	78.6
1 600	80.9
2 000	78.2
2 500	69.5
3 150	72.3
4 000	77.3
5 000	81.4



Rating according to
BS EN ISO 717-1:2013

Rw (C;Ctr) = 67 (-3;-8) dB

Max dev. 7.9 dB at 125 Hz

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

$C_{50\text{-}3150}$= **-6 dB** $C_{50\text{-}5000}$= **-5 dB** $C_{100\text{-}5000}$= **-2 dB**

$C_{tr,50\text{-}3150}$= **-17 dB** $C_{tr,50\text{-}5000}$= **-17 dB** $C_{tr,100\text{-}5000}$: **-8 dB**

Customer**: Hadley Group/Hadley Industries FZE (Dubai)**

UKAS TESTING
0296

LABORATORY AIRBORNE SOUND INSULATION TEST - BS EN ISO 10140-2:2010

Test Code: **H18711BA** Test Date: **13/05/2014**

Specimen Area, S = **8.64** m^2

	Room T2	Room T1	
Room Volume, m^3:	**98**	**59.27**	
Temperature, deg.C:	**17.4**	**17.2**	**± 0.3**
Rel. Humidity, %RH:	**51.8**	**51.4**	**± 1.6**
Static Pressure, Pa:	**101100**	**101100**	**± 65**

	Test Room T2 to Test Room T1								
Freq	Source	Rec. (uc)	Bgrnd	Rec. (corr)	Rev.time	Corr.	**R**	U.Dev.	R 1/1Oct
Hz	dB	dB	dB	dB	Sec	dB	**dB**	dB	dB
50	92.9	60.0	16.8	60.0	0.56	-2.9	**30.0**		
63	94.1	60.0	15.5	60.0	0.84	-1.2	**32.9**		31.7
80	103.6	69.3	13.3	69.3	0.81	-1.3	**33.0**		
100	105.4	61.9	11.9	61.9	0.98	-0.5	**43.0**	5.0	
125	104.7	61.6	7.8	61.6	1.10	0.0	**43.1**	7.9	44.4
160	111.0	61.4	3.9	61.4	1.31	0.8	**50.4**	3.6	
200	113.6	61.3	15.7	61.3	1.55	1.5	**53.8**	3.2	
250	115.2	59.1	1.9	59.1	1.59	1.6	**57.7**	2.3	56.7
315	114.2	53.8	6.9	53.8	1.64	1.7	**62.1**	0.9	
400	112.0	47.4	21.0	47.4	1.46	1.2	**65.8**	0.2	
500	110.0	42.2	4.9	42.2	1.40	1.1	**68.9**		67.6
630	107.9	40.3	4.6	40.3	1.51	1.4	**69.0**		
800	107.3	37.2	4.7	37.2	1.56	1.5	**71.6**		
1 000	106.1	32.5	13.5	32.5	1.56	1.5	**75.1**		74.2
1 250	105.1	28.2	4.3	28.2	1.61	1.7	**78.6**		
1 600	107.6	28.7	4.3	28.7	1.72	2.0	**80.9**		
2 000	108.8	32.3	5.1	32.3	1.62	1.7	**78.2**		73.5
2 500	106.6	38.2	5.3	38.2	1.43	1.1	**69.5**	1.5	
3 150	104.6	33.3	6.4	33.3	1.37	1.0	**72.3**		
4 000	103.7	27.4	9.2	27.4	1.37	1.0	**77.3**		75.5
5 000	105.8	25.3	11.3	**25.1**	1.29	0.7	**81.4**		
6 300									
8 000									
10 000									

Total U. Dev., dB **24.6**

Single Figure Ratings	**Rw**	**C**	**Ctr**
BS EN ISO 717-1: 2013	**dB**	**dB**	**dB**
	67	**-3**	**-8**
	(100-5000)	**-2**	**-8**
Background Corrected	**(50-3150)**	**-6**	**-17**
	(50-5000)	**-5**	**-17**

Procedure: AP 046 vs 5.1

Worksheet: 140_3_1.XLS

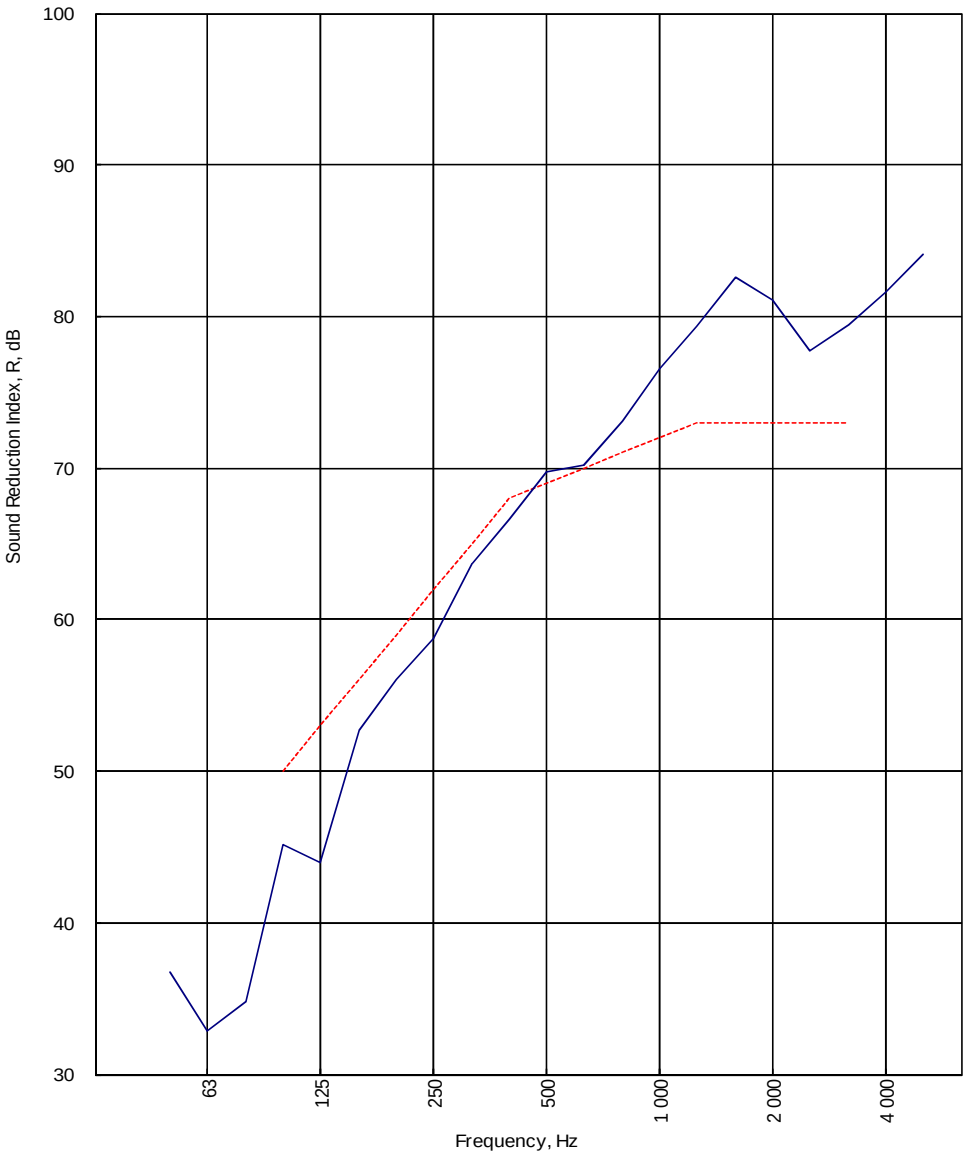
UKAS TESTING

0296

Customer**: Hadley Group/Hadley Industries FZE (Dubai)**

Test Code:
H18711CA
Test Date:
13/05/2014

Freq. Hz	R dB
50	36.7
63	32.9
80	34.8
100	45.2
125	44.0
160	52.7
200	56.1
250	58.7
315	63.7
400	66.6
500	69.7
630	70.2
800	73.1
1 000	76.5
1 250	79.3
1 600	82.6
2 000	81.1
2 500	77.7
3 150	79.5
4 000	81.6
5 000	84.1



Rating according to
BS EN ISO 717-1:2013

Rw (C;Ctr) = 69 (-3;-9) dB

Max dev. 9 dB at 125 Hz

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

$C_{50\text{-}3150}$= **-6 dB** $C_{50\text{-}5000}$= **-5 dB** $C_{100\text{-}5000}$= **-2 dB**

$C_{tr,50\text{-}3150}$= **-17 dB** $C_{tr,50\text{-}5000}$= **-17 dB** $C_{tr,100\text{-}5000}$: **-9 dB**

Customer**: Hadley Group/Hadley Industries FZE (Dubai)**

UKAS TESTING
0296

LABORATORY AIRBORNE SOUND INSULATION TEST - BS EN ISO 10140-2:2010

Test Code: **H18711CA** Test Date: **13/05/2014**

Specimen Area, S = **8.64** m^2

	Room T2	Room T1	
Room Volume, m^3:	**98**	**59.27**	
Temperature, deg.C:	**18.5**	**18.2**	**± 0.3**
Rel. Humidity, %RH:	**59.1**	**58.3**	**± 1.6**
Static Pressure, Pa:	**101500**	**101500**	**± 65**

	Test Room T2 to Test Room T1								
Freq	Source	Rec. (uc)	Bgrnd	Rec. (corr)	Rev.time	Corr.	**R**	U.Dev.	R 1/1Oct
Hz	dB	dB	dB	dB	Sec	dB	**dB**	dB	dB
50	91.2	52.4	11.9	52.4	0.68	-2.1	**36.7**		
63	92.9	58.8	11.4	58.8	0.83	-1.2	**32.9**		34.5
80	102.3	65.9	7.9	65.9	0.76	-1.6	**34.8**		
100	105.9	60.3	12.1	60.3	0.99	-0.4	**45.2**	4.8	
125	104.2	59.9	1.1	59.9	1.03	-0.3	**44.0**	9.0	46.0
160	110.5	59.2	2.5	59.2	1.51	1.4	**52.7**	3.3	
200	114.4	60.0	16.0	60.0	1.64	1.7	**56.1**	2.9	
250	115.3	58.3	1.4	58.3	1.62	1.7	**58.7**	3.3	58.5
315	114.3	52.6	6.0	52.6	1.73	2.0	**63.7**	1.3	
400	111.9	46.7	20.6	46.7	1.50	1.4	**66.6**	1.4	
500	109.7	41.4	4.8	41.4	1.51	1.4	**69.7**		68.5
630	107.9	39.1	4.3	39.1	1.53	1.4	**70.2**		
800	107.1	35.6	4.7	35.6	1.60	1.6	**73.1**		
1 000	106.1	31.0	13.6	31.0	1.51	1.4	**76.5**		75.6
1 250	104.9	27.4	4.1	27.4	1.67	1.8	**79.3**		
1 600	107.5	26.7	4.1	26.7	1.68	1.8	**82.6**		
2 000	108.7	29.3	4.8	29.3	1.63	1.7	**81.1**		80.0
2 500	106.6	30.0	5.3	30.0	1.42	1.1	**77.7**		
3 150	104.7	26.2	6.4	26.2	1.38	1.0	**79.5**		
4 000	103.6	23.1	9.3	**22.9**	1.34	0.9	**81.6**		81.3
5 000	105.6	22.5	11.1	**22.2**	1.29	0.7	**84.1**		
6 300									
8 000									
10 000									

Single Figure Ratings	**Rw**	**C**	**Ctr**	**Total U. Dev., dB**	**26**
BS EN ISO 717-1: 2013	**dB**	**dB**	**dB**		
	69	**-3**	**-9**		
	(100-5000)	**-2**	**-9**		
Background Corrected	**(50-3150)**	**-6**	**-17**		
	(50-5000)	**-5**	**-17**		

Procedure: AP 046 vs 5.1

Worksheet: 140_3_1.XLS

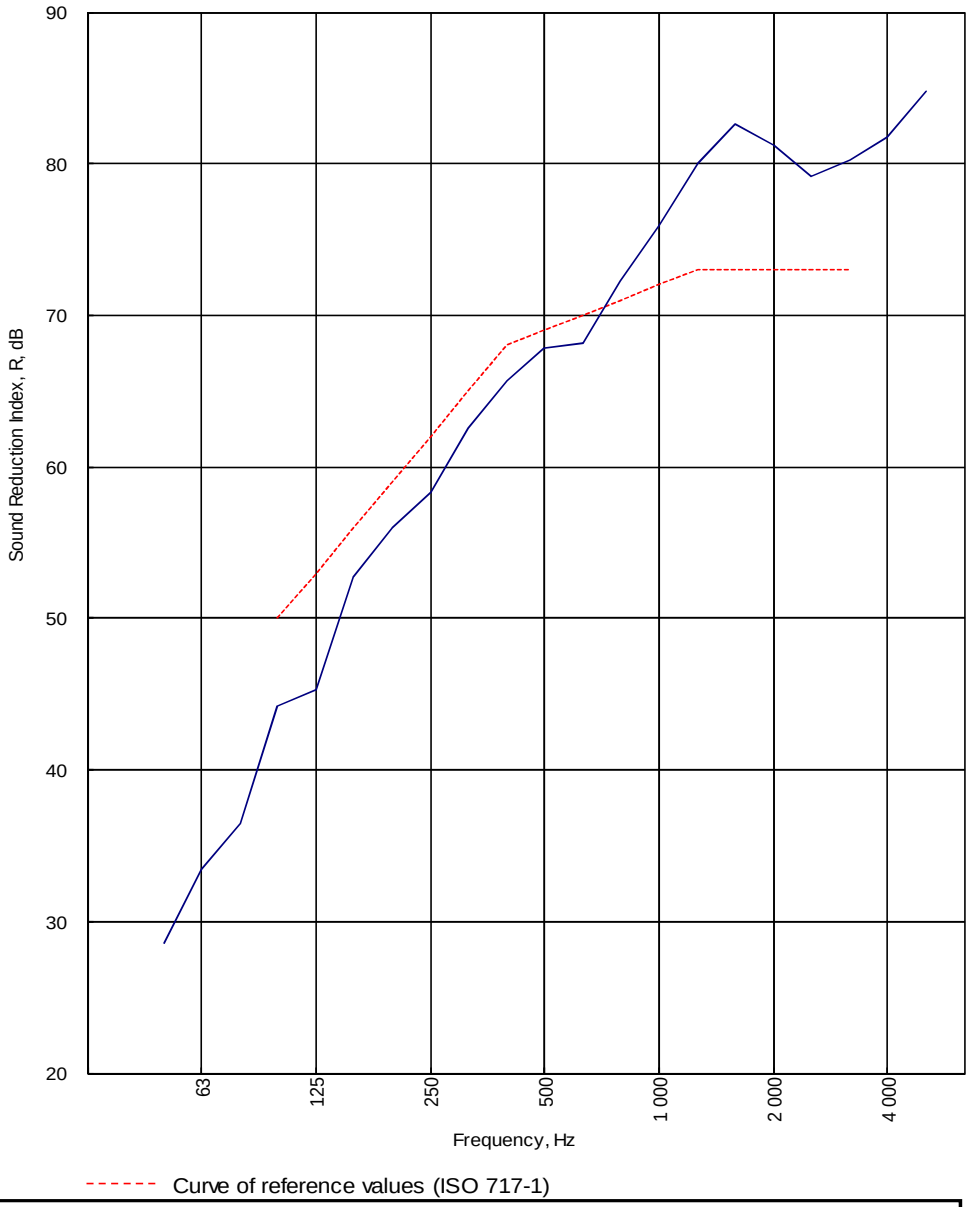
UKAS TESTING

0296

Customer**: Hadley Group/Hadley Industries FZE (Dubai)**

Test Code:
H18711DA
Test Date:
14/05/2014

Freq. Hz	R dB
50	28.6
63	33.4
80	36.5
100	44.2
125	45.3
160	52.7
200	56.0
250	58.3
315	62.5
400	65.7
500	67.8
630	68.2
800	72.3
1 000	75.9
1 250	80.0
1 600	82.6
2 000	81.2
2 500	79.2
3 150	80.2
4 000	81.7
5 000	84.8



Rating according to BS EN ISO 717-1:2013	**Rw (C;Ctr) = 69 (-3;-9) dB**		
	Max dev. 7.7 dB at 125 Hz		
Evaluation based on laboratory measurement results obtained by an engineering method:	$C_{50\text{-}3150}$= **-7 dB**	$C_{50\text{-}5000}$= **-6 dB**	$C_{100\text{-}5000}$= **-2 dB**
	$C_{tr,50\text{-}3150}$= **-19 dB**	$C_{tr,50\text{-}5000}$= **-19 dB**	$C_{tr,100\text{-}5000}$= **-9 dB**

Customer**: Hadley Group/Hadley Industries FZE (Dubai)**

UKAS TESTING
0296

LABORATORY AIRBORNE SOUND INSULATION TEST - BS EN ISO 10140-2:2010

Test Code: **H18711DA** Test Date: **14/05/2014**

		Room T2	Room T1	
Specimen Area, S = **8.64** m^2	Room Volume, m^3:	**98**	**59.27**	
	Temperature, deg.C:	**17.5**	**17.2**	**± 0.3**
	Rel. Humidity, %RH:	**54.1**	**55.4**	**± 1.6**
	Static Pressure, Pa:	**102400**	**102400**	**± 65**

	Test Room T2 to Test Room T1								R
Freq	Source	Rec. (uc)	Bgrnd	Rec. (corr)	Rev.time	Corr.	**R**	U.Dev.	1/1Oct
Hz	dB	dB	dB	dB	Sec	dB	**dB**	dB	dB
50	90.2	58.8	16.3	58.8	0.57	-2.8	**28.6**		
63	93.1	58.5	15.1	58.5	0.83	-1.2	**33.4**		31.6
80	103.0	65.1	13.0	65.1	0.80	-1.4	**36.5**		
100	105.1	60.4	12.5	60.4	0.98	-0.5	**44.2**	5.8	
125	105.2	59.7	2.9	59.7	1.05	-0.2	**45.3**	7.7	46.1
160	110.9	59.1	5.3	59.1	1.34	0.9	**52.7**	3.3	
200	114.4	59.9	15.9	59.9	1.55	1.5	**56.0**	3.0	
250	115.6	59.0	1.6	59.0	1.61	1.7	**58.3**	3.7	58.2
315	114.4	53.6	7.4	53.6	1.63	1.7	**62.5**	2.5	
400	112.3	48.0	21.0	48.0	1.50	1.4	**65.7**	2.3	
500	110.3	43.6	4.7	43.6	1.41	1.1	**67.8**	1.2	67.1
630	108.2	41.4	4.2	41.4	1.52	1.4	**68.2**	1.8	
800	107.5	36.7	4.8	36.7	1.55	1.5	**72.3**		
1 000	106.5	32.1	13.8	32.1	1.54	1.5	**75.9**		75.0
1 250	105.4	27.1	4.7	27.1	1.61	1.7	**80.0**		
1 600	107.7	26.8	4.6	26.8	1.63	1.7	**82.6**		
2 000	109.1	29.5	5.2	29.5	1.59	1.6	**81.2**		80.8
2 500	106.8	28.8	5.4	28.8	1.44	1.2	**79.2**		
3 150	105.0	25.7	6.5	25.7	1.36	0.9	**80.2**		
4 000	103.8	23.2	9.5	**23.0**	1.35	0.9	**81.7**		81.8
5 000	106.0	22.3	11.2	**21.9**	1.29	0.7	**84.8**		
6 300									
8 000									
10 000									

Single Figure Ratings	**Rw**	**C**	**Ctr**	**Total U. Dev., dB**	**31.3**
BS EN ISO 717-1: 2013	**dB**	**dB**	**dB**		
	69	**-3**	**-9**		
	(100-5000)	**-2**	**-9**		
Background Corrected	**(50-3150)**	**-7**	**-19**		
	(50-5000)	**-6**	**-19**		

Procedure: AP 046 vs 5.1

Worksheet: 140_3_1.XLS

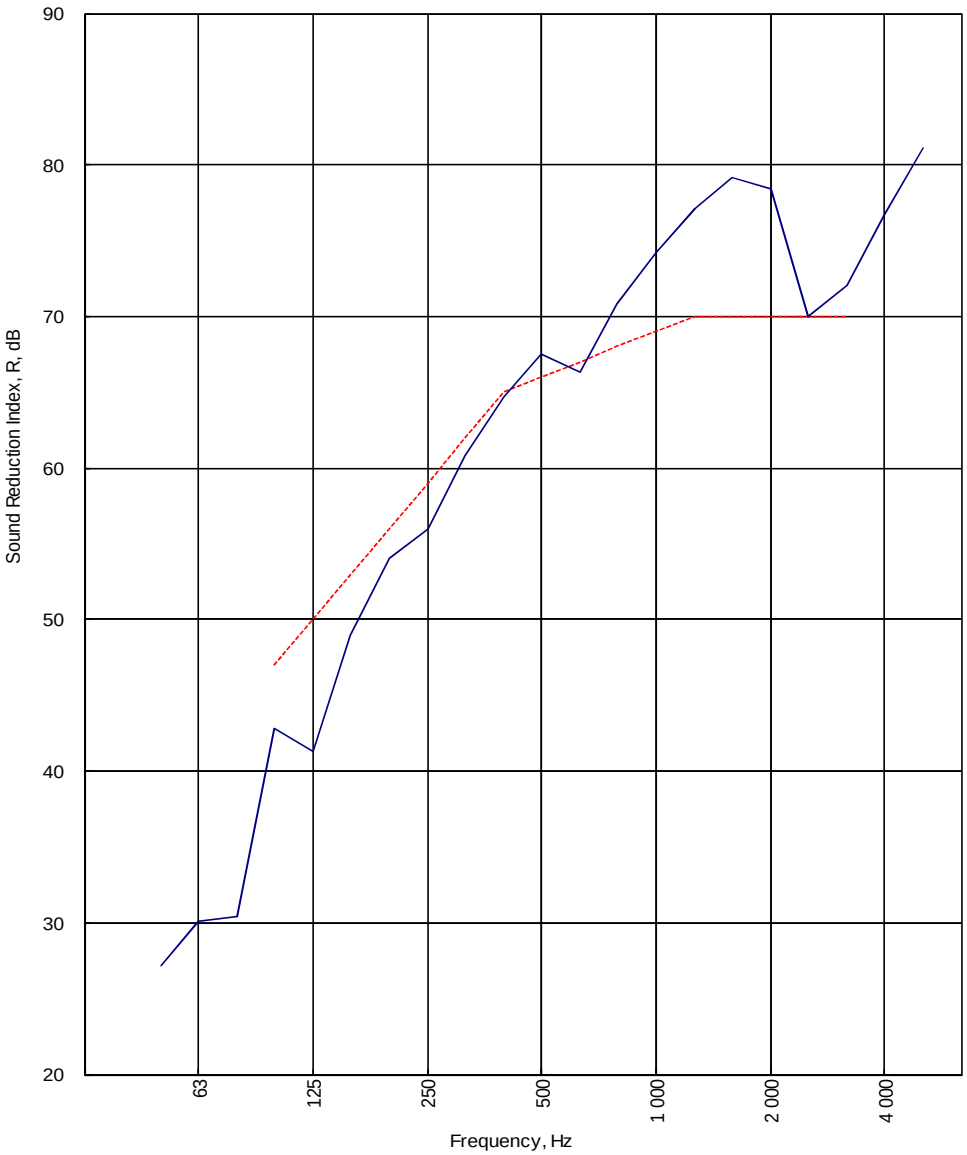
UKAS TESTING

0296

Customer**: Hadley Group/Hadley Industries FZE (Dubai)**

Test Code:
H18711EA
Test Date:
14/05/2014

Freq. Hz	R dB
50	27.2
63	30.1
80	30.4
100	42.8
125	41.3
160	49.0
200	54.0
250	56.0
315	60.8
400	64.7
500	67.5
630	66.3
800	70.9
1 000	74.2
1 250	77.1
1 600	79.2
2 000	78.4
2 500	70.0
3 150	72.0
4 000	76.7
5 000	81.1



Rating according to
BS EN ISO 717-1:2013

Rw (C;Ctr) = 66 (-3;-8) dB

Max dev. 8.7 dB at 125 Hz

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

$C_{50\text{-}3150}$= **-7 dB** $C_{50\text{-}5000}$= **-6 dB** $C_{100\text{-}5000}$= **-2 dB**

$C_{tr,50\text{-}3150}$= **-19 dB** $C_{tr,50\text{-}5000}$= **-19 dB** $C_{tr,100\text{-}5000}$: **-8 dB**

Customer**: Hadley Group/Hadley Industries FZE (Dubai)**

UKAS TESTING
0296

LABORATORY AIRBORNE SOUND INSULATION TEST - BS EN ISO 10140-2:2010

Test Code: **H18711EA** Test Date: **14/05/2014**

Specimen Area, S = **8.64** m^2

	Room T2	Room T1	
Room Volume, m^3:	**98**	**59.27**	
Temperature, deg.C:	**17.5**	**17.8**	**± 0.3**
Rel. Humidity, %RH:	**53.4**	**51.2**	**± 1.6**
Static Pressure, Pa:	**102500**	**102500**	**± 65**

	Test Room T2 to Test Room T1								R
Freq	Source	Rec. (uc)	Bgrnd	Rec. (corr)	Rev.time	Corr.	**R**	U.Dev.	1/1Oct
Hz	dB	dB	dB	dB	Sec	dB	**dB**	dB	dB
50	89.9	60.5	17.5	60.5	0.66	-2.2	**27.2**		
63	92.9	61.9	16.2	61.9	0.90	-0.9	**30.1**		29.0
80	101.7	69.9	15.0	69.9	0.79	-1.4	**30.4**		
100	106.0	62.4	10.4	62.4	0.92	-0.8	**42.8**	4.2	
125	104.3	63.0	6.8	63.0	1.11	0.0	**41.3**	8.7	43.3
160	110.3	62.1	5.2	62.1	1.33	0.8	**49.0**	4.0	
200	114.4	61.8	15.7	61.8	1.53	1.4	**54.0**	2.0	
250	115.5	61.3	2.0	61.3	1.67	1.8	**56.0**	3.0	56.1
315	114.2	55.6	7.0	55.6	1.81	2.2	**60.8**	1.2	
400	112.0	48.6	23.0	48.6	1.47	1.3	**64.7**	0.3	
500	110.0	43.9	6.2	43.9	1.53	1.4	**67.5**		66.0
630	107.9	42.9	4.8	42.9	1.47	1.3	**66.3**	0.7	
800	107.4	38.1	4.9	38.1	1.57	1.6	**70.9**		
1 000	106.3	33.6	13.3	33.6	1.56	1.5	**74.2**		73.3
1 250	105.2	29.9	4.5	29.9	1.66	1.8	**77.1**		
1 600	107.5	30.1	4.6	30.1	1.68	1.8	**79.2**		
2 000	108.9	32.2	5.1	32.2	1.63	1.7	**78.4**		73.8
2 500	106.5	37.8	5.4	37.8	1.47	1.3	**70.0**		
3 150	104.8	33.8	6.6	33.8	1.37	1.0	**72.0**		
4 000	103.7	27.9	9.6	27.9	1.36	0.9	**76.7**		75.1
5 000	105.9	25.6	11.3	**25.4**	1.27	0.6	**81.1**		
6 300									
8 000									
10 000									

Single Figure Ratings	**Rw**	**C**	**Ctr**	**Total U. Dev., dB**	**24.1**
BS EN ISO 717-1: 2013	**dB**	**dB**	**dB**		
	66	**-3**	**-8**		
	(100-5000)	**-2**	**-8**		
Background Corrected	**(50-3150)**	**-7**	**-19**		
	(50-5000)	**-6**	**-19**		

Procedure: AP 046 vs 5.1

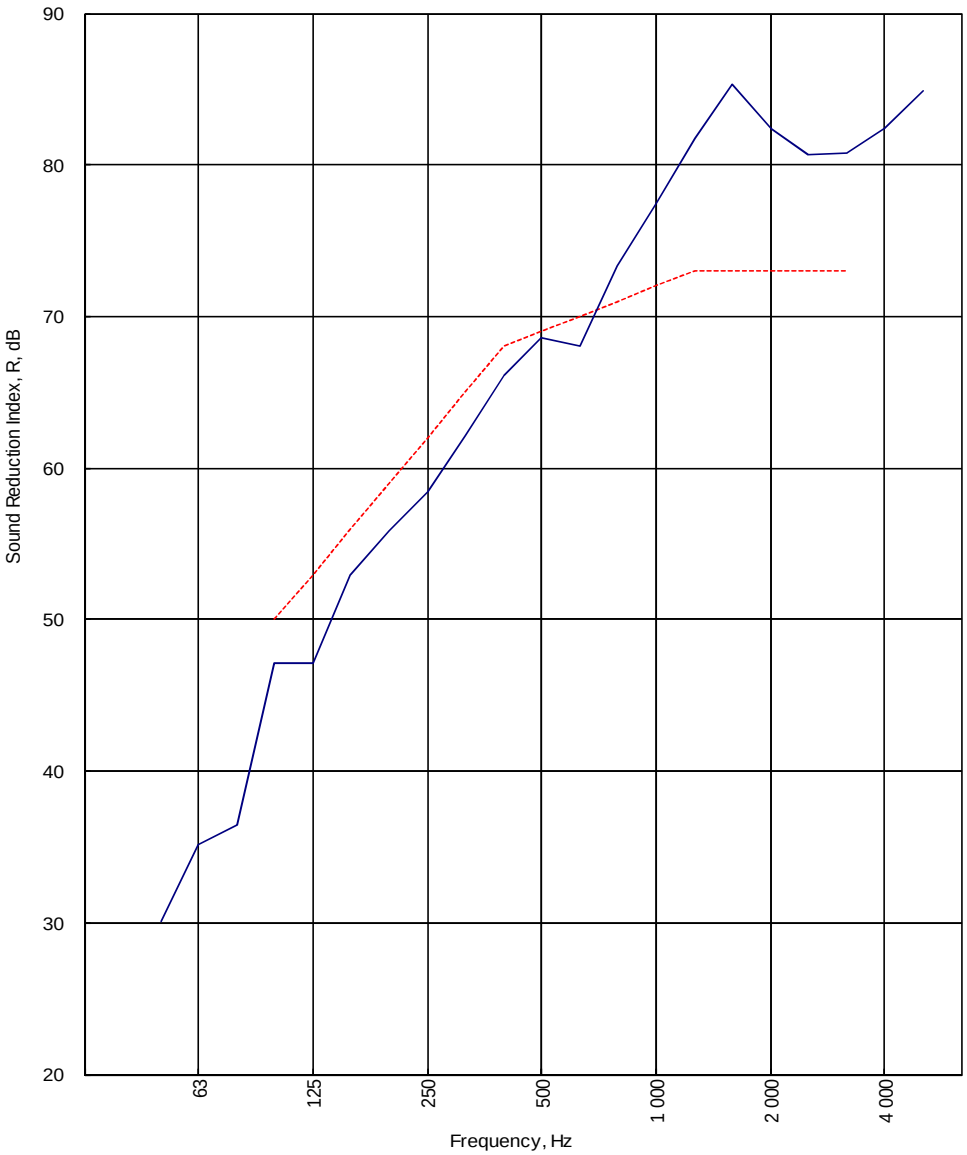
Worksheet: 140_3_1.XLS

UKAS TESTING

0296

Test Code:
H18711FA
Test Date:
14/05/2014

Freq. Hz	R dB
50	30.1
63	35.2
80	36.5
100	47.1
125	47.1
160	52.9
200	55.9
250	58.4
315	62.1
400	66.1
500	68.6
630	68.1
800	73.3
1 000	77.4
1 250	81.7
1 600	85.3
2 000	82.4
2 500	80.7
3 150	80.8
4 000	82.4
5 000	84.9



Rating according to
BS EN ISO 717-1:2013

Rw (C;Ctr) = 69 (-2;-7) dB

Max dev. 5.9 dB at 125 Hz

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

$C_{50\text{-}3150}$= **-6 dB** $C_{50\text{-}5000}$= **-5 dB** $C_{100\text{-}5000}$= **-1 dB**

$C_{tr,50\text{-}3150}$= **-17 dB** $C_{tr,50\text{-}5000}$= **-17 dB** $C_{tr,100\text{-}5000}$: **-7 dB**

Customer**: Hadley Group/Hadley Industries FZE (Dubai)**

UKAS TESTING
0296

LABORATORY AIRBORNE SOUND INSULATION TEST - BS EN ISO 10140-2:2010

Test Code: **H18711FA** Test Date: **14/05/2014**

Specimen Area, S = **8.64** m^2

	Room T2	Room T1	
Room Volume, m^3:	**98**	**58.84**	
Temperature, deg.C:	**17.9**	**17.5**	**± 0.3**
Rel. Humidity, %RH:	**52**	**48.2**	**± 1.6**
Static Pressure, Pa:	**102500**	**102500**	**± 65**

	Test Room T2 to Test Room T1								R
Freq	Source	Rec. (uc)	Bgrnd	Rec. (corr)	Rev.time	Corr.	**R**	U.Dev.	1/1Oct
Hz	dB	dB	dB	dB	Sec	dB	**dB**	dB	dB
50	89.8	57.3	10.6	57.3	0.63	-2.4	**30.1**		
63	92.2	55.8	8.9	55.8	0.82	-1.2	**35.2**		33.0
80	102.9	64.7	8.2	64.7	0.73	-1.7	**36.5**		
100	105.5	58.0	9.9	58.0	0.99	-0.4	**47.1**	2.9	
125	104.0	57.0	5.7	57.0	1.11	0.1	**47.1**	5.9	48.3
160	110.7	58.4	4.5	58.4	1.26	0.6	**52.9**	3.1	
200	114.2	59.8	16.2	59.8	1.53	1.5	**55.9**	3.1	
250	115.2	58.5	1.4	58.5	1.62	1.7	**58.4**	3.6	58.1
315	114.1	53.7	5.9	53.7	1.63	1.7	**62.1**	2.9	
400	112.1	47.2	20.1	47.2	1.45	1.2	**66.1**	1.9	
500	110.3	43.0	4.7	43.0	1.47	1.3	**68.6**	0.4	67.5
630	107.9	41.1	4.5	41.1	1.46	1.3	**68.1**	1.9	
800	107.4	35.6	4.8	35.6	1.54	1.5	**73.3**		
1 000	106.2	30.1	13.2	30.1	1.48	1.3	**77.4**		76.2
1 250	105.4	25.3	4.1	25.3	1.57	1.6	**81.7**		
1 600	107.7	24.2	4.6	24.2	1.65	1.8	**85.3**		
2 000	108.9	28.1	5.2	28.1	1.58	1.6	**82.4**		82.4
2 500	106.7	27.3	5.4	27.3	1.46	1.3	**80.7**		
3 150	104.8	25.1	6.5	25.1	1.40	1.1	**80.8**		
4 000	103.7	22.4	9.5	**22.2**	1.34	0.9	**82.4**		82.4
5 000	106.1	22.3	11.1	**22.0**	1.31	0.8	**84.9**		
6 300									
8 000									
10 000									

Single Figure Ratings	**Rw**	**C**	**Ctr**	**Total U. Dev., dB**	**25.7**
BS EN ISO 717-1: 2013	**dB**	**dB**	**dB**		
	69	**-2**	**-7**		
	(100-5000)	**-1**	**-7**		
Background Corrected	**(50-3150)**	**-6**	**-17**		
	(50-5000)	**-5**	**-17**		

Procedure: AP 046 vs 5.1

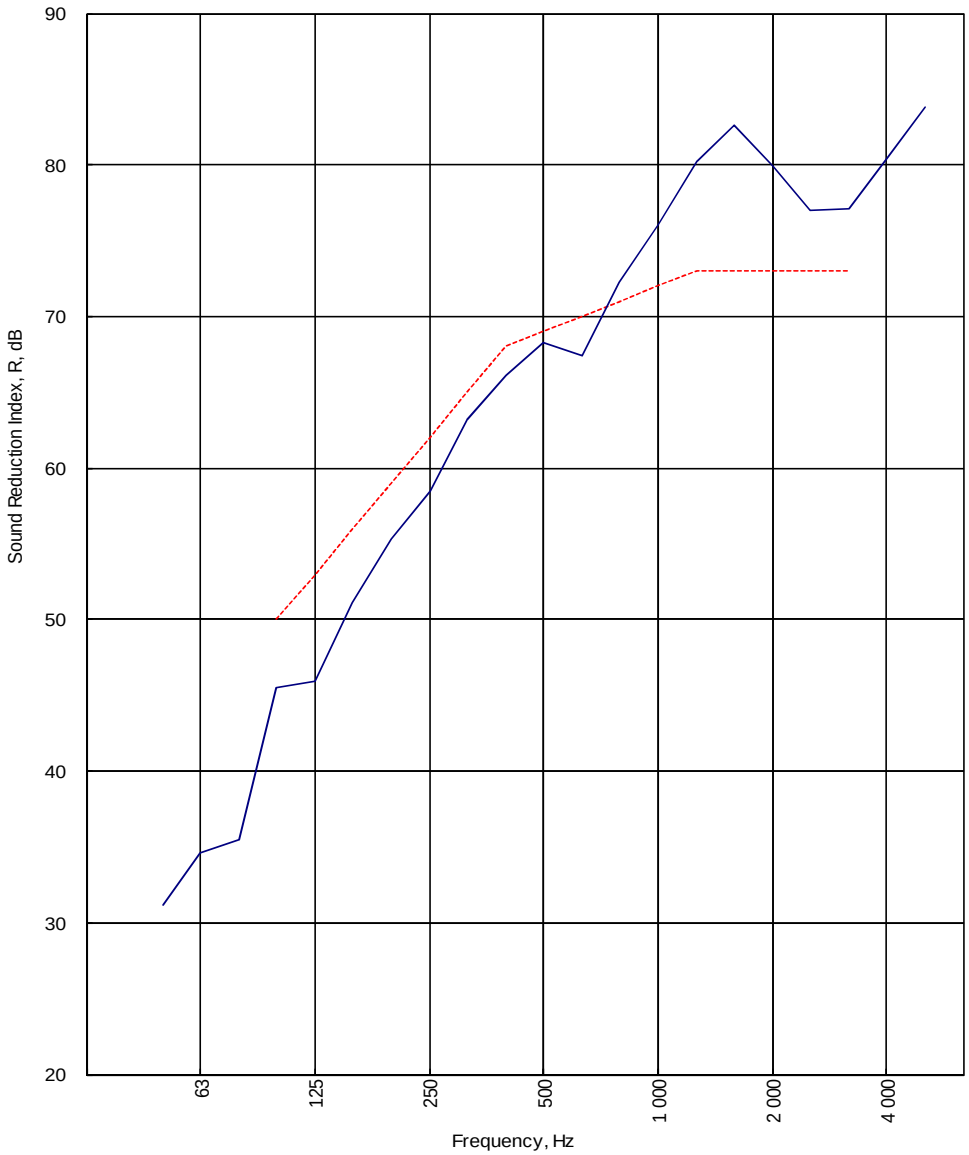
Worksheet: 140_3_1.XLS

UKAS TESTING

0296

Test Code:
H18711GA
Test Date:
14/05/2014

Freq. Hz	R dB
50	31.2
63	34.6
80	35.5
100	45.5
125	45.9
160	51.1
200	55.3
250	58.4
315	63.2
400	66.1
500	68.3
630	67.4
800	72.3
1 000	76.0
1 250	80.2
1 600	82.6
2 000	79.9
2 500	77.0
3 150	77.1
4 000	80.4
5 000	83.8



Rating according to
BS EN ISO 717-1:2013

Rw (C;Ctr) = 69 (-3;-8) dB

Max dev. 7.1 dB at 125 Hz

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

$C_{50\text{-}3150}$= **-6 dB** $C_{50\text{-}5000}$= **-5 dB** $C_{100\text{-}5000}$= **-2 dB**

$C_{tr,50\text{-}3150}$= **-18 dB** $C_{tr,50\text{-}5000}$= **-18 dB** $C_{tr,100\text{-}5000}$: **-8 dB**

LABORATORY AIRBORNE SOUND INSULATION TEST - BS EN ISO 10140-2:2010

Test Code: **H18711GA** Test Date: **14/05/2014**

Specimen Area, S = **8.64** m^2

	Room T2	Room T1	
Room Volume, m^3:	**98**	**58.84**	
Temperature, deg.C:	**17.8**	**18.3**	**± 0.3**
Rel. Humidity, %RH:	**55.5**	**47.8**	**± 1.6**
Static Pressure, Pa:	**102500**	**102500**	**± 65**

	Test Room T2 to Test Room T1								
Freq	Source	Rec. (uc)	Bgrnd	Rec. (corr)	Rev.time	Corr.	**R**	U.Dev.	R 1/1Oct
Hz	dB	dB	dB	dB	Sec	dB	**dB**	dB	dB
50	91.0	57.8	11.2	57.8	0.68	-2.0	**31.2**		
63	93.2	57.0	8.0	57.0	0.76	-1.6	**34.6**		33.3
80	101.5	64.1	6.2	64.1	0.70	-1.9	**35.5**		
100	105.4	59.3	9.0	59.3	0.94	-0.6	**45.5**	4.5	
125	104.5	58.6	4.9	58.6	1.09	0.0	**45.9**	7.1	46.9
160	110.1	60.2	5.0	60.2	1.42	1.2	**51.1**	4.9	
200	114.4	60.4	16.2	60.4	1.48	1.3	**55.3**	3.7	
250	115.3	58.5	2.1	58.5	1.58	1.6	**58.4**	3.6	57.9
315	114.3	52.8	7.2	52.8	1.60	1.7	**63.2**	1.8	
400	112.1	47.3	20.8	47.3	1.47	1.3	**66.1**	1.9	
500	109.8	42.5	5.2	42.5	1.36	1.0	**68.3**	0.7	67.2
630	107.8	41.6	4.6	41.6	1.45	1.2	**67.4**	2.6	
800	107.3	36.4	4.9	36.4	1.50	1.4	**72.3**		
1 000	106.1	31.2	13.8	31.2	1.41	1.1	**76.0**		75.1
1 250	104.9	26.3	4.3	26.3	1.58	1.6	**80.2**		
1 600	107.6	26.7	4.7	26.7	1.61	1.7	**82.6**		
2 000	108.8	30.4	5.6	30.4	1.55	1.5	**79.9**		79.2
2 500	106.7	30.9	5.8	30.9	1.43	1.2	**77.0**		
3 150	104.7	28.6	6.7	28.6	1.36	1.0	**77.1**		
4 000	103.8	24.4	9.3	24.4	1.38	1.0	**80.4**		79.6
5 000	106.0	23.3	11.9	**23.0**	1.30	0.8	**83.8**		
6 300									
8 000									
10 000									

Single Figure Ratings	**Rw**	**C**	**Ctr**	**Total U. Dev., dB**	**30.8**
BS EN ISO 717-1: 2013	**dB**	**dB**	**dB**		
	69	**-3**	**-8**		
	(100-5000)	**-2**	**-8**		
Background Corrected	**(50-3150)**	**-6**	**-18**		
	(50-5000)	**-5**	**-18**		

Procedure: AP 046 vs 5.1

Worksheet: 140_3_1.XLS

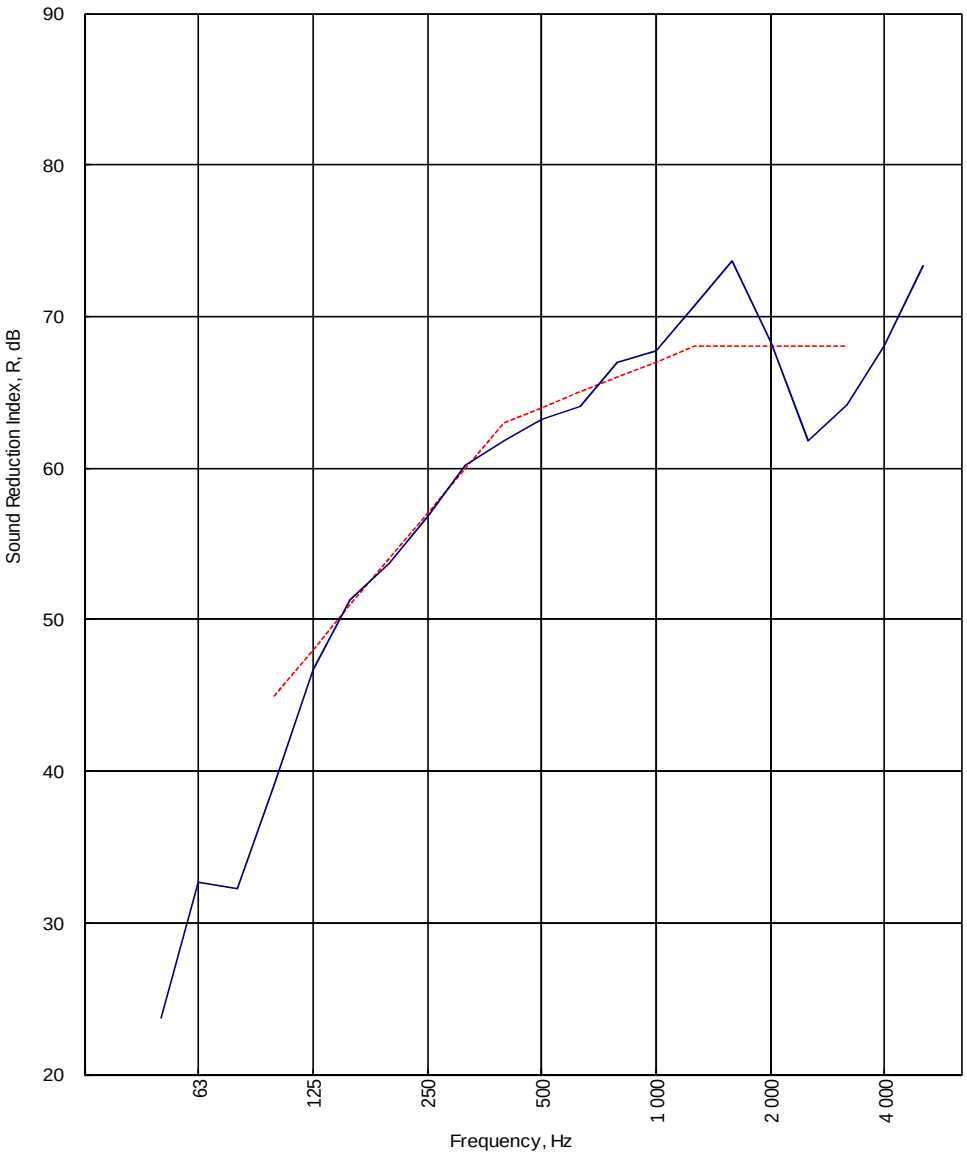
Customer**: Hadley Group/Hadley Industries FZE (Dubai)**

UKAS TESTING

0296

Test Code:
H18711HA
Test Date:
14/05/2014

Freq. Hz	R dB
50	23.7
63	32.7
80	32.2
100	39.1
125	46.7
160	51.3
200	53.7
250	56.8
315	60.2
400	61.8
500	63.2
630	64.1
800	67.0
1 000	67.7
1 250	70.7
1 600	73.7
2 000	68.3
2 500	61.8
3 150	64.2
4 000	68.1
5 000	73.3



Rating according to
BS EN ISO 717-1:2013

Rw (C;Ctr) = 64 (-2;-7) dB

Max dev. 6.2 dB at 2 500 Hz

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

$C_{50\text{-}3150}$= **-6 dB** $C_{50\text{-}5000}$= **-5 dB** $C_{100\text{-}5000}$= **-1 dB**

$C_{tr,50\text{-}3150}$= **-18 dB** $C_{tr,50\text{-}5000}$= **-18 dB** $C_{tr,100\text{-}5000}$: **-7 dB**

Customer**: Hadley Group/Hadley Industries FZE (Dubai)**

UKAS TESTING
0296

LABORATORY AIRBORNE SOUND INSULATION TEST - BS EN ISO 10140-2:2010

Test Code: **H18711HA** Test Date: **14/05/2014**

Specimen Area, S = **8.64** m^2

	Room T2	Room T1	
Room Volume, m^3:	**98**	**58.84**	
Temperature, deg.C:	**17.8**	**18.3**	**± 0.3**
Rel. Humidity, %RH:	**55.5**	**47.8**	**± 1.6**
Static Pressure, Pa:	**102500**	**102500**	**± 65**

	Test Room T2 to Test Room T1								
Freq	Source	Rec. (uc)	Bgrnd	Rec. (corr)	Rev.time	Corr.	**R**	U.Dev.	R 1/1Oct
Hz	dB	dB	dB	dB	Sec	dB	**dB**	dB	dB
50	89.4	63.5	14.6	63.5	0.66	-2.2	**23.7**		
63	92.9	58.6	14.0	58.6	0.76	-1.6	**32.7**		27.4
80	103.9	69.5	11.9	69.5	0.66	-2.2	**32.2**		
100	105.4	65.7	11.5	65.7	0.96	-0.6	**39.1**	5.9	
125	105.1	58.3	9.5	58.3	1.07	-0.1	**46.7**	1.3	43.0
160	111.2	61.0	6.2	61.0	1.40	1.1	**51.3**		
200	114.1	61.7	15.8	61.7	1.48	1.3	**53.7**	0.3	
250	115.0	59.9	2.8	59.9	1.63	1.7	**56.8**	0.2	56.1
315	114.4	56.0	7.7	56.0	1.65	1.8	**60.2**		
400	111.7	51.0	22.6	51.0	1.39	1.1	**61.8**	1.2	
500	109.9	47.7	6.0	47.7	1.37	1.0	**63.2**	0.8	62.9
630	107.9	45.0	5.1	45.0	1.43	1.2	**64.1**	0.9	
800	107.2	42.0	4.9	42.0	1.64	1.8	**67.0**		
1 000	106.2	39.9	13.3	39.9	1.51	1.4	**67.7**		68.2
1 250	104.9	35.9	4.0	35.9	1.62	1.7	**70.7**		
1 600	107.7	35.8	4.5	35.8	1.64	1.8	**73.7**		
2 000	108.7	42.1	5.1	42.1	1.60	1.7	**68.3**		65.5
2 500	106.6	46.0	5.8	46.0	1.44	1.2	**61.8**	6.2	
3 150	104.8	41.6	6.7	41.6	1.37	1.0	**64.2**	3.8	
4 000	103.7	36.7	9.5	36.7	1.40	1.1	**68.1**		67.1
5 000	105.9	33.3	12.0	33.3	1.29	0.7	**73.3**		
6 300									
8 000									
10 000									

Total U. Dev., dB **20.6**

Single Figure Ratings	**Rw**	**C**	**Ctr**
BS EN ISO 717-1: 2013	**dB**	**dB**	**dB**
	64	**-2**	**-7**
	(100-5000)	**-1**	**-7**
	(50-3150)	**-6**	**-18**
	(50-5000)	**-5**	**-18**

Procedure: AP 046 vs 5.1

Worksheet: 140_3_1.XLS

UKAS TESTING

0296

APPENDIX B - TEST METHOD AND CONDITIONS

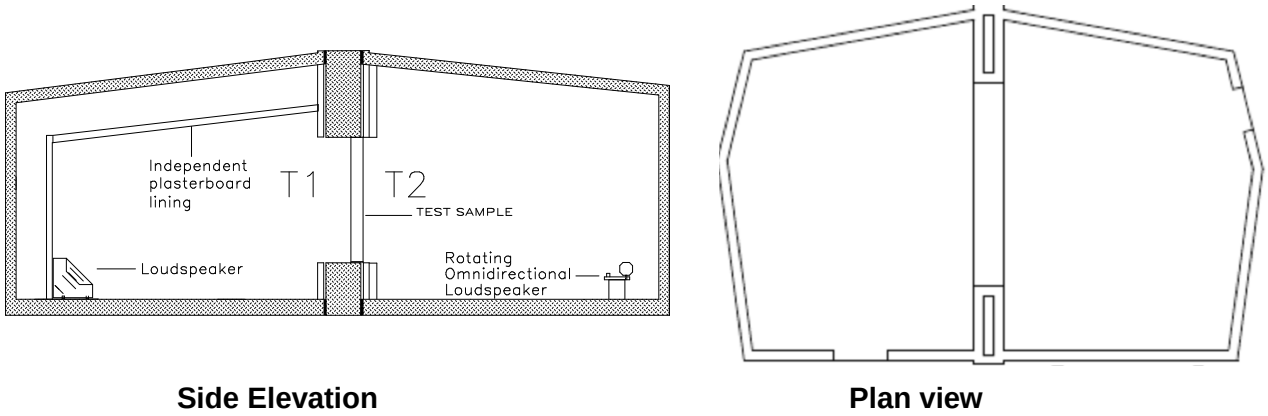
Method

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

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

Test Chamber Layout

The test suite is constructed to be as independent from the surround building as is physically possibly in order to minimise flanking transmission paths.



Side Elevation **Plan view**

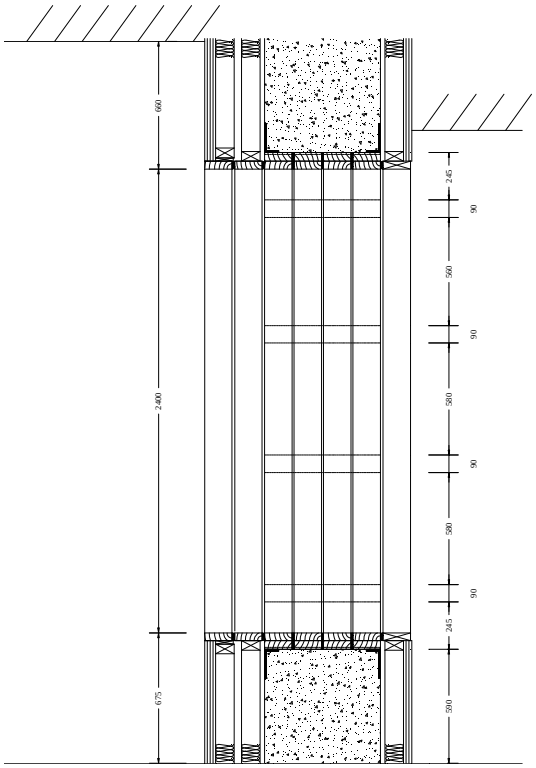
Test Chamber Shape

The source room (T2) contains two perspex diffusers of approximately 900mm x 1220mm. Panel absorbers are used to ensure reverberation times in source room (T2) are between one and two seconds at all frequencies at and above 100 Hz. An omni-directional loudspeaker sound source is placed near a back corner of the source room (T2), rotating at 1 rpm and at least 0.7m from any room boundary. A stationary loudspeaker sound source is placed in the corner of the receiving room (T1) opposite the test specimen.

Mounting

The BTC has a solid concrete frame which has been additionally lined to give improved reduction of flanking transmission. This is in order to ensure that, as far as possible, lab limits will not restrict the real performance measurement of just the test specimen.

Recommendations for installation position within the niche are given in our Installation Guidance Document. Details of actual installation position are held by the BTC in the Test Report folder.



Cross section of test aperture

Lab Limits

The laboratory limit for measurement due to flanking is (combined BTC 11709A, BTC13562EA, BTC 15398A and BTC 15829A).

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	45.0	46.9	58.5	62.4	62.9	67.7	71.2	77.2	84.2	92.0	97.7	101.5	103.8	97.6	102.4	104.8	101.8	102.9	98.7	96.4	96.2