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Acoustics Test Report Number

1199

Date

03/12/87

LABORATORY AIRBORNE SOUND INSULATION
MEASUREMENTS ON A 100mm GYPROC METAL STUD
PARTITION.

Test carried out for

BRITISH GYPSUM LTD, MARKETING DEPT.

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Research & Development Department,
East Leake, Loughborough, Leicestershire, England.

A handwritten signature in black ink, likely belonging to the Project Manager (Acoustics).

Project Manager (Acoustics)

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as an agent for, BPB United Kingdom Ltd.
Ruddington Hall, Ruddington, Nottingham

LABORATORY TEST

Acoustics test report - Confidential

Test code

H367.1

Date tested

01 Dec. 1987

Type of test

AIRBORNE SOUND INSULATION

Tested in accordance with

BS 2750 AND ISO 140

Report prepared by

D. PATTERSON



Specimen description

1. CONSTRUCTION TESTED100 mm Gyproc metal stud partition

comprising:

- * 2 x 12.5 mm Gyproc wallboard
- * 48 mm Gyproc 48S55 metal studs at 600 mm centres
- * 2 x 12.5 mm Gyproc wallboard

Joints filled and perimeter sealed.

See Appendix 1 for construction schedule and Appendix 2 for details of the airborne sound insulation test procedure.

2. RESULTS

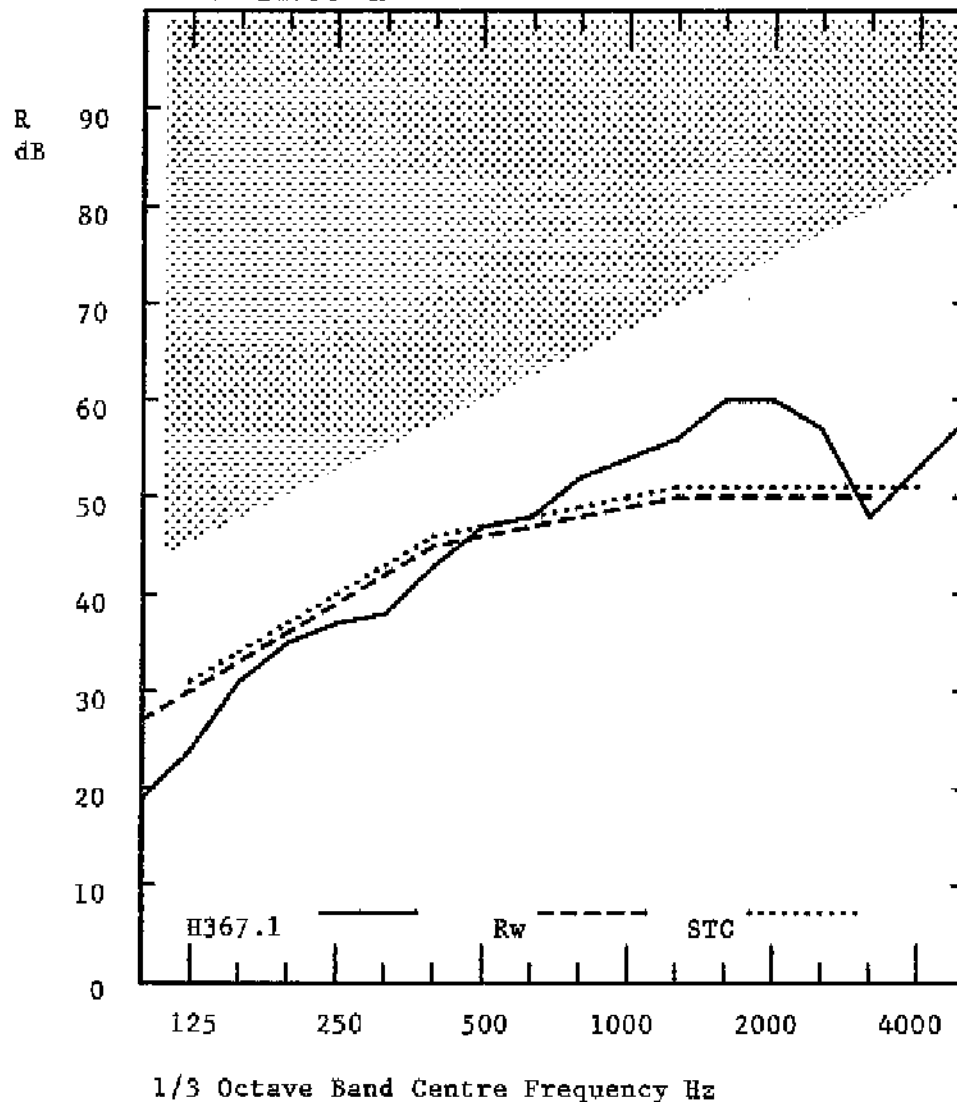
The result sheet overleaf gives the tabulated sound reduction indices and the principal single figure ratings in addition to the plotted spectrum, the BS 5821:1984 curve and the ASTM E413 curve.

The result calculated to BS 5821:1984 is:

Weighted Sound Reduction Index $R_w = 46$ (BS 5821)

Laboratory Test Code H367.1

Sound Reduction Index R



1/3 Octave Band Centre Freq. Hz	R dB
100	19
125	24
160	31
200	35
250	37
315	38
400	43
500	47
630	48
800	52
1000	54
1250	56
1600	60
2000	60
2500	57
3150	48
4000	53
5000	58

Rw(BS5821)	46
Mean(100-3150)	44
STC(ASTM E413)	47
dB(A)(100-5000)	44

Note: The lower edge of the shaded region approximates to the maximum sound reduction index that can be measured in this laboratory. A measured curve which lies in the shaded region will be an underestimate of the performance of the construction.

RESULT SHEET

APPENDIX 1CONSTRUCTION SCHEDULE

Test specimen erected within a timber lined aperture between two reverberation rooms in the Acoustics Research and Testing Laboratory, British Gypsum Research and Development Department.

Test aperture dimensions: 2400 mm high x 3600 mm wide.

Component List

Floor/ceiling channel: Gyproc 50C55
Metal studs : Gyproc 48S55
Glass wool infill :
Wallboard : 12.5 mm Gyproc wallboard (9.98 kg/m²)
Gyproc Jointex
Gyproc Joint Tape
Gyproc Sealant

Metal Stud Partition Construction Details:

Channels screw-fixed to the head and base of the aperture lining at 600 mm centres.

Studs located between channels at 600 mm centres. The end studs screw-fixed to the aperture lining at 600 mm centres.

A double layer of wallboard fixed to both sides of the frame; the base layer fixed with Gyproc Drywall screws at 300 mm centres around the perimeter of each board and the second layer, starting with a half-width board fixed with screws around the perimeter at 300 mm centres and at 300 mm centres along all studs.

The joints between wallboard filled with Gyproc Jointex and reinforced with Gyproc joint tape.

The perimeters sealed with Gyproc Sealant.

Product specification and further application details are available in the British Gypsum White Book.

APPENDIX 2HORIZONTAL TEST SUITE - AIRBORNE SOUND INSULATION

Test method to BS 2750:1980 Part III, ISO 140 Part III and ASTM E90-83. The test rooms are approximately 109 m³ in volume and the test specimen is 2.4 m x 3.6 m. The level difference at a given 1/3 octave band centre frequency is obtained by measuring the difference in mean sound pressure levels between rooms when one room contains a loudspeaker emitting band limited pink noise. The mean sound pressure level is estimated from the average of the spatial intensities measured within the room. The Sound Reduction Index R for the test specimen is obtained by the addition of the term $10 \log_{10} S/A$ to the level difference where S is the area of the test specimen and A is the equivalent absorption in the receiving room.

TEST PROCEDURE

With the following test method, the measurement of the sound reduction index of a test specimen meets the requirements of BS 2750:1980 Part II and ISO 140 Part II in terms of repeatability:

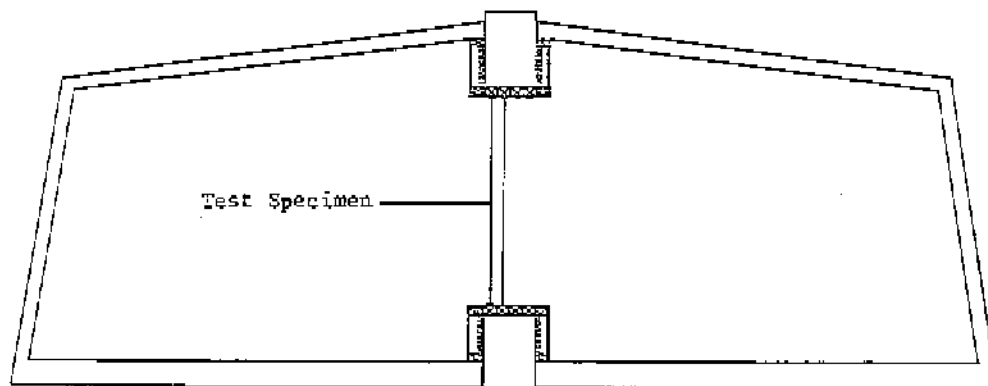
Four randomly placed stationary microphones to sample sound pressure levels in each room - Four reverberation time measurements (at different microphone locations) - The sound reduction index is measured in both directions and the mean result reported.

EXPRESSION OF RESULTS

The Sound Reduction Index R over the 1/3 octave band centre frequency range 100 - 5000 Hz is presented in tabular and graphical form. Four single figure ratings are given; the arithmetic mean of the sixteen spectral values over the range 100 - 3150 Hz, i.e. Mean R, The Weighted Sound Reduction Index R_w evaluated in accordance with BS 5821:1984, the Sound Transmission Class STC evaluated in accordance with ASTM E413 and the single figure rating in dB(A) as used in France.

TEST EQUIPMENT

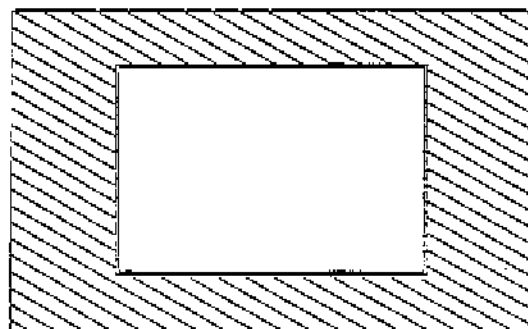
Norwegian Electronics Sound Insulation Measuring System Type 823 controlled by a Hewlett Packard 9836 microcomputer with Norwegian Electronics Microphone Multiplexers Type 827 with Bruel and Kjaer Type 4166/2619 microphones.



Section through Horizontal Test Suite

Room Dimensions

Mean Height ≈ 3.6 m
 Mean Width ≈ 6.0 m
 Mean Depth ≈ 3.0 m
 Volume ≈ 109 m³

DETAILS OF THE TEST FACILITY

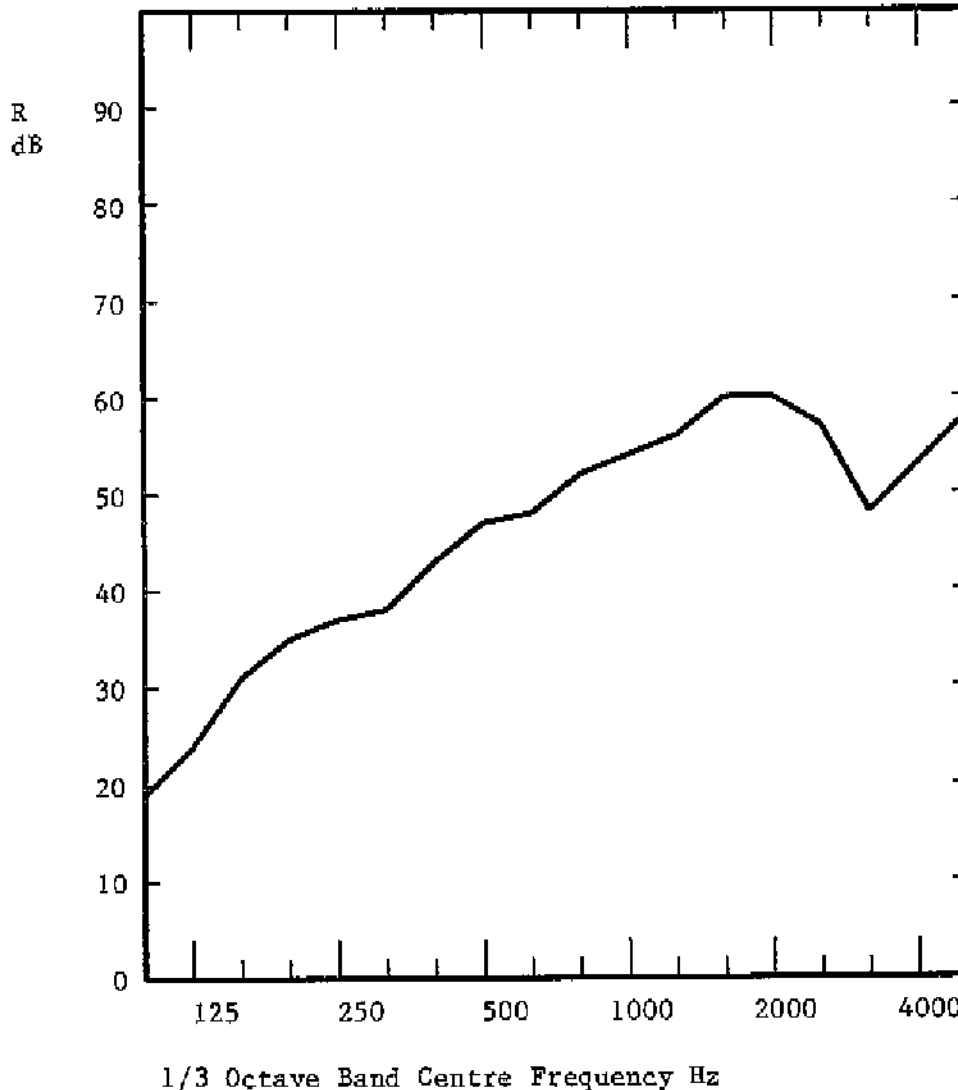
Elevation of Test Aperture (2.4 m x 3.6 m)

ACOUSTIC TEST DATA SHEET

Laboratory Test Code H367.1

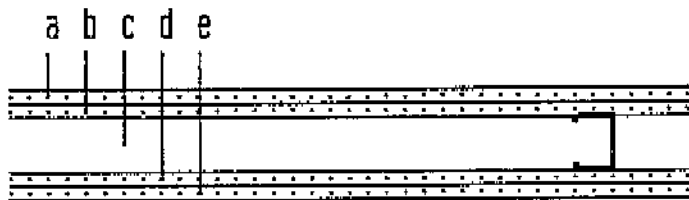


Sound Reduction Index R



Freq.	dB
100	19
125	24
160	31
200	35
250	37
315	38
400	43
500	47
630	48
800	52
1000	54
1250	56
1600	60
2000	60
2500	57
3150	48
4000	53
5000	58

$R_w = 46$ Mean = 44 $STC = 47$ $dB(A) = 44$

**100mm Gyproc Metal Stud Partition**

- a. 12.5mm Gyproc wallboard
- b. 12.5mm Gyproc wallboard
- c. Gyproc 48S55 metal studs
- d. 12.5mm Gyproc wallboard
- e. 12.5mm Gyproc wallboard

This data sheet presents the results of LABORATORY sound insulation tests on the partition under ideal conditions. When the partition is used in a building to divide rooms the result is affected by the surrounding structure. In order to achieve the optimum sound insulation it is therefore imperative that the surrounding structure is considered. The partition will achieve its maximum sound insulation so long as sound cannot find a weaker path from the source room to the receiving room. There must be no leakage path under, over or at the sides of the partition. The introduction of doors, windows or other departures from the specified partition construction may also reduce the sound insulation. Continuous floorboards under the partition or continuous timber joists over the partition may be a weak path as may blockwork flank walls. In the absence of flanking transmission the laboratory R_w rating is equivalent to the field $DnTw$ when the receiving room is 30 m³ in volume with a common wall area of 10 m². When the room sizes vary from this, the ratings differ from each other slightly depending on the layout. Further advice can be obtained from British Gypsum's Technical Advisory Service if required.



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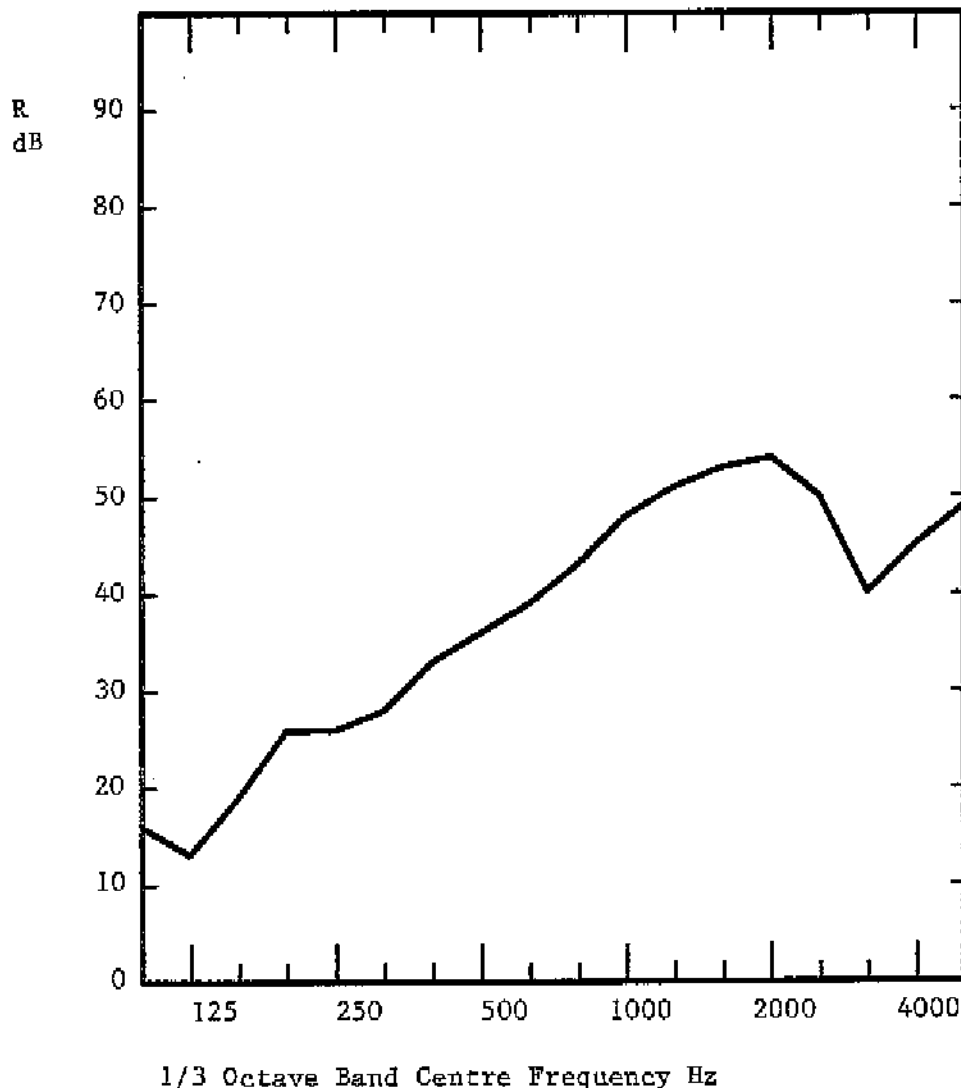
ACOUSTIC TEST DATA SHEET

Laboratory Test Code H367.4

A.T.R No. 1202



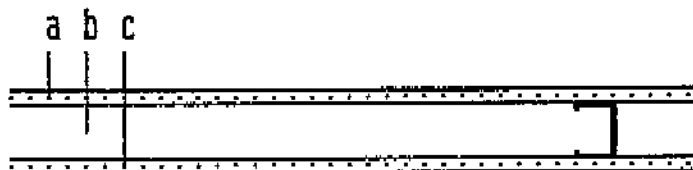
Sound Reduction Index R



Freq. db

100	16
125	13
160	19
200	26
250	26
315	28
400	33
500	36
630	39
800	43
1000	48
1250	51
1600	53
2000	54
2500	50
3150	40
4000	45
5000	49

Rw = 37 Mean = 36 STC = 37 dB(A) = 35

**75mm Gyproc Metal Stud Partition**

- a. 12.5mm Gyproc wallboard
- b. Gyproc 48S55 metal studs
- c. 12.5mm Gyproc wallboard

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Addendum To BGATR 1199

Ctr CALCULATION

Freq Hz	Source dB	Rec. (uc) dB	Bgrnd dB	Rec. (corr) dB	Rev.time Sec	Corr. dB	R dB	U.Dev. dB	R 1/1Oct dB
50									
63									
80									
100							19.0	8.0	
125							24.0	6.0	
160							31.0	2.0	
200							35.0	1.0	
250							37.0	2.0	
315							38.0	4.0	
400							43.0	2.0	
500							47.0		
630							48.0		
800							52.0		
1 000							54.0		
1 250							56.0		
1 600							60.0		
2 000							60.0		
2 500							57.0		
3 150							48.0	2.0	
4 000							53.0		
5 000							58.0		
6 300									
8 000									
10 000									

Single Figure Ratings

BS EN ISO 717-1: 1997

Rw
dB
46
C
dB
-3
Ctr
dB
-9
Total U. Dev., dB
27

$$Rw + Ctr = 37$$

Calculated By: _ Franklin Sanicharane

Checked By: _ Bob Allen

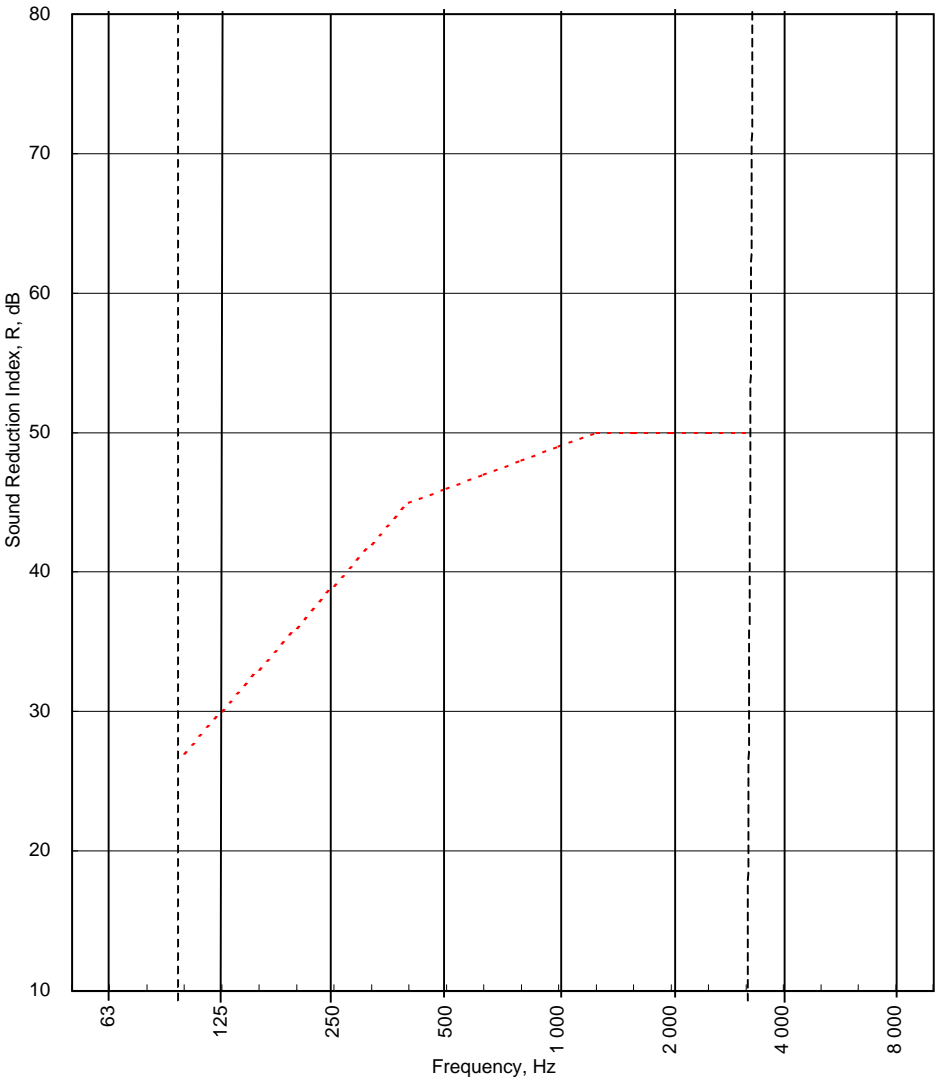
Test Standard: BS 2750: Part 3: 1980

Test Procedure: 2750/3 issue 4

Worksheet: ctr calculation.xls

Test Code:
Test Date:

Freq. Hz	R dB
50	
63	
80	
100	19.0
125	24.0
160	31.0
200	35.0
250	37.0
315	38.0
400	43.0
500	47.0
630	48.0
800	52.0
1 000	54.0
1 250	56.0
1 600	60.0
2 000	60.0
2 500	57.0
3 150	48.0
4 000	53.0
5 000	58.0
6 300	
8 000	
10 000	



Rating according to BS EN ISO 717-1:1997 Evaluation based on laboratory measurement results obtained by an engineering method:	R_w (C;C_{tr}) = 46 (-3;-9) dB		
	Max dev. dB at Hz		
	C₅₀₋₃₁₅₀ = dB	C₅₀₋₅₀₀₀ = dB	C₁₀₀₋₅₀₀₀ = dB
	C_{tr,50-3150} = dB	C_{tr,50-5000} = dB	C_{tr,100-5000} = dB