

# The Building Test Centre

## Fire Acoustics Structures

The Building Test Centre  
British Gypsum  
East Leake  
Loughborough  
Leics. LE12 6NP  
Tel (0115) 945 1564  
Fax (0115) 945 1562  
Email [btc.testing@saint-gobain.com](mailto:btc.testing@saint-gobain.com)  
Website [www.btconline.co.uk](http://www.btconline.co.uk)

Report Number **BTC 19032A**

An acoustic test report covering laboratory sound insulation testing to BS EN ISO 10140-2:2010 on a British Gypsum GypWall Classic partition clad with a double layer of 12.5mm Saint-Gobain X-Ray protection board each side with 50mm Isover APR 1200 insulation in the cavity.

Test Date: 27<sup>th</sup> February 2015.

Report issued date: 27<sup>th</sup> February 2015.

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

Customer: **British Gypsum**  
East Leake  
Loughborough  
Leicestershire  
LE12 6HX

Customer: **British Gypsum**

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### FOREWORD

The test sponsor was British Gypsum.

The test specimen was installed by Pete Rigley between the 25<sup>th</sup> and 27<sup>th</sup> February 2015.

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

### REPORT AUTHORISATION

Report Author



**Anisha Patel**  
BEng. MSc  
*Scientist*

Authorised by



**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.

### TEST CONSTRUCTION

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

Gypframe 72FEC50 Folded Edge Standard Floor and Ceiling Channels were fixed to the head and base of the test aperture at 600mm centres using 25mm Gyproc DuraGyp Drywall Screws.

Gypframe 70S60 'C' Studs were positioned between the head and base channels at each end of the aperture and fixed using 25mm Gyproc DuraGyp Drywall Screws spaced at 600mm centres.

Gypframe 70S60 'C' Studs were positioned between the head and base channels at 600mm centres.

50mm Isover APR 1200 insulation was placed within the stud cavity.

The framework was clad with a double layer of 12.5mm Saint-Gobain X-Ray Protection Board each side.

The inner layer of boards were screw fixed around the perimeter of the board at 300mm centres using 25mm Gyproc DuraGyp Drywall Screws as shown in the diagram below.

The outer layer of boards were screw fixed around the perimeter of the board and intermediate stud positions at 300mm centres using 35mm Gyproc DuraGyp Drywall Screws as shown in the diagram below.

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

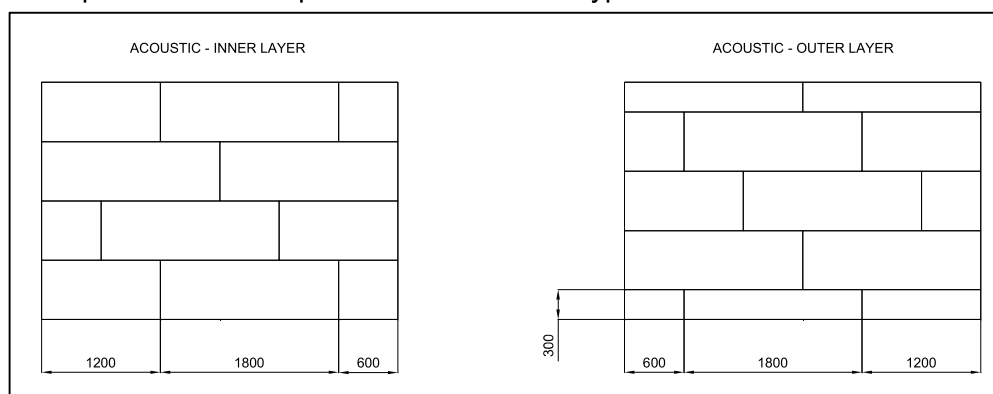
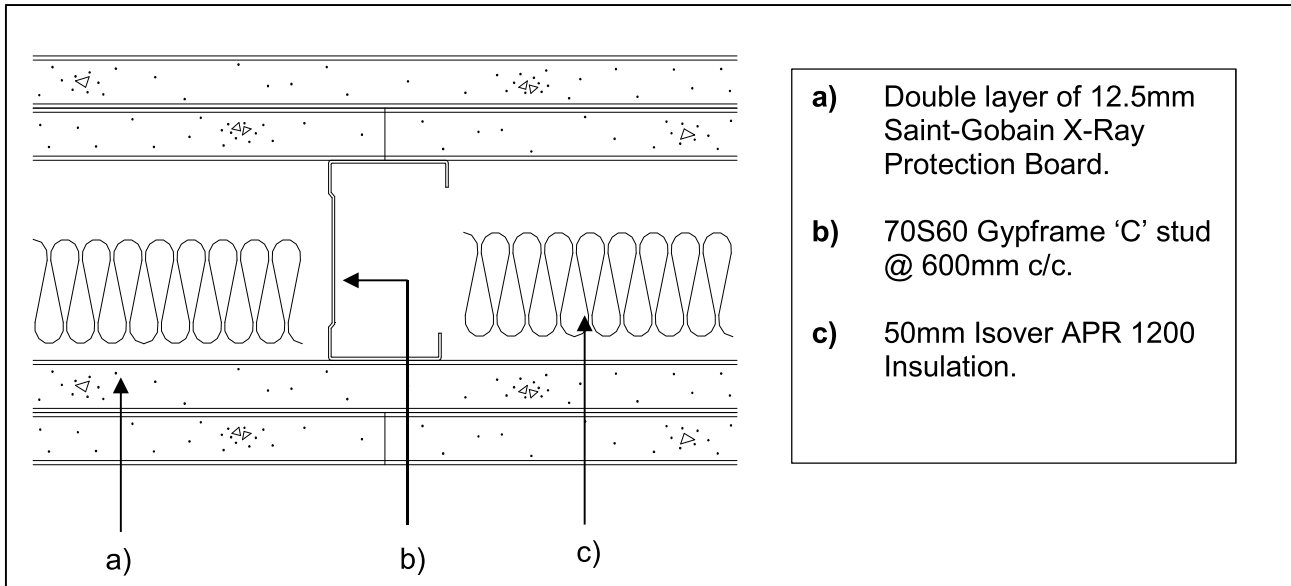


Figure 1. Plan view of specimen for both layers.



**Figure 2.** Horizontal cross section view of specimen.

*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

- i) Nominally 1800mm (long) x 600mm (wide) x 12.5mm (thick) Saint-Gobain X-Ray Protection board, manufactured by San Martin Spain, supplied by British Gypsum.

Surface density:	17.9kg/m <sup>2</sup>
Average thickness:	12.2mm
Board Code:	SN (27-01-15) 16:43

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

Material dimensions were supplied by the customer.

#### Insulation

- i) Nominally 50mm thick Isover APR 1200 insulation supplied by British Gypsum.

Average area	15.60 m <sup>2</sup>
Average weight	9.42 kg
Density	12.08 kg/m <sup>3</sup>

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

#### Metal Components

- i) 0.6mm thick Gypframe 70S60 'C' Studs.  
ii) 0.5mm thick Gypframe 72FEC50 Folded Edge Standard Floor and Ceiling Channels

All metal components are manufactured from galvanised mild steel using the 'UltraSTEEL' process and supplied by British Gypsum.

#### Fasteners

- i) 25mm Gyproc DuraGyp Drywall Screws.  
ii) 35mm Gyproc DuraGyp Drywall Screws.

All fasteners supplied by British Gypsum.

Customer: **British Gypsum**

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### Miscellaneous Components

- i) Gyproc Sealant supplied by British Gypsum.
- ii) Joint tape 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 AP070 vs 1.0.

### TEST RESULTS

Test Code	Description	Weighted Airborne Sound Reduction Index $R_w$ (C; Ctr)
H19032AA	Double layer of 12.5mm Saint-Gobain X-Ray Protection boards horizontally boarded each side on Gypframe 70S60 'C' studs, with 50mm APR 1200 insulation within the cavity.	57 (-1;-6) dB

For full data see Appendix A of this report.

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 cannot 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<sup>3</sup> and 62m<sup>3</sup>. 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.

Customer: **British Gypsum**

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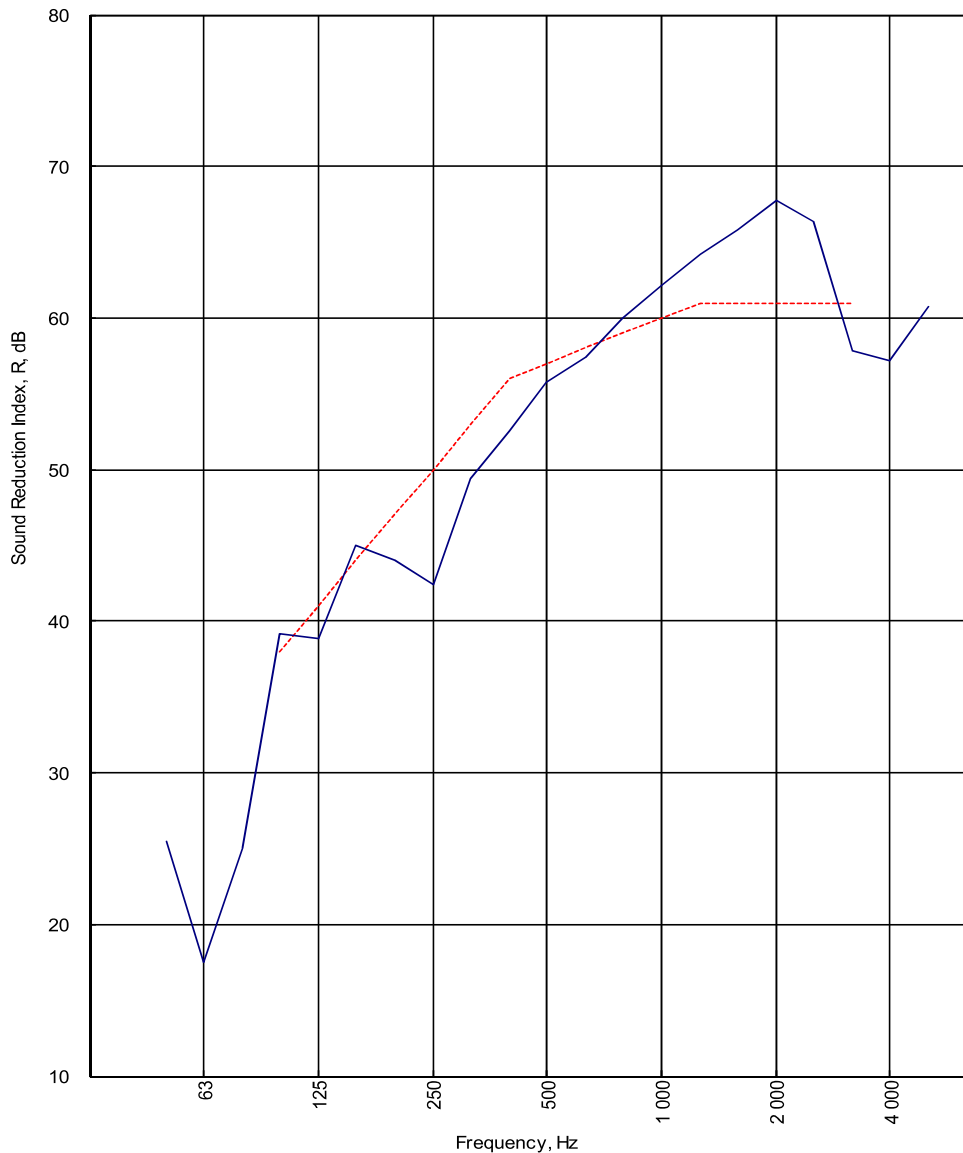


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## APPENDIX A - TEST DATA

Test Code: H19032AA
Test Date: 27/02/2015

Freq. Hz	R dB
50	25.5
63	17.5
80	25.1
100	39.2
125	38.8
160	45.0
200	44.0
250	42.4
315	49.4
400	52.6
500	55.8
630	57.4
800	60.0
1 000	62.1
1 250	64.2
1 600	65.8
2 000	67.8
2 500	66.4
3 150	57.8
4 000	57.2
5 000	60.7



----- Curve of reference values (ISO 717-1)

Rating according to BS EN ISO 717-1:2013	<b>R<sub>w</sub> (C;C<sub>tr</sub>) = 57 (-1;-6) dB</b>		
	<b>Max dev. 7.6 dB at 250 Hz</b>		
Evaluation based on laboratory measurement results obtained by an engineering method:	C <sub>50-3150</sub> = <b>-7 dB</b>	C <sub>50-5000</sub> = <b>-6 dB</b>	C <sub>100-5000</sub> = <b>-1 dB</b>
	C <sub>tr,50-3150</sub> = <b>-18 dB</b>	C <sub>tr,50-5000</sub> = <b>-18 dB</b>	C <sub>tr,100-5000</sub> = <b>-6 dB</b>

Customer: **British Gypsum**

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

Test Code: **H19032AA**

Test Date: **27/02/2015**

Specimen Area, S = **8.64** m<sup>2</sup>

	Room T2	Room T1	
Room Volume, m <sup>3</sup> :	<b>98</b>	<b>59.95</b>	
Temperature, deg.C:	<b>14.2</b>	<b>14.4</b>	<b>± 0.3</b>
Rel. Humidity, %RH:	<b>43.6</b>	<b>42</b>	<b>± 1.6</b>
Static Pressure, Pa:	<b>101300</b>	<b>101300</b>	<b>± 65</b>

Freq Hz	Test Room T2 to Test Room T1						R dB	U.Dev. dB	R 1/1Oct dB
	Source dB	Rec. (uc) dB	Bgrnd dB	Rec. (corr) dB	Rev.time Sec	Corr. dB			
50	60.5	32.6	19.9	<b>32.4</b>	0.61	-2.6	<b>25.5</b>		
63	62.9	43.8	10.9	43.8	0.76	-1.6	<b>17.5</b>		21.0
80	74.0	47.1	11.9	47.1	<b>0.73</b>	-1.8	<b>25.1</b>		
100	79.1	39.9	14.7	39.9	<b>1.10</b>	0.0	<b>39.2</b>		
125	104.6	65.6	6.8	65.6	1.05	-0.2	<b>38.8</b>	2.2	40.2
160	84.0	39.5	7.3	39.5	1.26	0.5	<b>45.0</b>		
200	88.6	46.0	14.6	46.0	1.52	1.4	<b>44.0</b>	3.0	
250	91.3	50.7	1.3	50.7	1.68	1.8	<b>42.4</b>	7.6	44.4
315	91.1	43.1	7.4	43.1	1.53	1.4	<b>49.4</b>	3.6	
400	89.5	38.1	17.9	38.1	1.47	1.2	<b>52.6</b>	3.4	
500	88.1	33.5	4.7	33.5	1.47	1.2	<b>55.8</b>	1.2	54.8
630	87.0	31.0	5.1	31.0	1.52	1.4	<b>57.4</b>	0.6	
800	87.9	29.6	4.5	29.6	1.65	1.7	<b>60.0</b>		
1 000	106.1	45.6	14.1	45.6	1.60	1.6	<b>62.1</b>		61.8
1 250	88.7	26.2	3.4	26.2	1.65	1.7	<b>64.2</b>		
1 600	91.1	26.7	3.2	26.7	1.55	1.4	<b>65.8</b>		
2 000	93.1	26.7	3.7	26.7	1.54	1.4	<b>67.8</b>		66.6
2 500	91.6	26.2	4.2	26.2	1.39	1.0	<b>66.4</b>		
3 150	90.4	33.1	5.5	33.1	1.25	0.5	<b>57.8</b>	3.2	
4 000	90.9	34.0	9.4	34.0	1.20	0.3	<b>57.2</b>		58.3
5 000	95.7	34.9	8.9	34.9	1.09	-0.1	<b>60.7</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>24.8</b>
<b>BS EN ISO 717-1: 2013</b>	<b>dB</b>	<b>dB</b>	<b>dB</b>		
	<b>57</b>	<b>-1</b>	<b>-6</b>		
	<b>(100-5000)</b>	<b>-1</b>	<b>-6</b>		
<b>Background Corrected</b>	<b>(50-3150)</b>	<b>-7</b>	<b>-18</b>		
<b>RT's &gt; factor 1.5 apart</b>	<b>(50-5000)</b>	<b>-6</b>	<b>-18</b>		
				Procedure: AP 046 vs 5.1	
				Worksheet: 140_3_1.XLS	

Customer: **British Gypsum**

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## APPENDIX B - TEST METHOD AND CONDITIONS

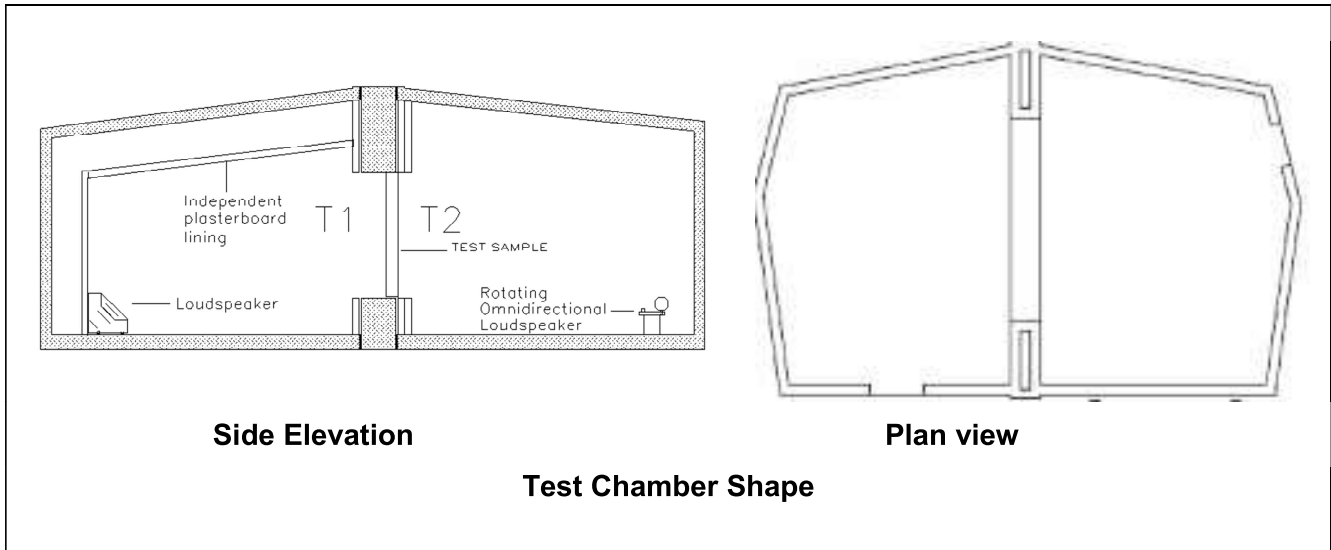
### Method

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° 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 possible in order to minimise flanking transmission paths.

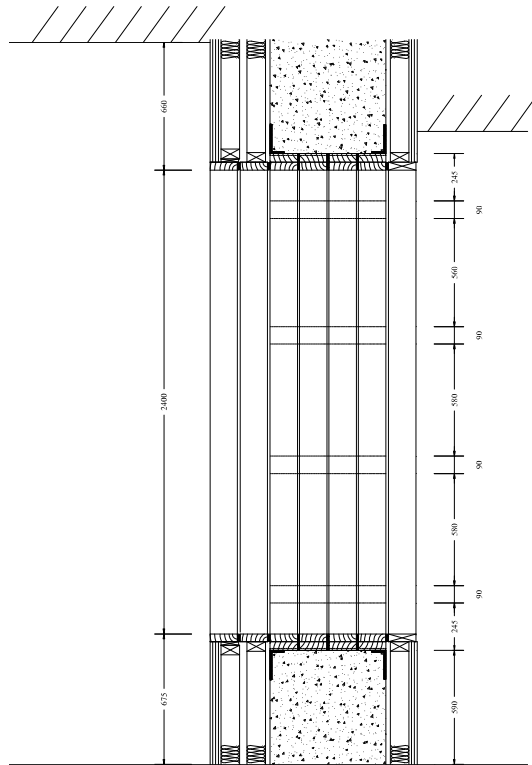


The source room (T2) contains two perspex diffusers of approximately 900mm x 1220mm. Panel absorbers are used to ensure reverberation times in source room (T2) are between one and two seconds at all frequencies at and above 100 Hz. An omni-directional loudspeaker sound source is placed near a back corner 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

