



Determination of the sound reduction and sound absorption of a PlastRex polymer noise barrier



Requested by: OÜ Rexest Grupp

Requested by	OÜ Rexest Grupp Tartu rd 84a-302 10112 Tallinn Estonia
Order	Order by A. Saareväli 16.5.2013. Confirmation of order VTT-O-144726-13.
Contact person	VTT Expert Services Ltd Senior Expert Pekka Sipari P.O. Box 1001, FI-02044 VTT, Finland Tel. + 358 20 722 6931, Fax + 358 20 722 7003 Email: pekka.sipari@vtt.fi

Task	Determination of the airborne sound insulation and sound absorption of a PlastRex polymer noise barrier
Structure of the specimen	Photos of the structure and details of the noise barrier specimen are shown in Appendix 2.
Installation	<p>The noise barrier specimen was installed 11.6.2013 by the customer into the measurement opening (with dimensions 4000 mm by 3000 mm) between two reverberation rooms KH1 and KH2. For sound insulation measurement the specimen was sealed to the opening with mineral wool, sealant mass and wooden beads.</p> <p>The same noise barrier element was used when the sound absorption was measured during the same day. In the measurement the specimen was installed by VTT Expert Services Ltd:s personnel on the floor of a reverberation room KH 3.</p>
Date and place of testing	The sound insulation and sound absorption of the noise barrier was tested June 11.6 – 17.6.2013 by the personnel of VTT Expert Services Ltd at VTT Expert Services Ltd:s research hall 1.
Method and	<p>The airborne sound reduction index of the specimen were determined by means of two-channel sound pressure level measurement with two fixed sources and moving microphones. The sound reduction index R was measured in accordance with <i>EN ISO 10140-2:2010</i> [1] in one third octave bands and the single number rating DL_R and categorisation was determined in accordance with <i>EN 1793 2</i> and <i>EN 1793 3</i> [2 and 3].</p> <p>Sound absorption and sound absorption coefficients α_{Si} in one third octave bands were measured according to standard <i>EN 20352</i> [4]. The single number rating DL_α and categorisation was determined in accordance with <i>EN 1793 1</i> [5].</p> <p>Reverberation room dimensions and measuring equipment are presented in Appendix 3.</p>

The test results relate only to the sample tested.

Results

The individual measuring result are presented in Appendix 1. The categorisation of the PlastRex noise barrier is as follows:

Plast Rex noise barrier Thickness of polymer planks 38 mm, surface mass c. 30 kg/m²		
Sound insulation	<i>DL_R</i> dB(A) and Category	31 B3
Sound absorption	<i>DL_α</i> and Category	0 A1

Espoo August 22, 2013



Mikko Nyman
Senior Expert



Pekka Sipari
Senior Expert

VTT Expert Services Ltd. is notified body No. NB 0809.

FINAS Finnish Accreditation Service has accredited our laboratory (T001, VTT Expert Services Ltd) to perform the tests mentioned.

Appendices

- Appendix 1 Results
- Appendix 2 Photos
- Appendix 3 Reverberation rooms and equipments

Distribution

- Customer Original
- Archive Original

References

- [1] *EN ISO 10140-2:2010 Acoustics - Measurement of sound insulation in buildings and of building elements - Part 2: Laboratory measurements of airborne sound insulation of building elements*
- [2] *EN 1793-2 Road traffic noise reducing devices. Test method for determining the acoustic performance. Intrinsic characteristics of airborne sound insulation*
- [3] *EN 1793-3 Road traffic noise reducing devices. Test method for determining the acoustic performance. Normalized traffic noise spectrum*
- [4] *EN ISO 354 Acoustics - Measurement of sound absorption in a reverberation room*
- [5] *EN 1793-1 Road traffic noise reducing devices. Test method for determining the acoustic performance. Intrinsic characteristics of sound absorption*

The test results relate only to the sample tested.

RESULTS

Sound insulation

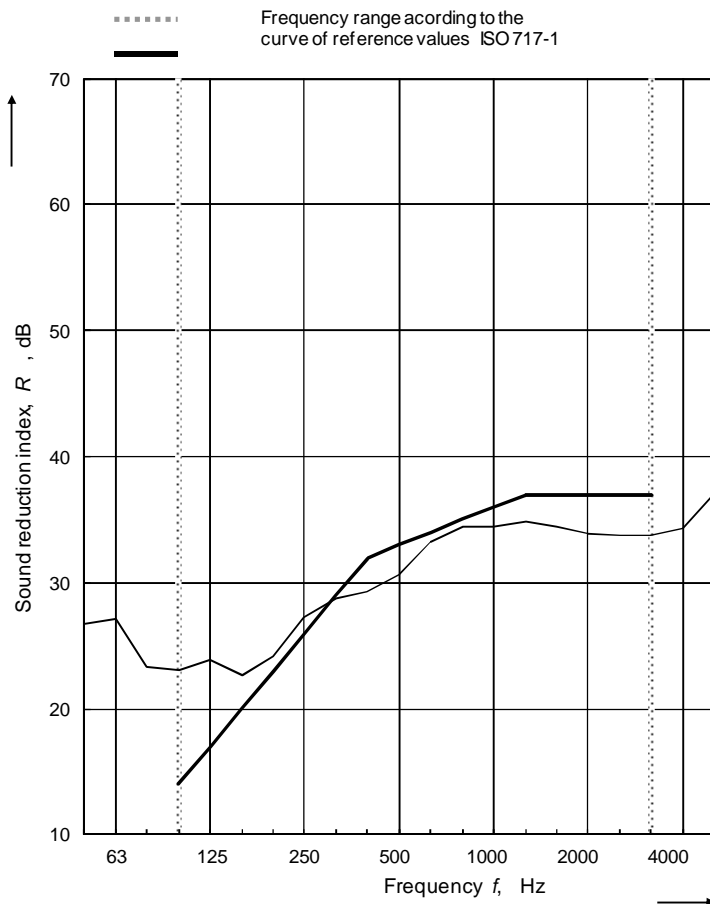
Client: Rexest Grupp
Tallin Estonia

Product identification: Noise barrier PlastRex

Test specimen mounted by: Client
Date of test: 11.6.2013

Areas of test specimen: 12 m²
Air temp. in the test rooms: 21 °C
Air humidity in the test rooms: 57 %
Source room volume: 102 m³
Receiving room volume: 131 m³

Frequency <i>f</i> Hz	<i>0</i> One-third octave dB
50	26,7
63	27,1
80	23,3
100	23,1
125	23,9
160	22,7
200	24,2
250	27,2
315	28,8
400	29,3
500	30,7
630	33,2
800	34,5
1000	34,4
1250	34,8
1600	34,5
2000	33,9
2500	33,7
3150	33,8
4000	34,3
5000	37,0



<p>Rating according to ISO 717-1:</p> <p>$R_w(C;C_{tr}) = 33 (0; -2) \text{ dB};$</p> <p>Evaluation based on laboratory measurement results obtained by an engineering method</p>	<p>According to EN1793-2 and EN1793-3:</p> <p>$DLR = 31 \text{ dB(A)} \quad \text{CATEGORY: B3}$</p>
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The test results relate only to the sample tested.

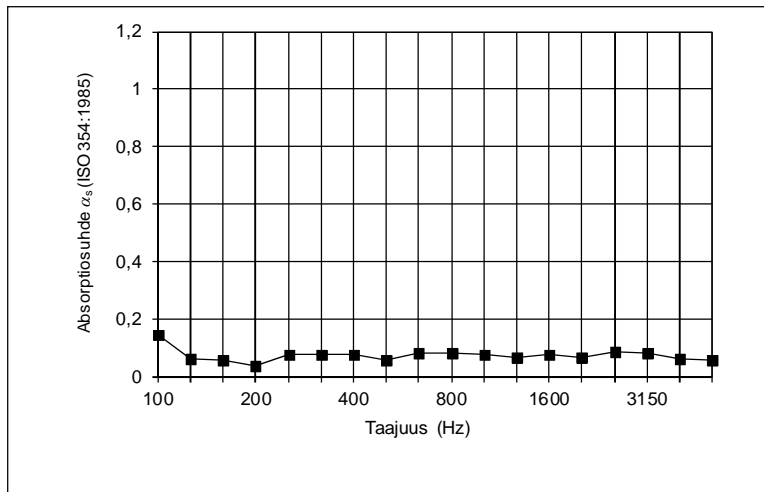
Determination of sound absorption of a noise barrier

Orderer:	PlastRex	Reverberation room	5
Address:	Tartu rd 84a, 10112 Tallin Estonia	Volume of rev. room	201 m ³
Order:	Aarne Saareväli	Area of inside surfaces	209 m ²
Sample:	Noise barrier, steel frame / 38 mm PlastRex plastic planks	Temperature and rel.hum	
Measuring date:	12.6.2013	Empty	21 °C 57 %
Measuring place:	VTT/TH1 Otaniemi	With sample	21 °C 57 %
Task:	Sound absorption and categorisation of a noise barrier (ISO 354-2003, E and EN 1793-1:1998)		

Sample:

Surface area (m ²)	11,8
Surface mass (kg/m ²)	29,5
Installation:	Sample on the floor

TULOKSET



Taajuus (Hz)	T ₁ (s)	T ₂ (s)	α_s
100	5,04	3,99	0,14
125	5,62	5,01	0,06
160	5,47	4,92	0,06
200	4,78	4,51	0,03
250	5,19	4,53	0,08
315	5,17	4,53	0,07
400	4,68	4,14	0,08
500	4,53	4,13	0,06
630	4,96	4,33	0,08
800	5,12	4,46	0,08
1000	5,17	4,53	0,07
1250	4,87	4,36	0,07
1600	4,32	3,87	0,07
2000	3,87	3,53	0,07
2500	3,59	3,23	0,09
3150	3,21	2,93	0,08
4000	2,72	2,56	0,06
5000	2,28	2,18	0,06

DL_α = 0
Class A1

The test results relate only to the sample tested.

PHOTOS



Photo 1. Steel frame for installation of planks to test opening



Photo 2. Steel frame thickness

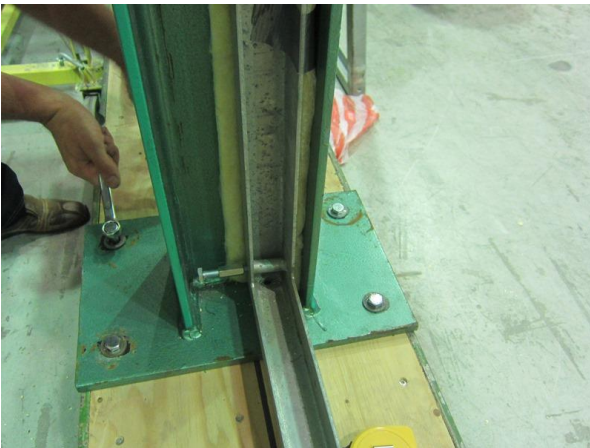


Photo 3. Installation of the steel post in middle width of specimen. In middle post mineral wool strips were used. Planks were sealed with sealing mass only from the sending side to installing frames.



Photo 3. Absorption measurement

The test results relate only to the sample tested.

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Measuring equipment and reverberation room dimensions / Sound insulation

Measuring equipment	Name	Serial No.
Condenser microphone	B&K (Brüel&Kjær) 4134	2415044
Condenser microphone	B&K (Brüel&Kjær) 4134	2527717
Microphone preamplifier	B&K 2639	2025241
Microphone preamplifier	B&K 2639	2554550
Rotating microphone boom	B&K 3923	1678216
Rotating microphone boom	B&K 3923	2630663
Power amplifier	Yamaha MX-1000	
Loudspeakers	Sinmarc V121L	
Real-time analyser	Norsonic 830	12717
Sound calibrator	B&K 4228	1704462

Reverberation room dimensions	Floor	Height	Volume
Source room KH1	4.7 m x 5.8 m	3.7 m	102 m ³
Receiving room KH2	5.0 m x 6.5 m	4.0 m	131 m ³

Thickness of the concrete walls, floors and ceilings of the reverberation rooms is 0.25 m

Measuring equipment and reverberation room dimensions / Sound absorption

Measuring equipment	Name	Serial No.
Condenser microphone	B&K (Brüel&Kjær) 4134	2527717
Microphone preamplifier	B&K 2660	2554550
Rotating microphone boom	B&K 3923	2630663
Power amplifier	Peavey PV 2600	
Loudspeakers	Sinmarc V121L	
Real-time analyser	Norsonic 830	12717
Sound calibrator	B&K 4228	1704462

Reverberation room dimensions	Floor	Height	Volume
Reverberation room KH3	5.95 m x 7.20 m	4.70 m	201 m ³

Thickness of the concrete walls, floors and ceilings of the reverberation rooms is 0.25 m

The test results relate only to the sample tested.