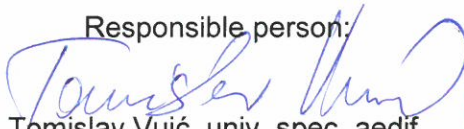


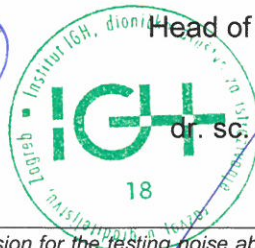
## TEST REPORT AND ASSESSMENT OF PERFORMANCE BASED ON TESTING No. EN-72570/116/21-239/21

(based on sampling carried out by the manufacturer)

Client: SONITUS d.o.o., Tina Ujevića 26, HR-48000 Koprivnica  
Offer: Offer No. 72570-0-0398/19 dated on 2019-05-28  
Building product: absorber Sonitus Acoustics WAVE-X  
Manufacturer: SONITUS d.o.o., Tina Ujevića 26, HR-48000 Koprivnica  
Date of receipt of the sample: 2021-11-05  
Laboratory sample No.: LGF 265/21  
Place of testing: INSTITUT IGH, d.d., Materials and Structures Department, IGH Laboratory, Building Physics Laboratory, Janka Rakuše 1, HR-10000 Zagreb, Croatia  
Tested property: Sound absorption  
Decision No.: KLASA: UP/I-360-01/20-08/37, URBROJ: 531-04-2-1-2-21-10 dated on 2021-04-15

Responsible person:  
  
Tomislav Vuić, univ. spec. aedif.

Head of the Building Physics Laboratory  
  
dr. sc. Mladen-Bezjak, dipl. ing. stroj.



Institut IGH d.d. is a notified body of the European Commission for the testing noise absorption of products used in civil engineering with the number: NB 2477 in the NANDO database.

Test results refer only to the tested specimens. Partial copying of this report is not permitted without a written authorization of the Head of the Laboratory. No. of text pages: 7, included annexes: 0.

**Test report No: EN-72570/116/21-239/21**

- Task:** Sound absorption testing of samples delivered by the manufacturer.
- Testing standard:** HRN EN ISO 354:2004 – Acoustics -- Measurement of sound absorption in a reverberation room (ISO 354:2003; EN ISO 354:2003)
- Evaluating standard:** HRN EN ISO 11654:1998 – Acoustics -- Sound absorbers for use in buildings – Rating of sound absorption (ISO 11654:1997; EN ISO 11654:1997)

**Description of tests samples** (information supplied by the client):

**PRODUCT NAME :** SONITUS ACOUSTICS WAVE-X

**DESCRIPTION :** brightband absorber

**MATERIAL :**

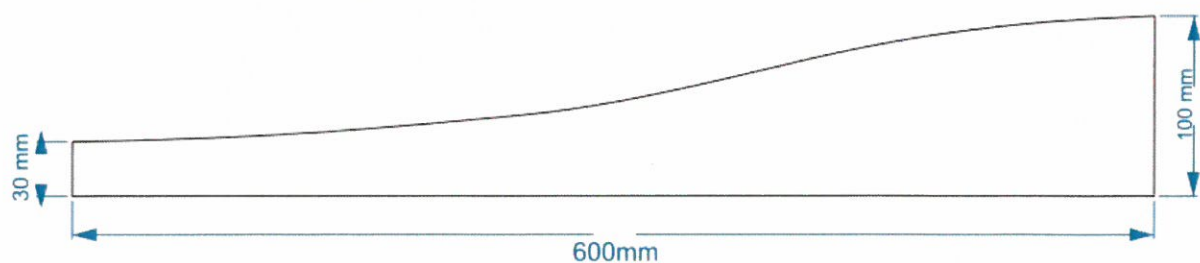
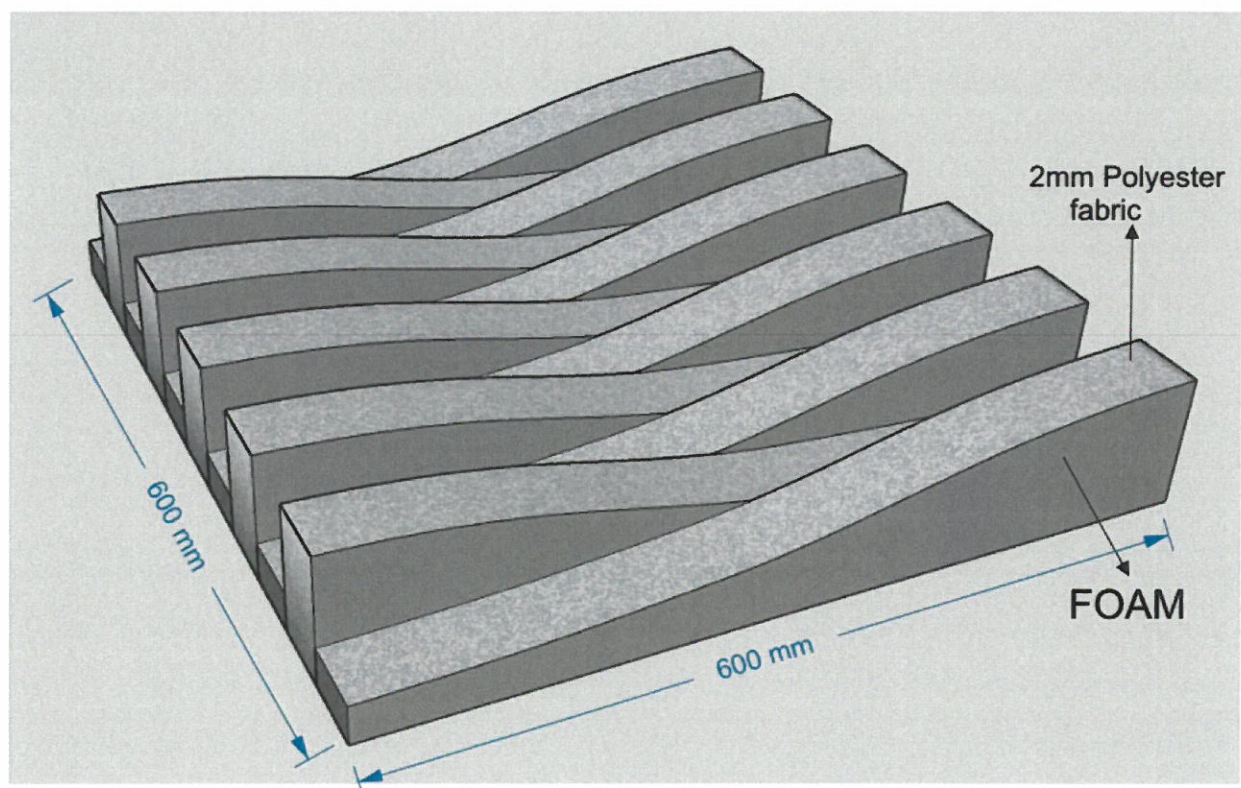
>Polyether foam 25kg / +-2kg m<sup>3</sup>, 6 kPa +- 0,6 kPa, fire retardant according to FMVSS302 <100mm/min

fire retardant according to FMVSS302 <100mm/min

>2mm polyester fabric

**COLOR :** ANTHRAZITE FOAM WITH DIFFERENT FABRIC FINISH

**DIMENSIONS :** 600x600x103mm



**Test report No: EN-72570/116/21-239/21**

Absorber Sonitus Acoustics WAVE-X, nominal dimensions: 600 mm x 600 mm, thickness: 103 mm, base height 30 mm, were tested (photo 1 and 2).

Measured surface mass of the Sonitus Acoustics WAVE-X absorber: 4,31 kg/m<sup>2</sup>.



Photo 1

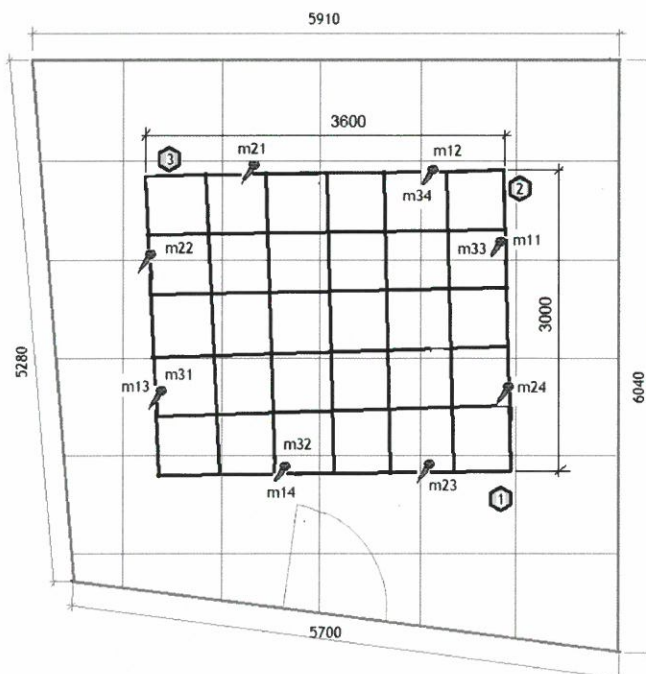


Photo 2

**Installation method of test samples:**

For measuring sound absorption of Sonitus Acoustics WAVE-X, 30 pieces of absorber, dimensions: 600 mm x 600 mm, were placed on the floor of the reverberation room and formed a surface of 10,80 m<sup>2</sup> (Sketch 1).

Lateral surfaces of the Sonitus Acoustics WAVE-X absorbers haven't been protected, so they were a part of the absorption surface (photo 3 and 4) too, creating additional 0,40 m<sup>2</sup>.



Sketch 1

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Photo 3

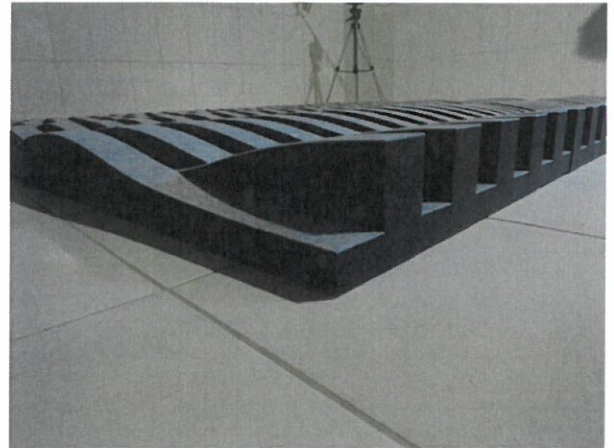


Photo 4

**Description of a reverberation room:**

- volume: 194,8 m<sup>3</sup>,
- area: floor 32,65 m<sup>2</sup>, ceiling: 32,65 m<sup>2</sup>, walls: 136,77 m<sup>2</sup>,
- diffusers: pieces 8, total area: 30,17 m<sup>2</sup>.

**Test conditions:**

- number of microphone positions: 12 (m11... m34),
- number of loudspeaker positions: 3,
- number of averaging on individual position microphone/ loudspeaker: 3.

**Measuring and testing equipment:**

- hand-held analyzer, type 2270 (Dual Channel), Bruel & Kjaer, serial number: 2679276,
- sound pressure calibrator, type 4231, Bruel & Kjaer, serial number: 3023871,
- thermohygrometer, ROTRONIC, type Hygroclip S, laboratory mark 1680, serial number: 23535 011,
- condenser microphone, type 4189, Bruel & Kjaer, serial number: 2670475,
- preamplifier, type ZC 0026, Bruel & Kjaer, serial number: 2877,
- power amplifier, type 2716, Bruel & Kjaer, serial number: 2486522,
- sound source, type 4296, Bruel & Kjaer, serial number: 2485310,
- barometer, serial number: 225558, laboratory mark 1135.

**Test results:**

The sound absorption coefficient ( $\alpha_s$ ) and partical sound absorption coefficient ( $\alpha_p$ ) of tested samples as a function of frequency is shown in table and diagram. In presenting the results, the following symbols are used:

- $f$  – centre frequency of the one-third-octave band (Hz),
- $\alpha_s$  – sound absorption coefficient,
- $\alpha_p$  – partical sound absorption coefficient (for each octave band),
- $T_1$  – reverberation time of the empty reverberation room (s),
- $T_2$  – reverberation time of the reverberation room with test samples (s),
- $\alpha_w$  – weighted sound absorption coefficient.



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**Test report No: EN-72570/116/21-239/21**

### **Results of sound absorption measurements of absorber Sonitus Acoustics WAVE-X**

Client: SONITUS d.o.o., Tina Ujevića 26, HR-48000 Koprivnica  
Manufacturer: SONITUS d.o.o., Tina Ujevića 26, HR-48000 Koprivnica  
Building product: absorber Sonitus Acoustics WAVE-X  
Laboratory sample No.: LGF 265/21  
Measuring assembly made by: laboratory staff  
Date of test: 2021-11-05  
Area of test samples:  $S = 11,20 \text{ m}^2$   
Volume of the reverberation room:  $V = 194,8 \text{ m}^3$

Climatic conditions in the empty reverberation room (2021-11-05):

- temperature 20,9 °C,
- relative air humidity 43,3 %,
- air pressure: 100,7 kPa,

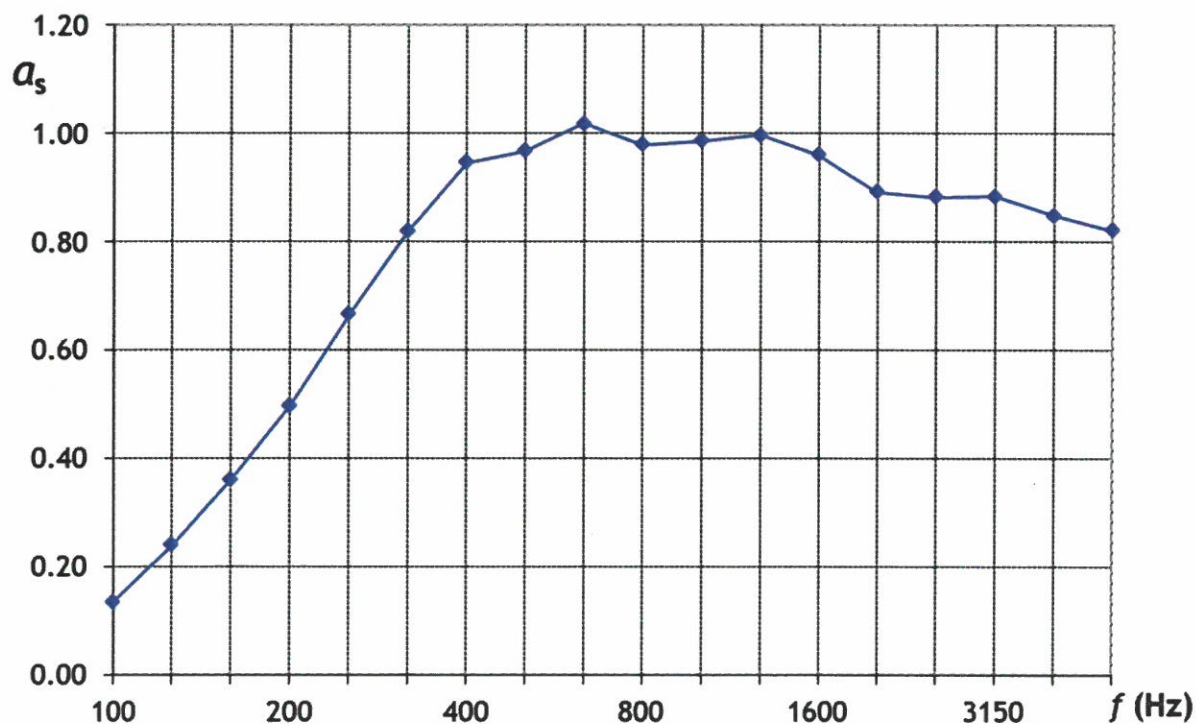
Climatic conditions in the reverberation room with test samples (2021-11-05):

- temperature 20,6 °C
- relative air humidity 38,1 %
- air pressure: 100,9 kPa

**Test report No: EN-72570/116/21-239/21**

Frequency $f$ (Hz)	Reverberation time of empty reverberation room $T_1$ (s)	Reverberation time of reverberation room with test samples $T_2$ (s)	Sound absorption coefficient $\alpha_s$
100	16.36	9.16	0.13
125	12.31	6.00	0.24
160	11.84	4.69	0.36
200	10.71	3.69	0.50
250	9.54	2.92	0.67
315	9.45	2.51	0.82
400	9.02	2.23	0.95
500	9.45	2.22	0.97
630	8.99	2.11	1.02
800	8.30	2.13	0.98
1000	7.90	2.09	0.99
1250	7.21	2.02	1.00
1600	6.44	2.00	0.96
2000	5.72	2.01	0.89
2500	4.91	1.90	0.88
3150	4.01	1.73	0.88
4000	3.16	1.56	0.85
5000	2.42	1.35	0.82

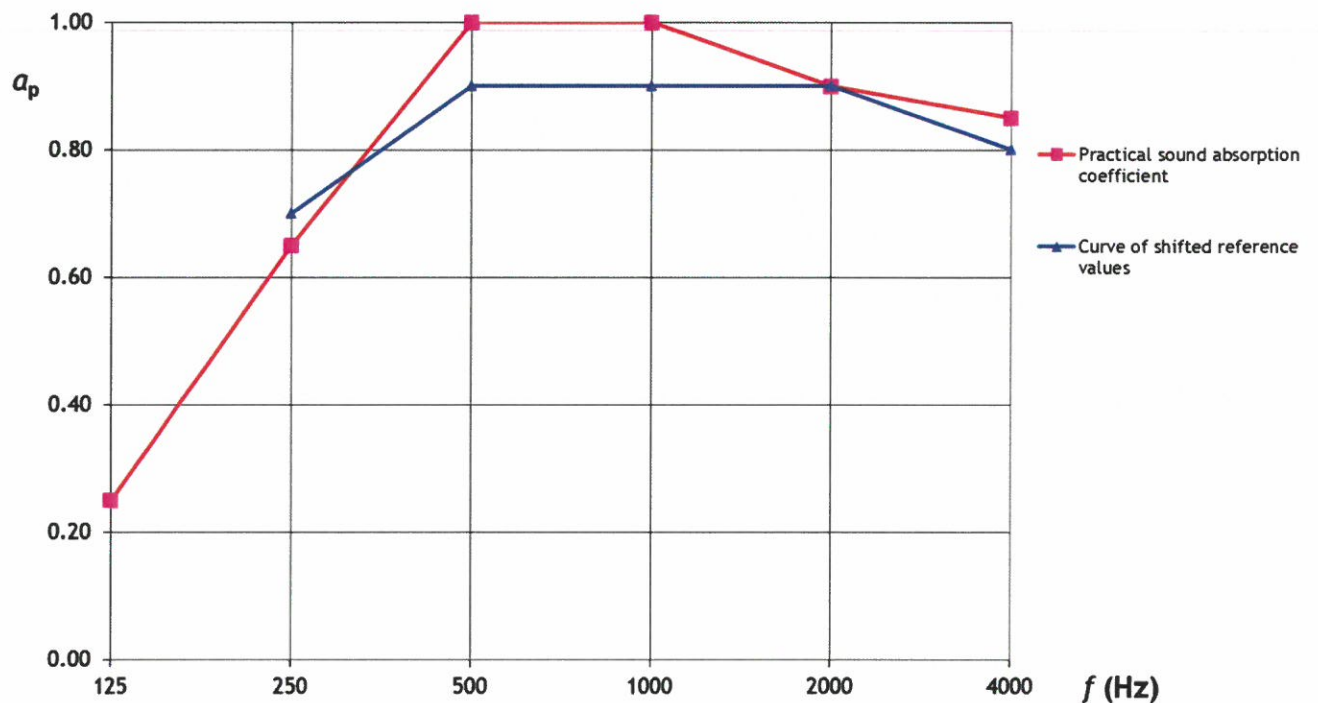
**Sound absorption coefficient:**



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### Classification of the sound absorption measurement results of absorber Sonitus Acoustics WAVE-X, according to HRN EN ISO 11654: 1998

Frequency $f$ (Hz)	Curve of shifted reference values	Practical sound absorption coefficient $\alpha_p$
125		0.25
250	0.70	0.65
500	0.90	1.00
1000	0.90	1.00
2000	0.90	0.90
4000	0.80	0.85



Absorber Sonitus Acoustics WAVE-X manufactured by SONITUS d.o.o., Tina Ujevića 26, HR-48000 Koprivnica	
Weighted sound absorption coefficient	Sound absorption class according to HRN EN ISO 11654:1998
$\alpha_w = 0,90$	<b>A</b>