Report on acoustical characterization of materials according to UNI EN ISO 10534-2

Test report:	MAA-ABSN-PG0320EN
Client:	Pugi.rg srl Via Garibaldi, 33/b 51037 Montale (PT)
Date of test:	01/07/2020
Place of test:	Laboratorio di Acustica - Dipartimento di Ingegneria Università degli Studi di Ferrara Via Saragat, 1 – 44122 FERRARA
Measurement method:	UNI EN ISO 10534-2
Number pf pages:	6

Tested material	**Fabric** Model: Elba S Material: 100% PL FR (Tr Cs) Weight: 365 ± 5% g/m^2 Nominal thickness: -

Ferrara 6 luglio 2020

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1. Introduction

Upon request of Pugi.rg srl, acoustic measurements were conducted to verify the effect of the fabric applied to a sound-absorbing panel. In particular, normal incidence sound absorption coefficient tests according to UNI EN ISO 10543-2: 2001 have been carried out firstly on a sample of sound-absorbing material and successively on the same material sample covered by the fabric.

2. Description of samples under test

The fabric under test, called Elba S, is a velvet in TR CS with watered effect, from many years it's a classic in the production of chairs, sofas and curtains.

Considering the main usage of the fabric, and to also evaluate the effect on different sound-absorbing materials, it was chosen to use two different supporting panels:

Base A Mineral wool panel, finished with fleece, having a density of about 160 kg/m^3, nominal thickness 40 mm, usually used for self-supporting suspended sound-absorbing panels,

Base B Polyester fiber panel, having a density of about 40 kg/m^3, nominal thickness 40 mm, usually used for sound-absorbing wall coverings,

For each one of the two materials, the measurements have been carried out on the basic sound-absorbing panel and on the same panel covered with the fabric. Three different samples of fabric have been used and the average of the three measurements has been finally calculated.

The fabric was not glued on the panel but was placed on it and fixed with a plastic ring. The same ring has also been maintained for the measurement without fabric for comparison.

The samples used for the measurements are shown in figure 1 and the fabric on the sample inside the tube is shown in figure 2.

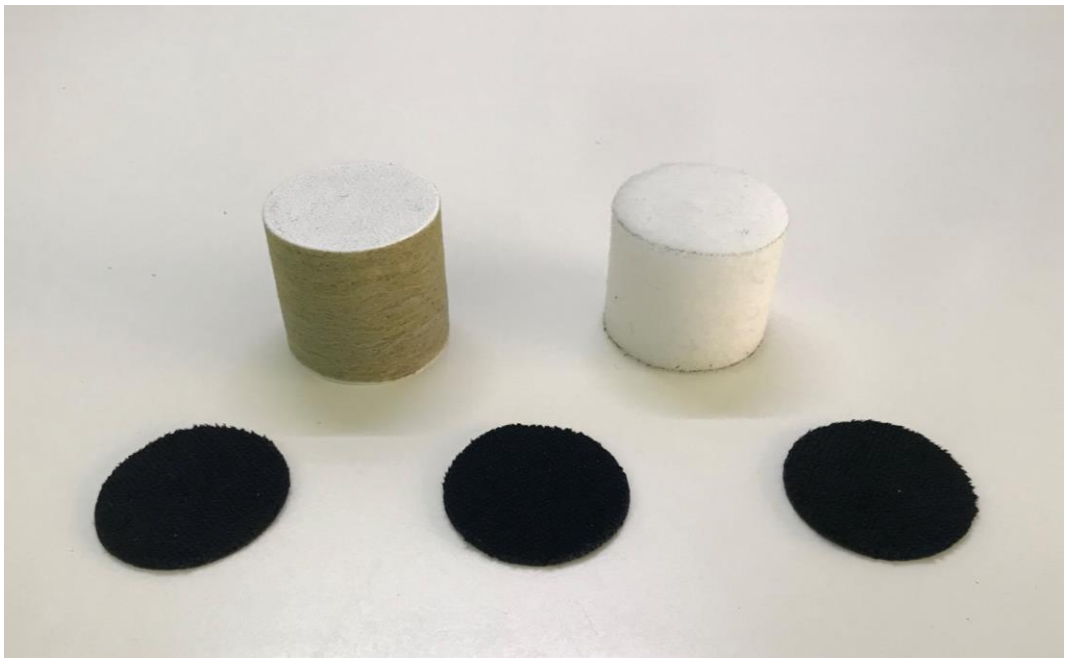

Figure 1– Samples of tested materials

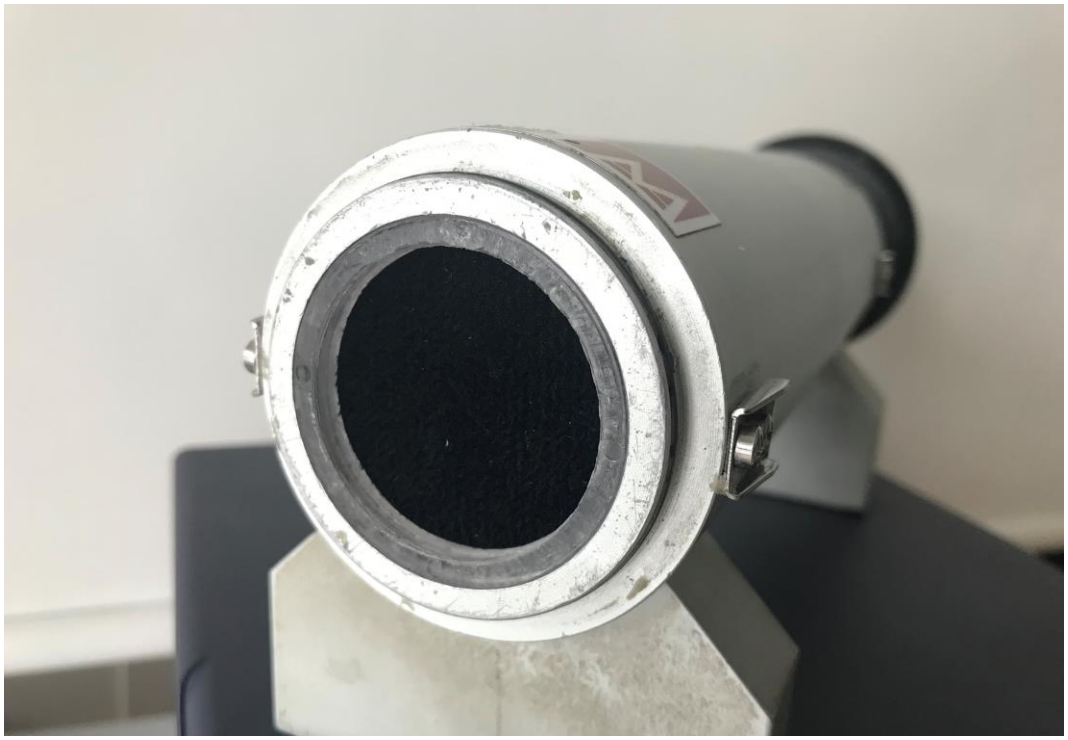

Figure 2 – Sample of panel covered with the fabric inside the measurement tube

3. Materials and methods

The experimental set-up meets the specifications of UNI EN ISO 10534-2 [1] for the measurement of the normal incidence sound absorption coefficient. It uses the method of the transfer function in a standing wave tube and allows the determination of the sound absorption values as a function of frequency for any material placed on a reflective surface or with an air gap.

Figure 3 – Acoustic impedance measurement tube

The experimental set-up consists of:

- Impedance tube 2mics MAA [2];
- 2 Microphones GRAS 40BF;
- Power amplifier B&K type 2716C;
- NI USB 4431 AI & AO device;
- Acquisition ad post-processing software developed on Labview® platform.

Before the execution of the tests, a calibration procedure has been applied in order to correct the amplitude and phase mismatch of microphones as described in [1]. Subsequently, once the sample was mounted, measurements have been carried out according to the standard [1].

The environmental conditions of measurement recorded during the tests: temperature 26° C, RH 70%.

The precision of the absorption coefficient measurement is not indicated by the standard [1]. Instead, the maximum uncertainty on the transfer function is declared, equal to 1% for the amplitude and 0.6 degrees for the phase. From internal tests, an average uncertainty of 0.05 on the absolute value of sound absorption has been found.

4. Results

Figure 4 shows the comparison between the measurements of the mineral wool panel only (Base A) and the same panel covered with fabric, in third octave bands from 100 Hz to 4 kHz.

Elba S fabric decreases the sound absorption of the Base A mineral wool panel starting from 500 Hz.

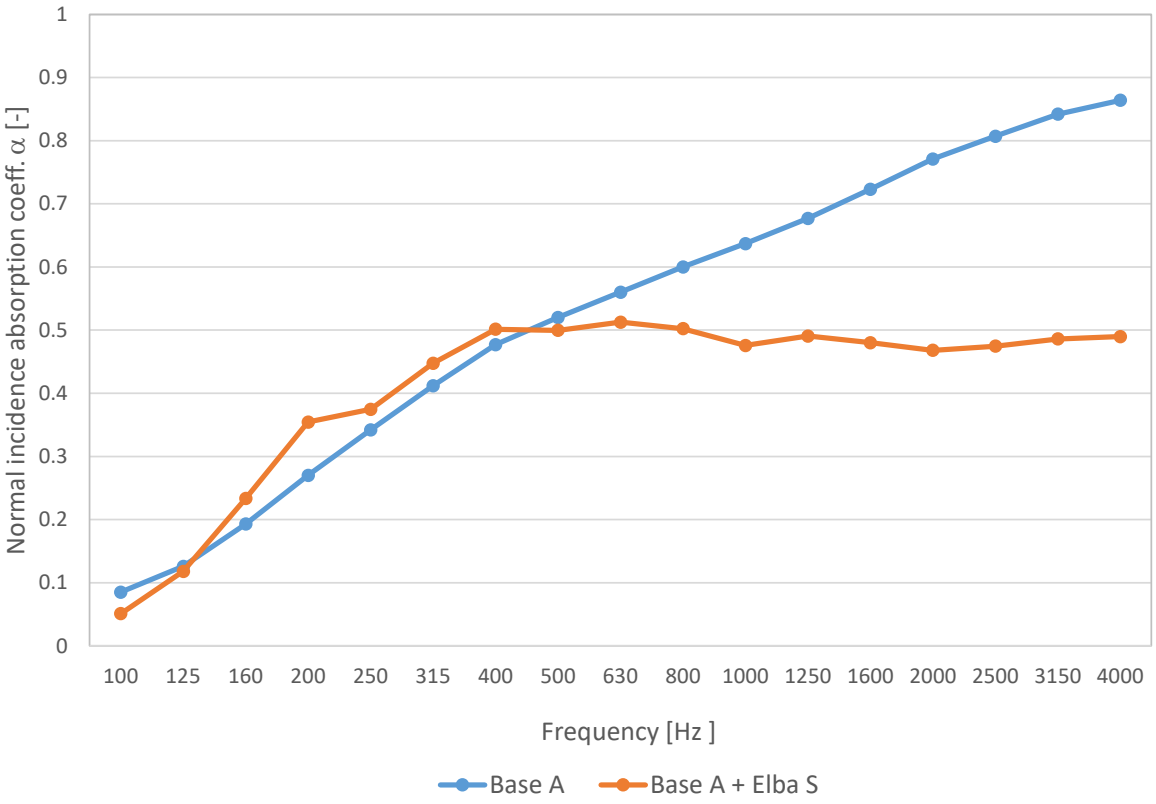

Figura 4 – Comparison in 1/3 octave bands between the sound absorption coefficient of the mineral wool panel (base A) and of the same panel covered with fabric (average of the 3 samples)

Figure 5 shows the comparison between the measurements of the polyester fiber panel only (Base B) and the same panel covered with fabric, in third octave bands from 100 Hz to 4 kHz.

Elba S fabric increases the sound absorption of the Base B polyester fiber panel up to 1250 Hz and decreases the sound absorption above 1600 Hz.

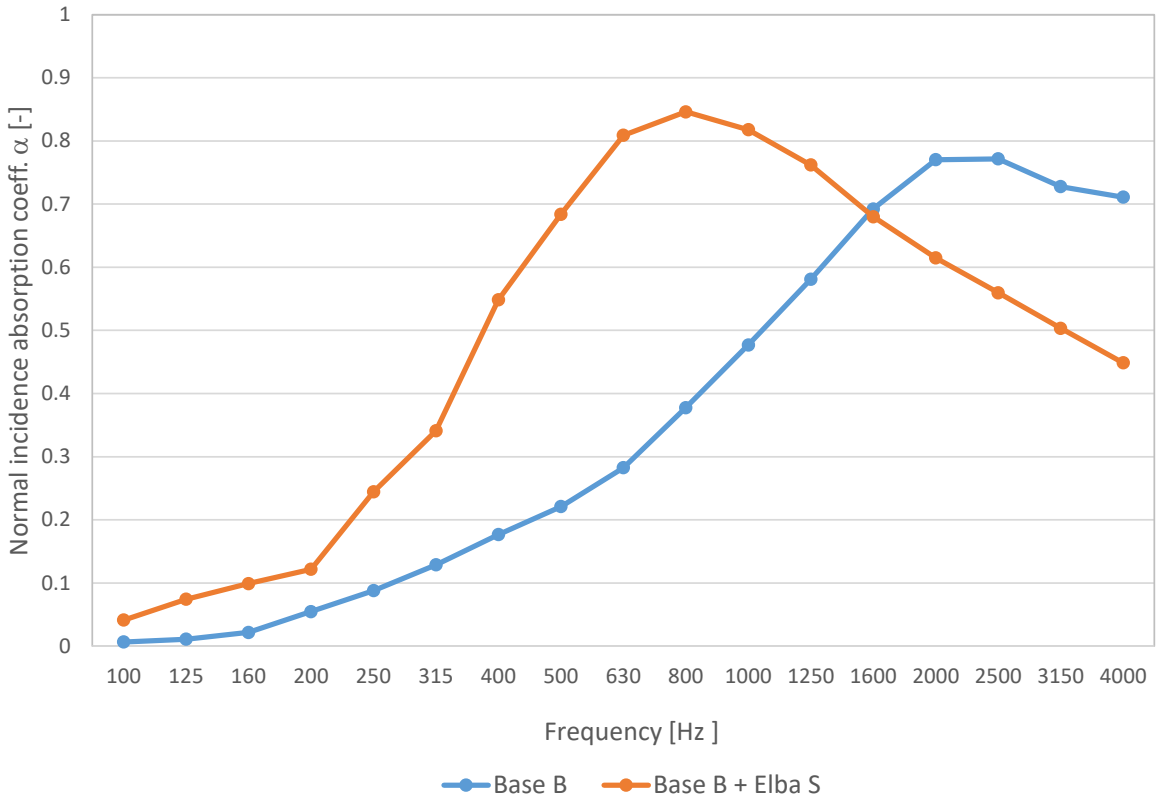

Figura 5 – Comparison in 1/3 octave bands between the sound absorption coefficient of the polyester fiber panel (base B) and of the same panel covered with fabric (average of the 3 samples)

5. Bibliography

[1] UNI EN ISO 10534-2:2001, Acustica - Determinazione del coefficiente di assorbimento acustico e dell'impedenza acustica in tubi di impedenza - Metodo della funzione di trasferimento.

[2] www.materiacustica.it