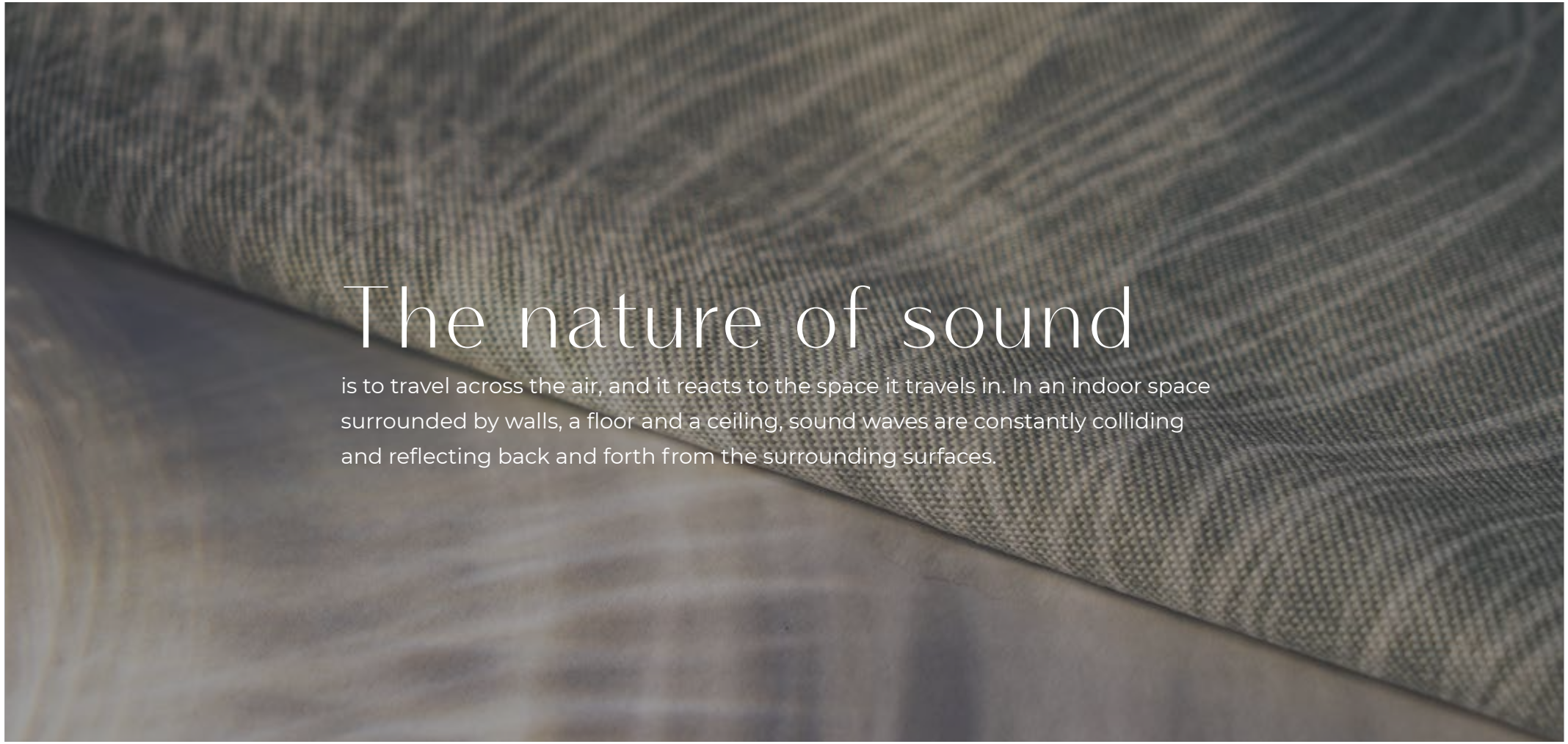
ACOUSTIC COLLECTION PRESENTATION

VANELLI

Acoustic Collection

“Design is a balance between the function and the look of the fabric, while at the same time holding on to high quality.”



The nature of sound

is to travel across the air, and it reacts to the space it travels in. In an indoor space surrounded by walls, a floor and a ceiling, sound waves are constantly colliding and reflecting back and forth from the surrounding surfaces.

— Where can we use acoustic textiles?

OPEN OFFICES

need to encourage concenteration, productivity and a sense of wellness. The inability to have a comfortable conversation is the biggest frustration for people working in an open office. In a recent survey, 75% of workers cited "workplace acoustics" as the worst aspect of their office environment.

HOTELS

have multiple acoustic needs depending on the space and its purpose: while lobby should be a warm and buzzing (but not cacophonous), a hotel room must be peaceful and quiet. Noise is the most common complaint at hotels.

RESTAURANTS

require a delicate, balance between a sense of liveliness and overwhelming noice. Diners need to be able to hear one another without competing with everyone else's conversations.

SCHOOLS

need 100% speech intelligibility in their classrooms so that students and teachers can hear everything that is being said. Most schools in the U.S. only have 75% speech intelligibility, which means every fourth word that is spoken is not understood. Noise from reverberation makes it difficult to focus on the teacher and leads to a poor learning environment.

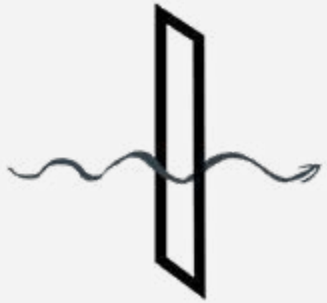
— Modern architecture and acoustics

Glass, concrete and steel are being used more and more in modern architecture. These clean surfaces reverberate which is often interpreted as an uncomfortable noise.

Sound conditions are a top priority when it comes to designing an indoor space, since good sound conditions enhance the purpose the space is built for and affect directly how people experience that space. In order to have a pleasing sound environment indoors, the reflecting behaviour of travelling sound waves must be controlled.

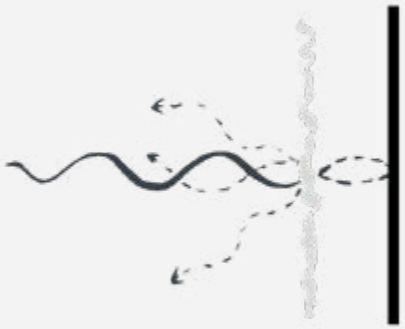
— Sound absorption

Sound absorption can be controlled with the use of porous materials. When a sound wave hits the material, some of it reflects back, and some of it gets absorbed. A part of the wave goes through the material, but if there is a hard surface behind the porous material, the sound wave bounces back from it and gets absorbed again. Absorption happens when sound energy transforms to heat energy.



Full absorption

Full reflection



Sound absorption of a porous material

How do interior fabrics enhance the experience of sound?

In general, interior fabrics have a positive influence on the sound in the room. However, special acoustic curtains reduce sound considerably.

They absorb the sound and thus reduce noise pollution. In addition, they can optimize the acoustics of the room and positively influence communication. Be it at work, in a restaurant, in a hotel room or in the theatre, good room acoustics foster the well-being, communication and output.

As an example: as we may install a blind in front of a window to control its brightness, similarly, acoustic solutions are necessary to effectively manage sound and the effect it has upon noise and echo within an interior as it bounces off hard, reflective surfaces.


Designing acoustic fabrics is searching for
the perfect balance between absorbing and
reflecting material and structural qualities.


Vanelli collection of acoustic
fabrics — for a harmonious balance
of acoustics and aesthetics.

—Our inspiration for the collection

The acoustic capsule collection is built upon sheer and semi sheers curtain fabrics, opaque heavier curtain fabrics, and digitally printed curtain fabrics.

Acoustic capsule collection – Universe of Sound and Light

- movement vs stillness
- transparency vs opacity
- reflection vs absorption
- natural vs constructed
- intimate vs public

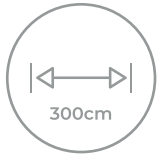
— The Vanelli acoustic capsule collection

The Vanelli acoustic capsule collection is built upon wide-width and narrow-width plain, textured jacquard-woven and digitally printed sheers and semi-sheers, curtain fabrics and upholstery fabrics.

There are many possibilities to influence room acoustics with the help of textiles. They can be used as curtains, chairs, room separators, wall covering, ceiling suspension, as a panel or an upholstery fabric. With its comprehensive acoustic collection, Vanelli creates the peace that we humans need to feel well at our work desk or during our leisure time.

Sound Absorbing

Flame Retardant



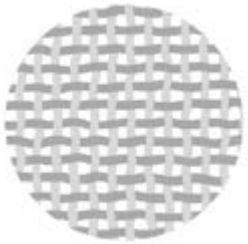
Wide Width

Recycle

—Designing acoustic fabrics

There are several factors that influence the acoustic performance, and those have to be researched and considered carefully. The performance requirements have to be then tested and fulfilled as a part of the design process.

The focus in designing acoustic fabrics should be in creating a balanced fabric cover and a maximum surface area. It is apparent that the fabric cannot be too open, or the sound just passes through it. The fabric cannot be too densely covered either, otherwise the sound just reflects from the surface. With woven textiles the surface area does not consist of only the size of the fabric but also the microstructural three-dimensional composition.



Balanced fabric cover

High surface area


Testing acoustic fabrics

Test methods

Flow Resistance

The flow resistance (or the airflow resistance) method DIN EN ISO 9053-1 measures the amount of direct airflow passing through a porous material sample (Pa s/m). Air pressure is measured both in front and behind the test sample, and the specific airflow resistance (RS) is then counted. The RSvalue is then compared with the surface density and the thickness of the fabric, and an evaluation of the sound absorption performance is given. The RSvalues between 600–1000 refer to good sound absorbers. The evaluation can be applied for selecting the most promising samples for sound absorption coefficient tests, or for monitoring the production of acoustic products in the market.

Impedance Tube Method

The impedance tube method DIN EN ISO 10534-2 measures the sound absorption coefficient with a perpendicular sound. The test is done inside a tube, and the material sample is attached to the one end of the tube and a speaker to the other. A sound is played from the speaker, and microphones inside the tube measure the maximum and minimum pressures of the standing wave. From those measurements it is possible to count the sound absorption coefficient values of the material sample in different frequencies.

Reverbation Room Method

The reverberation room method DIN EN ISO 354 measures the sound absorption coefficient (αW) in a large echoing room (approximately 200 m3) with a diffuse sound. The reverberation time is measured both with and without the material sample. From the reverberation time it is possible to count the sound absorption coefficients in different frequency ranges.

Basically, room acoustics are in relation to the sound in the room. The sound absorption coefficient, which describes the property of a material to absorb sound, is measured. This is measured in a reverberation room according to DIN EN ISO 354 and divided into absorber classes A-E.

— Sound absorption values

The reverberation room method measures sound absorption with sound absorption coefficient values (α) in several frequency ranges. Then a single value Weighted sound absorption coefficient (α_w) is calculated to best describe the material's ability to absorb sound. The α_w values stand between 0 and 1, where 0 equals full reflection and 1 equals full absorption. With porous materials α_w values between 0.60 to 0.85 are considered highly absorptive. Another rating for sound absoption is Noise reduction coefficient (NRC), that is similar to α_w.

Sound absorption classes

The α_w values are grouped into sound absoption classes A–E, though the α_w values give the more detailed information about the absorption ability.

0 Reflection  **1** Absorption

Sound absorption class (According EN ISO 11654)	α_w – waarde (According ISO 354)	Absorption Class (According VDI 3755/2000)	NRC
A	0,90; 0.95; 1,00	Highest Absorption	NRC>= 0,75
B	0,80; 0,85	Highest Absorption	NRC>= 0,75
C	0,60; 0,65; 0,70; 0,75	High Absorption	0,5<= NRC < 0,75
D	0,30; 0,35; 0,40; 0,45; 0,50; 0,55	Absorption	0,5<= NRC < 0,75
E	0,15; 0,20; 0,25	Low Absorption	0,25<= NRC < 0,5
No Class	0,05; 0,1	Reflection	NRC < 0,25

Vanelli acoustic fabrics

Sound absorption classes and values

Fabric weight and type is an important factor when evaluating test results. In this perspective the results of different types of fabrics are not directly comparable. The challenge is to develop lightweight fabrics which reach high α_w values. As featured in the table, we reached our goal, the highest possible α_w values of 0,65-0,70 for sheers and lightweight fabrics.

Vanelli Fabric Code	Fabric Weight (g/m^2)	Sound Absorption Class(according EN ISO 11654)	Sound Absorption Cœfficient(α_w) (according ISO 354)	Noise Reduction Cœfficient (NRC) (ASTM C423)
DN083	358	B	0.85	0.85
DL196	269	C	0.70	0.80
MN111	192	C	0.70	0.70
MN110	117	C	0.65	0.60
DN026	141	C	0.65	0.65
B34-J03112	123	D	0.50	0.65
633-J01798	198	D	0.50	0.70
MN094	96	D	0.30	0.25

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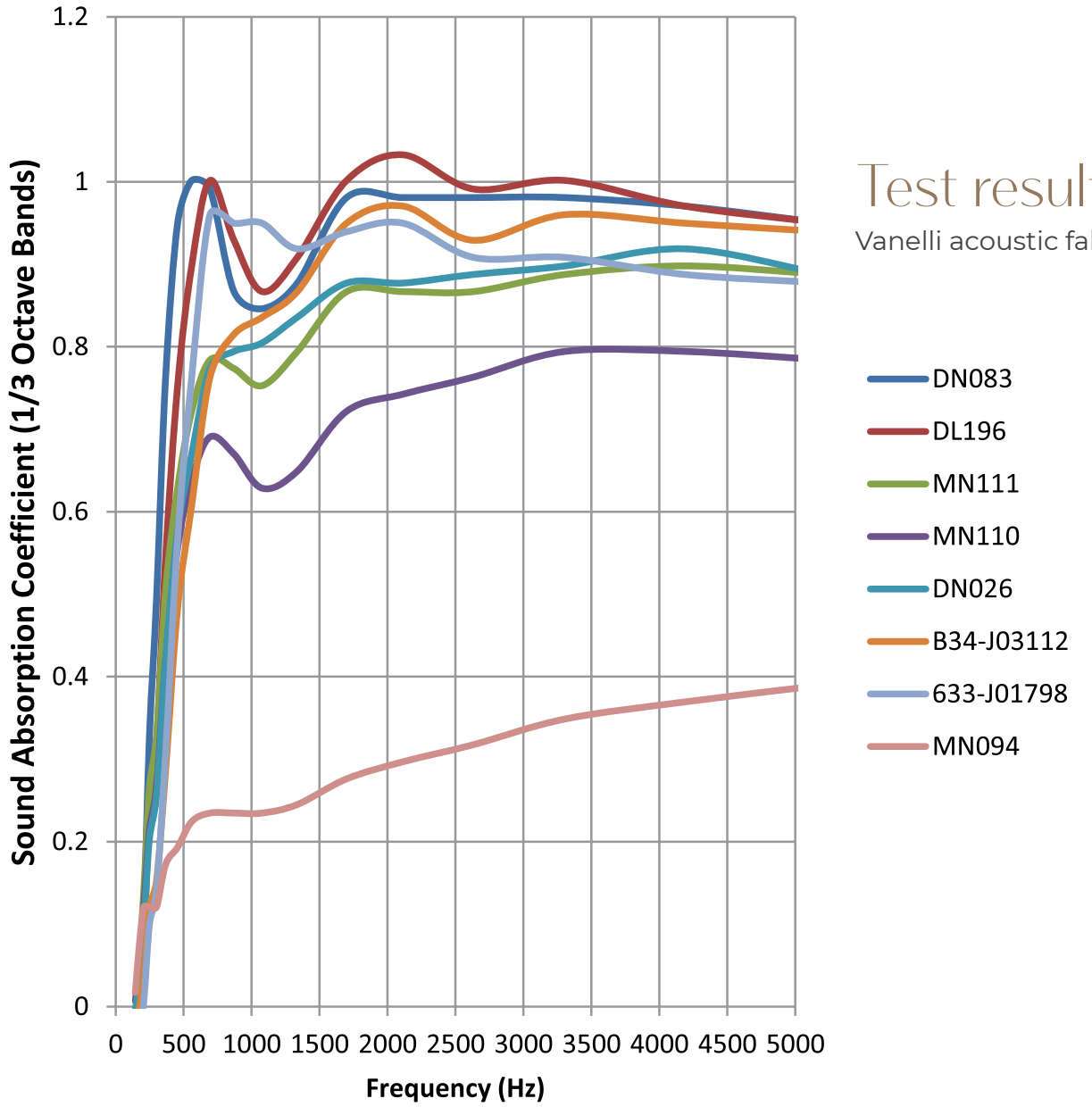
Test results

Vanelli acoustic fabrics



Test results for Vanelli DN083

Sound absorption coefficient ISO 354

Measurement of sound absorption in reverberation rooms

Client: Mega Textile A.S., OSB Gri Cadde No: 2 Nilüfer, 16140 Bursa, Turkey

Test specimen: Curtain fabric DN083, arranged hanging pleated with 100 % fullness, 100 mm wall distance

Curtain fabric:
Information provided by the client
- designation DN083
- 100 % Trevira CS

Properties determined by the testing laboratory at one A4-sized sample from test material:
- area specific mass $m'' = 358$ g/m²
- airflow resistance $R_S = 1427$ Pa s/m
- thickness $t = 0.86$ mm

Test arrangement:
- style of type G-100 mounting acc. to DIN EN ISO 354
- curtain fabric hanging pleated with 100 % fullness in front of a reflecting wall
- fixed directly underneath the ceiling of the reverberation room, suspended from a metal rail (height 90 mm, overlap 60 mm), distance to the back wall 100 mm
- test arrangement without enclosing frame
- fabric dimensions $W \times H = 7000$ mm x 3030 mm
- test surface width x height = 3.50 m x 2.97 m (starting at the lower edge of the metal rail)

MÜLLER-BBM Planegg, 2021-08-23
No. of test report M160926/1

Appendix A
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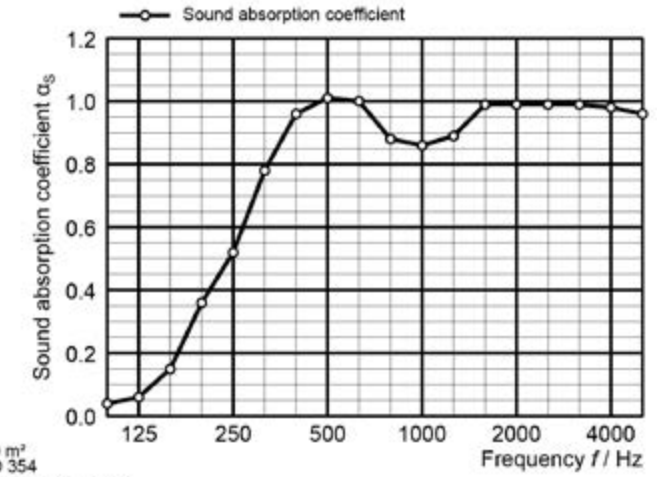
Room: E
Volume: 199.60 m³
Size: 10.40 m²
Date of test: 2021-07-09

Frequency [Hz]	α_S 1/3 octave	α_p octave
100	∘ 0.04	
125	∘ 0.06	0.10
160	0.15	
200	0.36	
250	0.52	0.55
315	0.78	
400	0.96	
500	1.01	1.00
630	1.00	
800	0.88	
1000	0.86	0.90
1250	0.89	
1600	0.99	
2000	0.99	1.00
2500	0.99	
3150	0.99	
4000	0.98	1.00
5000	0.96	

	θ [°C]	*r. h.* [%]	*B* [kPa]
without specimen	23.9	59.7	95.6
with specimen	23.9	60.1	95.6



∘ Equivalent sound absorption area less than 1.0 m²
α_S Sound absorption coefficient according to ISO 354
α_p Practical sound absorption coefficient according to ISO 11654

Rating according to ISO 11654:	Rating according to ASTM C423:
Weighted sound absorption coefficient $\alpha_w = 0.85$ (*H*)	**Noise Reduction Coefficient *NRC* = 0.85**
Sound absorption class: B	**Sound Absorption Average *SAA* = 0.85**

We have tested all fabrics with the impedance provide detailled test reports for all items in our acoustic fabric collection.

Sheer and lightweight acoustic curtains can offer both the decorative value of a soft and airy look, and the functional value of the sound environment improvement of the space.

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