COMPARATIVE TESTS AT THE LABEIN TECHNOLOGY CENTRE

Akustik+Sylomer® is de trademark of a new solution for the anti-vibration mountings of false ceilings or vibrating elements that have to be suspended. They are used for the attenuation of vibrations, reducing structure-borne noise.

The **Akustik+Sylomer®** ceiling mounts are made of Sylomer®, a microcelular polyurethane material specially conceived for vibration isolation. This material produces a higher degree of damping than the elastomers traditionally used for this purpose.

The **Labein** technology centre performed a series of comparative tests to confirm the good acoustic results of Akustik+Sylomer®. This centre is officially ENAC-certified and complies with the requirements of the ISO 140-1:1997 standard.

PURPOSE OF THE TEST

The purpose of the test is to compare, in equal conditions, the acoustic isolation to air-borne noise of a false ceiling without anti-vibration suspensions (direct transmission) to a false ceiling with the new Akustik+Sylomer® suspensions.

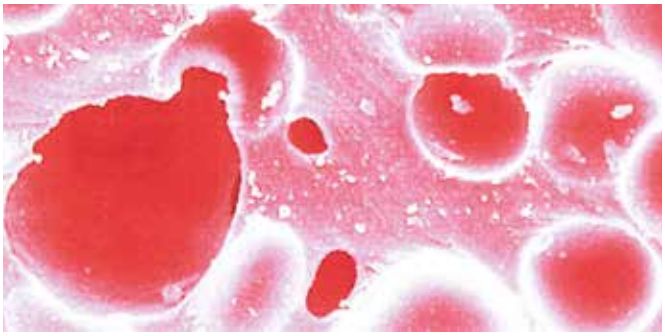
The secondary endpoint is to compare the Akustik+Sylomer® to another suspension with the same size-specific characteristics using high-resilience natural rubber from our Akustik 4 45 shore A standard series.

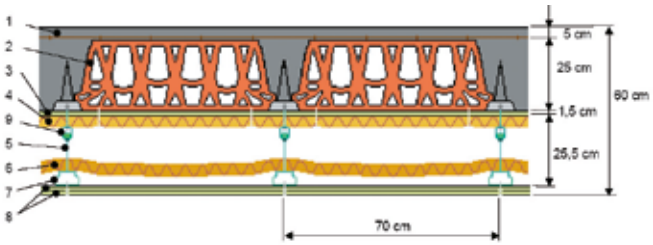
TEST METHODOLOGY

The reports contain the results of the noise isolation test to airborne noise conducted according to the UNE-EN ISO 140-3 standard for a false ceiling with the following ceiling mounts:

- Direct transmission (without antivibration suspensions).
- Akustik 4 45 shore A.
- Akustik 3 + Sylomer®30 Type B.

Besides the isolation curves, two RW and RA indexes have been calculated and used to compare the performance of the different suspensions. The Rw noise reduction index of the sample tested and the terms of adaptation of the C and Ctr spectrum were obtained according to the ISO 717-1 standard, based on the isolation curve. The pink noise isolation index RA between 100Hz and 5 KHz is that which is specified by the Basic Spanish Building Standard: NBE-CA 88 "Acoustic Conditions".

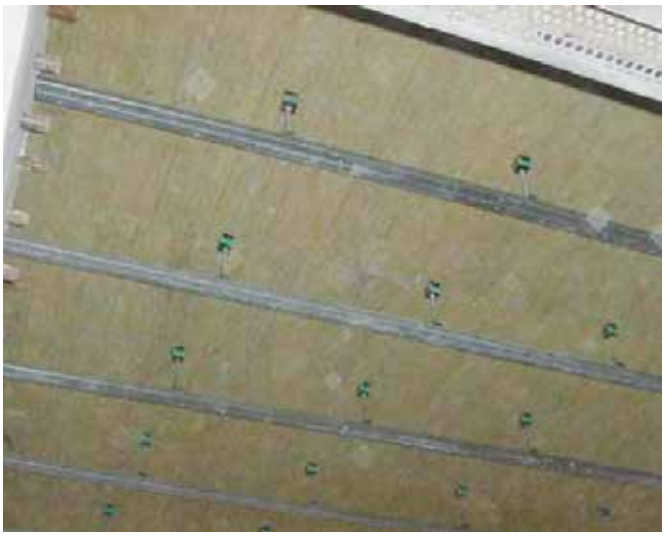




Specimen used for the test

IMPORTANT NOTE: The composition of the false ceiling is not meant to be used for teaching purposes in acoustics. It is a standard implementation whose objective is to compare the anti-vibration elements.

The specimen used in the tests is a standard ceramic hollow block with an approximate isolation of 54 dB.



The results and the descriptive reports can be downloaded free of charge from **www.akustik.com**

AKUSTIK + sylomer® by getzner

COMPARATIVE TESTS AT THE LABEIN TECHNOLOGY CENTRE

COMPARATIVE RESULTS OF THE TEST BETWEEN A SUSPENDED CEILING WITH AND WITHOUT AKUSTIK+SYLOMER®.

Graphic 1 shows the isolation provided by a single plasterboard suspended with Akustik + Sylomer® suspensions and the same ceiling fitted with M6 rod. The blue line represents the isolation achieved with Akustik + Sylomer® mounts.

As can be seen, there are major differences at low and high frequencies, offering a difference of:

- 3 dB at 125 Hz
- 6 dB at 250 Hz
- 5 dB at 500 Hz
- 5 dB at 1000Hz

At the same time, comparative tests were conducted with ceilings with a greater number of plasterboards. Table 1 shows the results of the RW reduction index:

It is clear that the use of Akustik+Sylomer® suspensions provides far greater airborne isolations, which in some cases are equivalent to or greater than the use of 2 or 3 plasterboards with anti-vibration ceiling mounts.

The results and descriptive reports can be downloaded free from www.akustik.com

Akustik isolation curves

Graphic 1

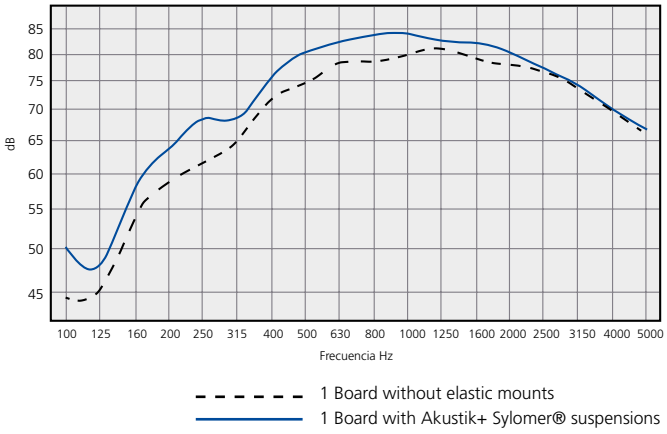
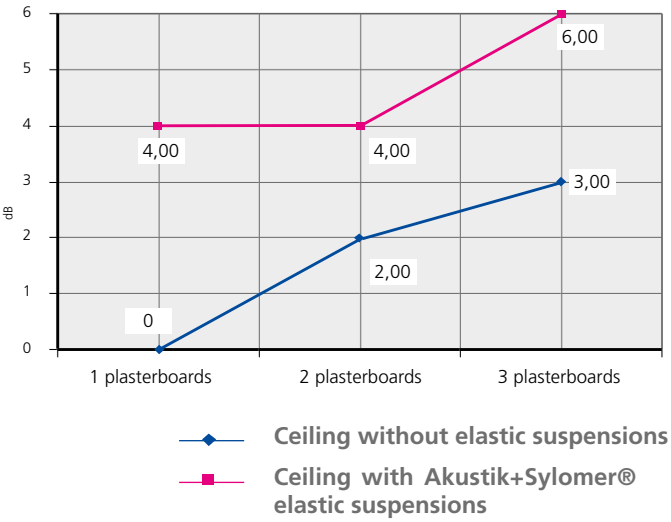


Table 1

RW sound isolation index	Without suspensions(M6 rod)	With suspensions Akustik + sylomer®
1 plasterboard	71 dB	75 dB
2 plasterboard	73 dB	75 dB
3 plasterboard	74 dB	77 dB

Gain in dB thanks to the use of the Akustik+Sylomer® suspensions as opposed to a ceiling without elastic suspensions.



COMPARATIVE TESTS AT THE LABEIN TECHNOLOGY CENTRE

COMPARATIVE RESULTS OF THE TEST BETWEEN A SUSPENDED CEILING WITH AKUSTIK+SYLOMER VS RUBBER SUSPENSIONS.

Table 2 compares the RA sound isolation index according to the number of plasterboards.

The improvement is self-evident, the akustik+sylomer® mounts offer a superior isolation to the rubber mounts. This difference is so great that it may be said that a ceiling with a plasterboard withakustik+sylomer® offers the same isolation as a ceiling with two plasterboard rubber suspensions. This therefore means savings in time and material.

The savings in plasterboard and labour costs make these mounts particularly interesting. both technically and economically.

In order to provide a better analysis of the differences between the rubber mounts and the akustik+sylomer® mounts. table 3 shows the isolation data at different frequencies.

The results of these tables show that the isolation differences are in the low frequency range. which is particularly interesting for the isolation of premises without soundproofing. since they are particularly difficult to isolate.

Table 2

RW sound isolation index	Akustik + sylomer®	RUBBER
1 plasterboard	75 dB	74 dB
2 plasterboard	75 dB	75 dB
3 plasterboard	77 dB	76 dB

Table 3

Suspended ceiling with 1 plasterboard		
FREQUENCY	Akustik + sylomer®	RUBBER
160 Hz.	58,3 dB	57,5 dB
250 Hz.	68,4 dB	66 dB
500 Hz.	80,3 dB	79,1 dB

False ceiling with 2 plasterboards		
FREQUENCY	Akustik + sylomer®	RUBBER
160 Hz.	57 dB	56,9 dB
250 Hz.	70 dB	68 dB
500 Hz.	81,5 dB	81,1 dB

False ceiling with 3 plasterboards		
FREQUENCY	Akustik + sylomer®	RUBBER
160 Hz.	60,4 dB	58,5 dB
250 Hz.	69,4 dB	67 dB
500 Hz.	82,4 dB	81,1 dB

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BEHAVIOUR AT HIGH AND LOW FREQUENCIES

Structure-borne noise is that which is transmitted through the structures of a building, machine, installation... This radiation noise becomes airborne noise.

Low noise frequencies are those that are usually less damped in the air and are therefore better transmitted through structures. The range of low frequencies is between 20 and 500 Hz.

NATURAL FREQUENCY OF THE AKUSTIK+ SYLOMER® MOUNTS

The akustik+sylomer® ceiling mounts can obtain very low natural frequencies of up to 7 Hz at the optimal loading point. At this loading point the decoupling frequency of the akustik+sylomer® mounts is 9,9Hz.

Such a low natural frequency is optimal for the false ceilings of soundproofed premises. This type of suspensions are also particularly interesting for the isolation of machines or vibrating elements that work at more than 600 rpm. Examples are:

- Ducts / pipelines:
- Of cooling liquids from refrigerating compressors, and are ideal for use in supermarkets, the frozen food section.
- Air conditioning.
- Pumping of water
- From fume exhausts.
- Suspension of air conditioning machinery.
- Suspension of vibrating elements in general.

BEHAVIOUR OF THE AKUSTIK+SYLOMER® MOUNTS AT LOW FREQUENCIES IN SOUNDPROOFED PREMISES.

The range of audible frequencies in the human being may vary according to age and to other factors although in general it is between 20 Hz and 20.000Hz. By way of example the notes produced by a guitar have a frequency range from 82 to 698 Hz.

Considering that the most unfavourable excitation frequency, i.e. 20 Hz, the isolation degree of structure-borne noise produced by an akustik+sylomer® suspension would be close to 90%. (*)

(*) Installation of the optimal loading point of the akustik + sylomer for a theoretical single mass spring system.

BEHAVIOUR OF THE AKUSTIK+SYLOMER® MOUNTS AT MEDIUM AND HIGH FREQUENCIES.

Sound waves are not comprised of just one frequency, but rather of a set of frequencies superimposed without any order, which is the main reason why noise is unpleasant. Thus, the ideal suspender must be able to isolate the broadest possible range of frequencies.

Behaviour of a metal spring

These suspenders are often recommended for the elastic suspension of false ceilings. It is important to know that this type of mount is suitable for the damping of low frequencies, whereas the high frequencies are propagated through the coils of the spring. To filter this type of frequencies the springs must be combined with a stage of viscoelastic material under the spring to stop the propagation of this type of vibration.

Behaviour of the akustik+ Sylomer

Thanks to the viscoelastic properties of the Sylomer, the akustik+Sylomer has a behaviour similar to the spring at low frequencies and at the same time not only prevents the high frequencies as occurs in the spring via its coils, but also considerably improves the behaviour of the rubber at high frequencies. These results are shown in the comparative section of Akustik + Sylomer with regard to rubber suspenders.

CREEPING AND LONG-TERM BEHAVIOUR

Static loads produce a certain degree of creeping. This phenomenon can be observed in all elastomers. Creeping is the increase in deformation under consistent loading Figs. 1 and 3 show the creeping for the two types of Sylomer® used for our ceiling mounts.

Within the field recommended for the application of continuous loads, the additional deflection remains under 50% of the initial deflection even after an extended period of 10 years.

The dynamic stiffness of the ceiling mounts must increase as little as possible over time. Figs. 2 and 4 show the variation of the dynamic module over time of the two types of Sylomer used in our ceiling mounts.

Sylomer® Low Loads

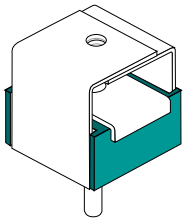


Fig.1
"Creeping" Behaviour

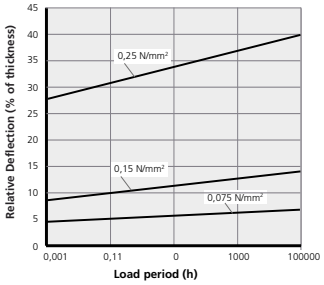
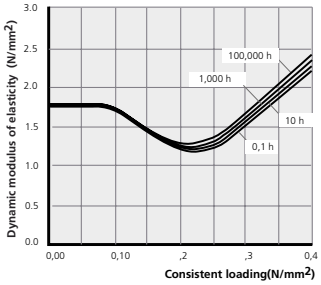


Fig. 2
Dynamic modulus of elasticity at long term loading



Sylomer® High Loads

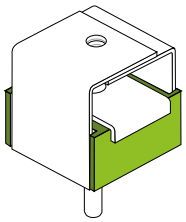


Fig.3
"Creeping" Behaviour

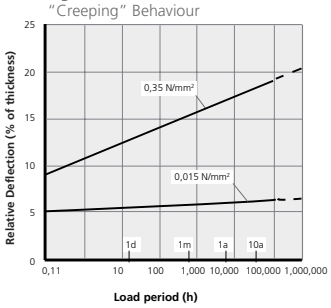


Fig. 4
Dynamic modulus of elasticity at long term loading