

***kuraray***

**TROSIFOL®**

# **SOUND CONTROL<sup>+</sup>**

PERFECT SILENCE IN GLASS

ENGLISH

# WHAT IS NOISE?



Noise is defined as any type of sound that is considered disturbing, annoying or painful. Ambient noise consists of a multitude of sounds of different frequencies and intensities.

The measurement of noise intensity takes account of what is perceived by the human ear. Higher pitches are subjectively perceived as louder than lower pitches. The loudest sound that a human being can painlessly hear has ten trillion times the sound intensity of the quietest.

The sense of hearing organises perception by converting the tenfold sound intensity into about twice the perceived volume.

To represent the volume perceived by the human ear, a logarithmic scale has been chosen for acoustic measurements. The unit of measurement is the decibel (dB). The auditory threshold is assigned by definition the value of 0 dB, while the tenfold sound intensity has a value of 10 dB, the hundredfold sound intensity 20 dB etc. through to the pain threshold, which has a value of about 130 dB.

The following illustrations show typical sounds with their volumes and subjectively perceived intensities.





- 登机口 Gates 
- 国内超规行李托运 Domestic Over-sized Baggage Drop off 
- 洗手间 Toilets   
- 银行 Banks 
- 餐厅、商店 Restaurant, Shops  

> There are many types of noise,  
but only one silence. <

Kurt Tucholsky



## CAUSES AND CONSEQUENCES OF NOISE

In the industrialised nations, the traffic density on the roads, in the air and on rails has almost doubled in the last two decades. At the same time, the noise nuisance for the population has increased sharply as a result of two decisive factors: greater settlement density and the associated development and use of building land. This means that the required noise control in buildings in noise-affected zones such as the landing paths of airports and areas close to motorways and railway lines has grown considerably.

It is a proven fact that noise causes illness. People who are constantly exposed to unwanted, continuous noise nuisance suffer from such ailments as stress, nervousness, sleeplessness, poor concentration and cardiovascular disorders. To keep the effects of such problems within acceptable bounds, designers and architects are increasingly called upon to incorporate noise mitigation in building design. It is particularly important in this connection that the glazed surfaces of buildings in zones exposed to noise are correctly designed.

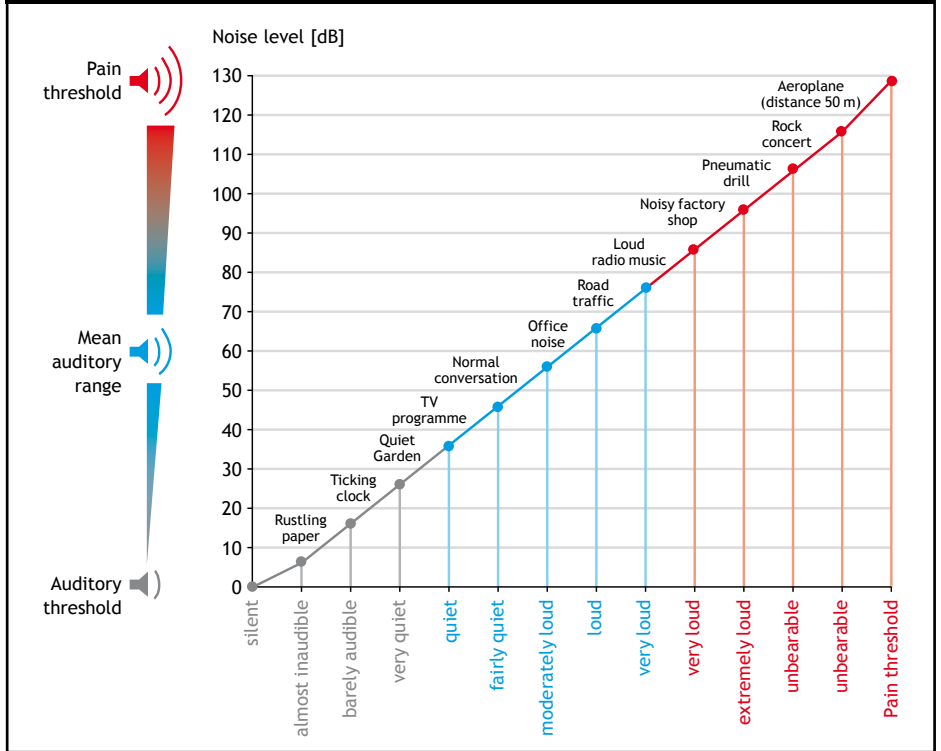




janeek - photocase.com



## NOISE SOURCES AND PERCEPTION



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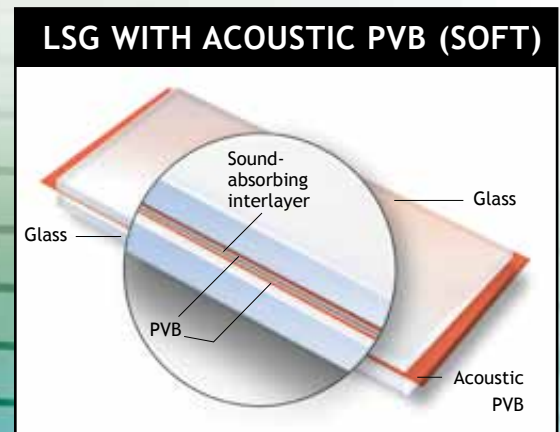
# LAMINATED SAFETY GLASS WITH TROSIFOL® SOUND CONTROL<sup>+</sup>

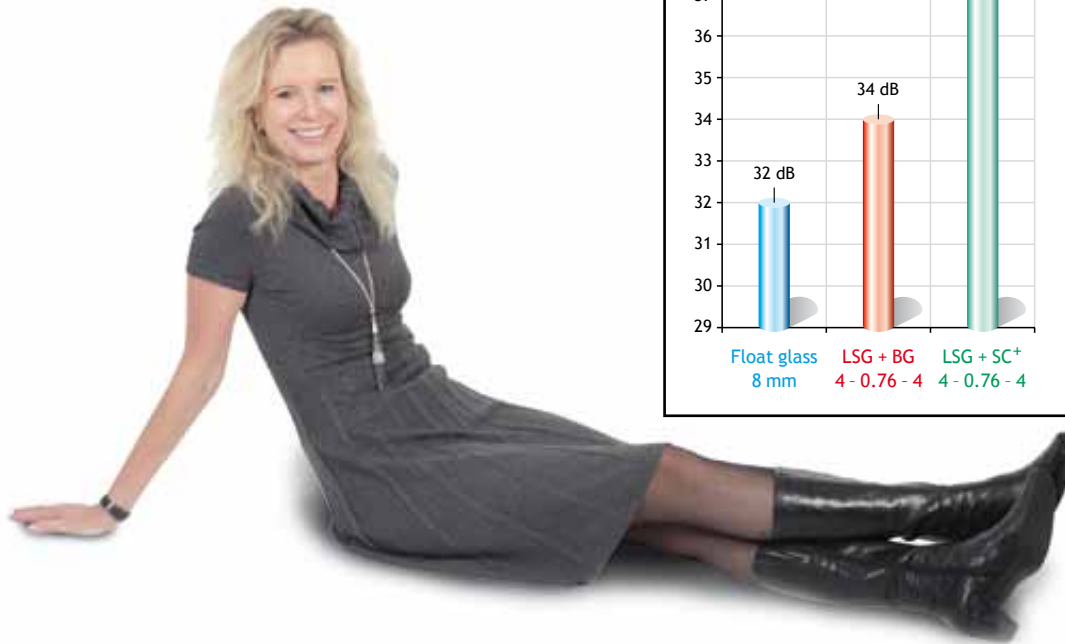


With the development of TROSIFOL® SOUND CONTROL<sup>+</sup> (TROSIFOL® SC<sup>+</sup>), a special PVB acoustic film, TROSIFOL® made a breakthrough in high-grade acoustic glazing. This monolayer film product used in multiple insulating glass combines outstanding sound protection properties with all the advantages of a conventional TROSIFOL® PVB film. Even in monolithic laminated safety glass, TROSIFOL® SOUND CONTROL<sup>+</sup> reveals its exceptional sound protection performance.

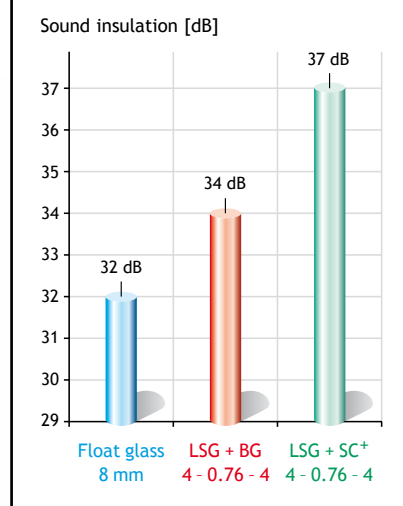
Compared to float glass of the same thickness, an improvement of 5 dB in the sound insulation value is achieved in this example with TROSIFOL® SOUND CONTROL<sup>+</sup>.

TROSIFOL® SOUND CONTROL<sup>+</sup> is a new and technically improved sound insulation PVB film. It permits superlative production efficiency thanks to its multilayer design and optimised processing much like standard product TROSIFOL® BG.

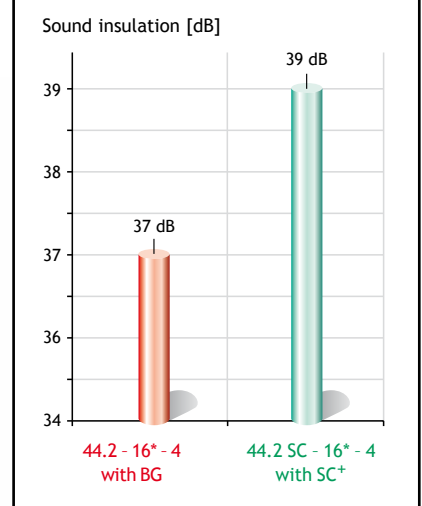




## SOUND INSULATION WITH MONOLITHIC GLASS



## SOUND INSULATION WITH MULTIPLE INSULATING GLASS

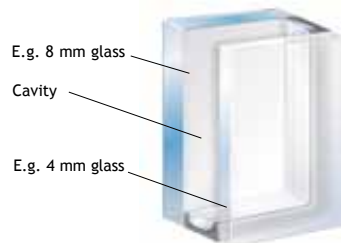


\* Argon filling

# SCOPE FOR OPTIMISING SOUND INSULATION

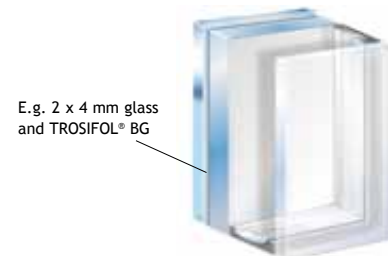
### ■ Step 1:

Asymmetrical assembly



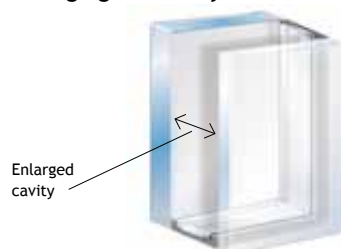
### ■ Step 3:

Use of TROSIFOL® standard



### ■ Step 2:

Enlarging the cavity



### ■ Step 4:

Use of TROSIFOL® SOUND CONTROL+



Invitations for tenders for building windows in Germany are subject to the familiar tables of VDI Guideline 2719, supplemented by the standard DIN 4109 "Sound protection in building construction".



# SOUND PROTECTION CLASSES OF INSULATING GLASS WINDOWS

## SOUND PROTECTION CLASSES ACCORDING TO VDI GUIDELINE 2719

Sound protection class <sup>1)</sup>	R <sub>w</sub> value [dB] measured on the building	Window's required R <sub>w</sub> value [dB] measured on the test stand	Glazing's required R <sub>w</sub> value [dB] measured on the test stand
1	25 - 29	≥ 27	≥ 27
2	30 - 34	≥ 32	≥ 32
3	35 - 39	≥ 37	≥ 37
4	40 - 44	≥ 42	≥ 45
5	45 - 49	≥ 47	<sup>2)</sup>
6	≥ 50	≥ 52	<sup>3)</sup>

<sup>1)</sup> For single-glazed windows with insulating glass complying with VDI Guideline 2719, Tables 2+3.

<sup>2)</sup> Single-glazed windows with insulating glass for Class 5 must undergo type testing on the test stand in accordance with DIN 52210.

<sup>3)</sup> Sound insulation Class 6 has so far only been achieved by tested box-type windows.

Important factors for the sound insulation of windows in addition to the sound insulation values of the glass include:

- Acoustic quality of the frame and casement
- Seal between the casement and frame
- Seal of the frame against the brickwork, i.e. where the window frame is firmly connected to the building.



# SOUND TEST DATA OF TROSIFOL® SOUND CONTROL<sup>+</sup>

The performance of the acoustic product TROSIFOL® SOUND CONTROL<sup>+</sup> is revealed in laminated safety glass - consisting of 2 plies of 3 mm to 12 mm float glass - sandwiching a layer of TROSIFOL® SOUND CONTROL<sup>+</sup> (0.50/0.76 mm). The measured  $R_{wp}$  values refer to the standardised test size of 1230 mm x 1480 mm.

A laminated glass assembly containing TROSIFOL® SOUND CONTROL<sup>+</sup> achieves up to 3 dB better sound insulation values than with standard PVB film.

## SOUND INSULATION VALUES OF MONO LSG CONTAINING TROSIFOL® SOUND CONTROL<sup>+</sup>

Glass 1 [mm]	TROSIFOL® SC <sup>+</sup> [mm]	Glass 2 [mm]	$R_w$ [dB]	C [dB]	Ctr [dB]
3	0.50	3	36	-1	-4
4	0.50	4	37	0	-2
5	0.50	5	39	-1	-3
6	0.50	6	40	-1	-3
8	0.50	8	41	0	-2
3	0.76	3	36	-1	-4
4	0.76	4	37	0	-2
5	0.76	5	38	-1	-3
6	0.76	6	40	-1	-3
8	0.76	8	41	-1	-3
10	0.76	10	42	-1	-3
12	0.76	12	43	-1	-3

## PRODUCT PROPERTIES OF TROSIFOL® SOUND CONTROL<sup>+</sup>

- Outstanding sound protection properties in LSG and insulating glass
- Extremely high production efficiency, above all with jumbo sizes
- Processing identical to that of TROSIFOL® BG standard products
- Outstanding transparency, clarity and light stability
- Security/safety classes conforming to EN 356 and EN 12600 much like TROSIFOL® BG
- Can be combined with any TROSIFOL® PVB film
- Passes UV radiation test to EN 12543
- Available as a refrigerated film and with PE interleaf in a width up to 3210 mm



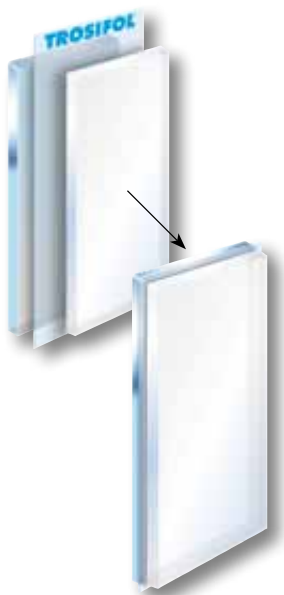
## SOUND INSULATION VALUES OF DOUBLE INSULATING GLAZING UNITS WITH LSG CONTAINING TROSIFOL® SOUND CONTROL+

Glass 1 LSG	Cavity* [mm]	Glass 2 LSG	Total thickness [mm]	Total weight [kg/m <sup>2</sup> ]	R <sub>w</sub> [dB]	C; Ctr [dB]
4	16	33.2 SC+	27	26	36	-2;-6
6	16	33.2 SC+	29	31	40	-2;-6
8	16	33.2 SC+	31	36	42	-3;-7
4	16	44.2 SC+	29	31	39	-3;-7
6	16	44.2 SC+	31	36	41	-2;-6
8	16	44.2 SC+	35	41	42	-3;-8
8	16	66.2 SC+	37	51	43	-2;-6
10	16	44.2 SC+	35	46	44	-2;-6
10	20	44.2 SC+	39	46	46	-2;-6
10	16	66.2 SC+	39	56	44	-1;-5
44.2 SC+	16	66.2 SC+	38	50	48	-2;-7
44.2 SC+	20	66.2 SC+	42	52	49	-2;-7
86.2 SC+	16	66.2 SC+	44	67	51	-2;-6
88.2 SC+	16	66.2 SC+	46	72	51	-1;-6
88.2 SC+	24	88.2 SC+	58	82	52	-2;-6

## SOUND INSULATION VALUES OF TRIPLE INSULATING GLAZING UNITS WITH LSG CONTAINING TROSIFOL® SOUND CONTROL+

Glass 1 LSG	Cavity* [mm]	Glass 2 [mm]	Cavity* [mm]	Glass 3 LSG	R <sub>w</sub> [dB]	C; Ctr [dB]
44.2 SC+	12	4	12	6	42	-3;-8
44.2 SC+	14	4	14	6	43	-2;-7
44.2 SC+	12	4	12	8	43	-2;-7
44.2 SC+	16	4	16	8	45	-3;-7
55.2 SC+	12	6	12	8	44	-2;-7
66.2 SC+	12	6	12	8	45	-1;-5
66.2 SC+	14	6	14	8	46	-2;-6
44.2 SC+	12	6	12	44.2 SC+	46	-2;-7
44.2 SC+	12	6	12	46.2 SC+	47	-2;-7
66.2 SC+	12	6	12	44.2 SC+	49	-1;-7
66.2 SC+	14	6	14	44.2 SC+	50	-2;-7

Depending on thermal insulation needs, air or argon/krypton can be used as the cavity filling gas. The tables list the measured sound test data R<sub>wp</sub> in conformity with EN 20140-3 and EN ISO 140.\*\* The values refer to the standardised test specimen size of 1230 mm x 1480 mm.



\* All values with argon as the filling  
 \*\* Test certificate on request

# PRODUCT PROPERTIES OF TROSIFOL® SOUND CONTROL<sup>+</sup>

TROSIFOL® SOUND CONTROL<sup>+</sup> acoustic PVB film satisfies all the requirements of EN 14449 and EN ISO 12543-4 and is thus assured of a long service life in laminated safety glass exposed to heat and humidity. The following table lists the key security/safety properties of TROSIFOL® SOUND CONTROL<sup>+</sup>.

## SECURITY/SAFETY PROPERTIES OF TROSIFOL® SOUND CONTROL<sup>+</sup>\*

Test method	Standard	Test result for TROSIFOL® SC <sup>+</sup>
Ball drop test	EN 356	P1A 44.1
		P2A 44.2
Pendulum test	EN 12600	1B1 33.2, 44.2
		2B2 33.1, 44.1
Ball drop test 1030 g	Construction Product List for Germany	Passed at 4 m 33.1 and 44.1



\* LSG consisting of 2 x 3 mm and 2 x 4 mm clear glass with 0.50 mm (44.1) and 0.76 SC<sup>+</sup>

## TROSIFOL® SOUND CONTROL<sup>+</sup>

Film type	Thickness [mm]	Water content [%]	Roughness R <sub>z</sub> [µm]	Widths [mm]	Length of roll PE-interleaved/refrigerated [m]
TROSIFOL® SOUND CONTROL <sup>+</sup>	0.50	0.45	30	3210	370/625
TROSIFOL® SOUND CONTROL <sup>+</sup>	0.76	0.45	40	1000/1300/1600/2000/2400/2700/3210	230/470

## ENERGY AND LIGHT TRANSMITTANCE DATA\*

Film type	Thickness [mm]	Colour	Light transmittance	Light reflectance [8° angle]	Energy transmittance	g-value	Shading coefficient	UV Transmittance
TROSIFOL® SOUND CONTROL <sup>+</sup>	0.50	Clear	88	8	75	81	101	0.4
TROSIFOL® SOUND CONTROL <sup>+</sup>	0.76	Clear	88	8	74	79	99	0.1

\* LSG with 2 x 4 mm clear glass according to EN 410

All details in %



## **TROSIFOL®**

PVB FILM FOR LAMINATED SAFETY GLASS

For further products of the Kuraray Group, please visit [www.kuraray.eu](http://www.kuraray.eu).  
You can find information on our TROSIFOL® products and services at  
[www.trosifol.com](http://www.trosifol.com).

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