

**CUSTOMER: FGR engineering srl / ZI creative – CITTADILLA (Pd)**

**ASSESSMENT OF THE SOUND-INSULATING POWER " $R_w$ " [dB \ STC] OF "DNAX – L 62" DOUBLE-GLAZED PARTITION WALL WITH EACH SKIN CONSISTING OF TWO SHEETS OF GLASS: TOTAL WALL THICKNESS 62 mm.**

The object of these considerations is the forecast assessment of the "**sound-insulating power**" achievable with panelling in modular elements, fully glazed (from floor to superimposed structure: suspended ceiling or other), composed of two sheets, each sheet made of laminated safety glass, acoustic type 6+6, with a sheet of PVB sandwiched between them for reinforcement and vibration/sound damping, nominal overall thickness of sheets 13 mm and density 33 kg/m<sup>2</sup>, mounted, with an airspace of **26 mm [1" 1/64]** between them, on suitable guides in extruded aluminium for containment along their upper and lower edges, the guides being integrated into the floor and the structure above (see attached drawing).

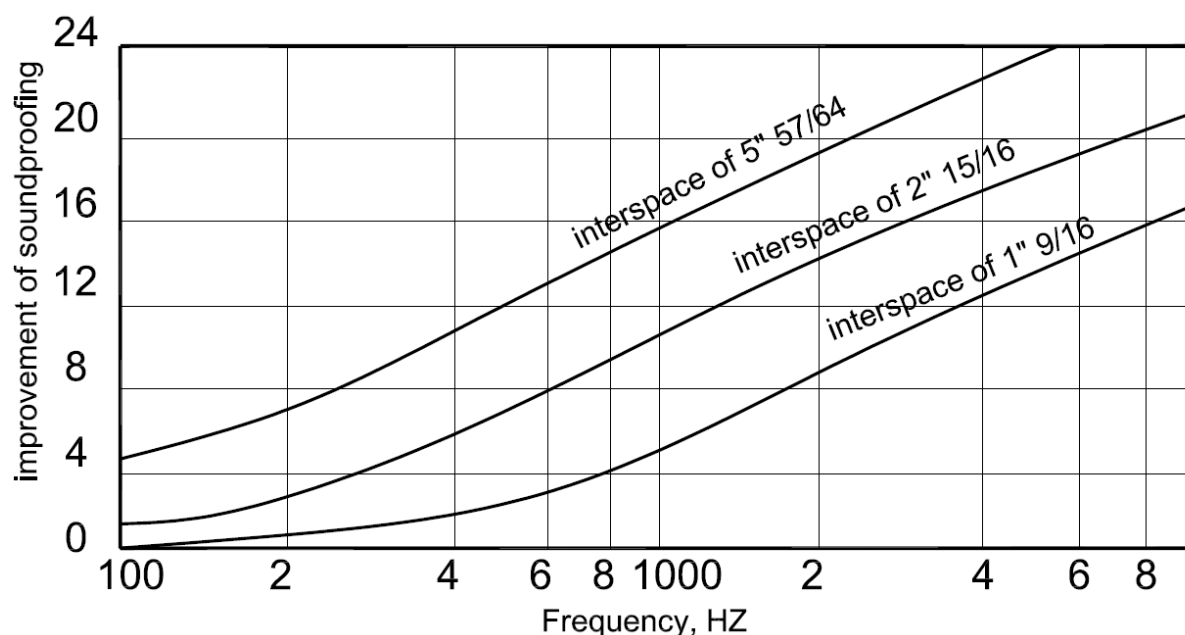
= total thickness of modular panel = **62 mm [2" 7/16]**

The normalised performance index " $R_w$ " of the sound-insulating power of each individual sheet of laminated *acoustic* glass with a PVB sheet sandwiched between the layers, is declared by the manufacturer of the glass to be **39 dB \ STC** (see specific CE certificate attached).

The new partition wall under examination will be made up of a pair of panels in laminated glass as described above, spaced 26 mm [1" 1/64] apart, fitted into a suitable profile for containment along its upper and lower edges (as for a partition wall with single sheets).

From the well-known "*mass law*" (of sound insulation):  $R_w = 20 \times \log_{10} [M \times f] - 42.5$  (dB \ STC), it follows that if the mass is doubled, there is a corresponding increase of **+6 dB \ STC** in the sound-insulating power of the new panelling.

In the case under examination a further improvement in performance is to be expected as a result of the spacing of the two sheets making up the panel. Leaving aside the complicated analytical explanation, the graph reproduced below is still helpful (from: "ELEMENTI DI ACUSTICA TECNICA" – R.Lazzarin & M.Strada – publ. CLEUP/Padua):



the graph precisely shows the effect of the thickness of the layer of air between the two panels on the improvement in sound insulation, compared with what is achievable with a single-glazed partition of equal mass. For best results it will be necessary in all cases to make the joint between the two sheets by fitting resilient seals.

As a first sufficient approximation we estimate that at the reference frequency with the midB \ STC and value at 500 Hz, the presumed improvement as a result of the airspace will be about **2.0 - 2.5 dB \ STC**.

In conclusion, it follows that even for the case which is the subject of this study, the forecast assessment of the rating in operation of the sound insulating power of the new partition is, conservatively, as follows:

$$R_{w \text{ partition}} = [39 + 6 + (2.0 + 2.5)] = \mathbf{47.0} > \mathbf{47.5} \text{ [dB \ STC]} = \text{STC (Sound Transmission Class)}$$

#### RESONANCE FREQUENCY OF THE "DOUBLE-SHEET PANEL" SYSTEM

As is well-known, this is the frequency at which, as a result of the combined effect of the elastic reaction to the acoustic pressure stress of the individual component panels, a fall in performance occurs which could compromise the acoustic insulation of the system for the particular source concerned (for example: conversation between people).

It is calculated as follows:

$$f_{\text{ris.}} = 160 \times \sqrt{\frac{0,111}{l} \times \left( \frac{1}{m_1} + \frac{1}{m_2} \right)} \quad [\text{Hz}]$$

Assuming:  $l = 0,026$  m (thickness of the airspace between the two glazed sheets)  
 $m_1 = m_2 = 33$  Kg/m<sup>2</sup> (density of each sheet)

we get:

$$f_{\text{ris.}} = 160 \times \sqrt{\frac{0,111}{0,026} \times \left( \frac{1}{33} + \frac{1}{33} \right)} = \mathbf{81} \quad [\text{Hz}]$$



a value well below the range of frequencies of interest for the problems which are the subject of these considerations:  $f = 200 > 2.000$  Hz (sound spectrum corresponding to conversation between people).



Cittadella, 12 December 2016

Attached:

- "CE" certificate for glass manufactured by *Saint-Gobain Glass*: SGG STADIP SILENCE 66.1
- Schematic section of DNAX "62" partition

			
DECLARATION OF PERFORMANCE			
<b>Saint-Gobain - Building Glass Europe</b> <small>Les Miniers, 92096 La Défense, France 1/12/2016</small>			
EN 14449:2005+AC:2005			
Laminated safety glass intended to be used in buildings and construction works			
SGG STADIP SILENCE 66.1 L0101441			
NB: 0336, 0497, 0679, 0757, 0809, 1116, 1136, 1154, 1174, 1234, 1322, 1694, 1717, 1750, 1751			
Essential characteristics	AVCP Systems	Performances	
<i>For uses relating to safety in case of fire:</i>			
Resistance to fire	1	NPD	
Reaction to fire	3,4	NPD	
External fire performance	3,4	NPD	
<i>for uses as anti-bullet or anti-explosion glazing</i>			
Bullet resistance	1	NPD	
Explosion resistance	1	NPD	
<i>for uses liable to present "safety-in-use" risks and subject to such regulations</i>			
Burglar resistance	3	P1A	
Pendulum body impact resistance	3	2B2	
Resistance against sudden temperature changes and temperature differentials	K	4	40
Wind, snow, permanent and imposed load resistance	mm	4	12
<i>for uses relating to noise reduction</i>			
Direct airborne sound insulation	dB	3	39(0;-2)
<i>for uses relating to energy conservation</i>			
Declared emissivity $\epsilon_w$	3	0.89	
U-value	W/(m <sup>2</sup> .K)	3	NPD
Light transmittance $\tau_v$	3	0.88	
Light reflectance $\rho_{ext}$	3	0.08 / 0.08	
Solar direct transmittance $\tau_{s,d}$	3	0.74	
Solar direct reflectance $\rho_{s,d}$	3	0.07 / 0.07	
g-value	3	0.79	
Durability	3	PASS	

NPD : No Performance Determined

1. Identification number of the certification body.

6 mm / 1 PVB SILENCE / 6 mm - Produced with 1 Silence interlayer

**The performance of the product is in conformity with the declared performances.****This declaration of performance is issued under the sole responsibility of the manufacturer.**

Signed for and on behalf of the manufacturer by:

Christophe Lengereau  
Marketing Director Building Glass Europe1/12/2016  
LA DEFENSE, FRANCE