COMPOR

NOISE BARRIERS

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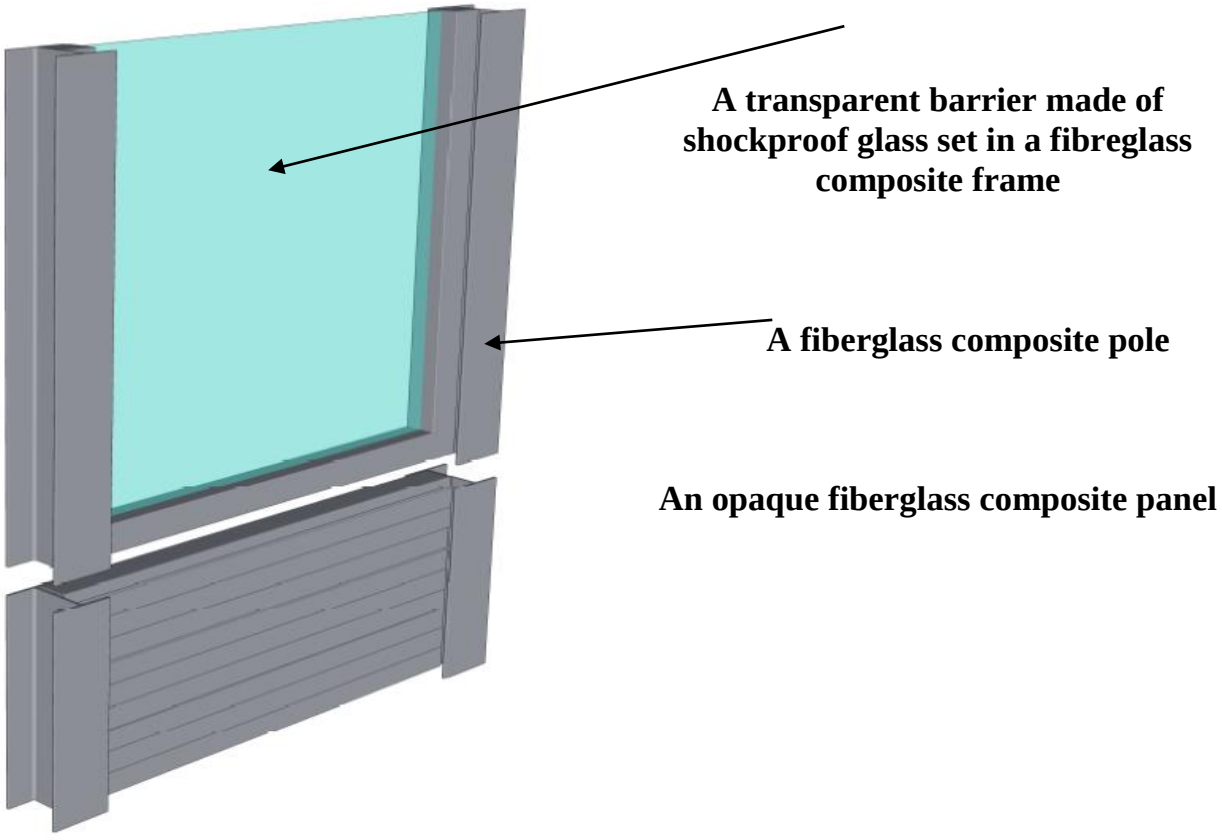
1. Brief Description of the Products

By using a modern building material – a fibreglass composite – limited company Compor has developed a new product: **noise barriers**.

Noise barriers are installed along motorways and railways in order to reduce the sound pressure on the surrounding areas. In the course of performance of their primary function, noise barrier panels are subjected to a series of power loads which occur as a consequence of the wind and aerodynamic pressure caused by cars passing by. They are also subjected to the impact of stones and other debris caused by cars passing by, and in some countries they are exposed to dynamic forces caused by snow thrown on them by snow ploughs. Limited company Compor has therefore developed noise barriers which can sustain the above forces.

The barriers may be produced in any form and type according to the customer's request, and in any combination of the main structural elements.

2. Components of the Noise Barriers



Depending on the project and the customer's requirements, there are **several types** of noise barriers:

- completely opaque barriers made of panels,

- fully transparent barriers made of shockproof glass;

- a combination of panels and shockproof glass.

In cases of combining a noise barrier with the transparent section, the shockproof glass and panel are fixed by means of special elements: angle sections made of the fibreglass composite.

Noise barrier structures are resistant to acid, alkaline and salty liquids, corrosive vapours and gases, including oil products and exhaust fumes.

Barriers made of a fibreglass composite are fully researched, and one can conclude that UV rays have no effect on this profile, as a result of which there is no ageing of the fibreglass profile due to the impact of UV rays.

The material is dielectric.

No mechanic damage (in the form of indentations and scratches) occurs during the installation of the barriers.

3. Classification and Properties of Noise Barriers

Table 3.1

Physical Properties of Noise Barriers

	Barrier Thickness	Barrier Weight	Notes
An **opaque** fibreglass barrier	92 mm	22 – 30 kg/m2, depending on the filling	Consists of a fibreglass panel with a filling. The panel's surface is embossed in the longitudinal direction.
A transparent barrier made of shockproof glass	13.5 mm	34 kg/m2	The barrier can be produced with silk-screen printing lines for protection against birds (line thickness: 2 mm and the distance between lines: 30 mm).
A combination of an opaque panel and shockproof glass		Depending on the design	

Limited company R&D Akustika has carried out a lab study to determine acoustic insulation ratings.

Table 3.2

Acoustic Properties of Noise Barriers

Design Type	**R_w**	**R_{tr}**	**α_s**
1. An opaque fibreglass composite barrier			
Thickness: 92 mm	37	32	0.8
2. A transparent barrier made of shockproof glass	37	31	0.2
3. A combination of opaque and transparent panels			
Thickness: 92 mm +13.5 mm	37	31-32	0.2-0.8
3. A **fiberglass composite *pole***			
3.1. I 150 x 150 x 10 mm	39	33	0.8
3.2. I 200 x 200 x 10 mm	39	33	0.8

R_w – sound insulation index according to the LVS ISO 717-1 Standard.

R_{tr} - traffic isolation index according to the LVS ISO 717-1 Standard.

α_s – sound absorption index according to the LVS EN ISO11654: 1997 Standard

Compliance Standards and Norms for the Noise Barriers

1. **LVS EN 1793 -** Road traffic noise reduction devices – Test methods for determining the acoustic performance;
2. **LVS EN 1794 -** Road traffic noise reduction devices – Non-acoustic performance;

   2.1. 1794-1 - Static and wind load (EN 1991-2-4), net weight, stone impact, collision safety (EN 1317-1 and EN 1317-2), dynamic load caused by slow ploughs**;**

   2.2. 1794-2 – Fire, secondary safety: danger of falling debris, environmental protection, emergency exits, light reflection EN ISO 2813, transparency

3. **LV EN ISO 140-1** – **Acoustics:** Measurement of sound insulation of building elements: Part 1: Requirements for the laboratory testing of buildings;
4. **LV EN ISO 140-3** – **Acoustics:** Measurement of sound insulation of building elements: Part 3: Laboratory measurement of sound insulation of building elements;
5. **LVS ISO 717-1** – **Acoustics:** Rating of sound insulation in buildings and of building elements: Part 1: Airborne sound insulation;
6. **LVS EN ISO 11654:1997** – **Acoustics:** Sound absorbers for use in buildings: rating of sound absorption;
7. **LVS EN 356 –** Glass in building. Safety glazing. Classification of resistance and shock testing;
8. **LVS EN 1364 –** Fire resistance tests of load-bearing elements;
9. **LVS EN 13501 –** Fire classification of construction products and building elements.

4. Description of Opaque Noise Barriers

The opaque noise barrier is made of a fiberglass composite with a filling and produced using the pultrusion method.

Fragment of an opaque sound barrier

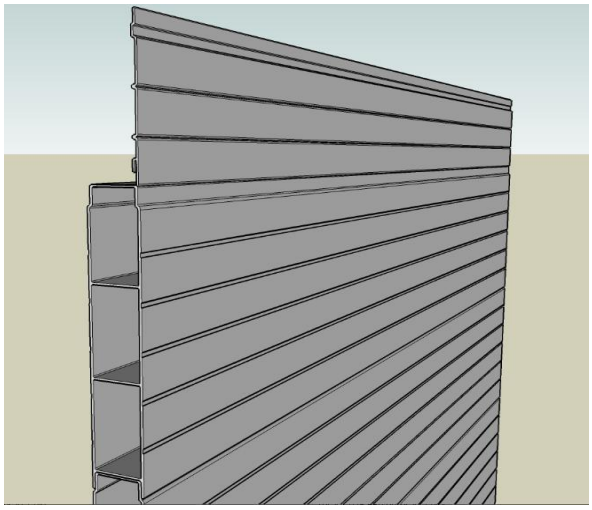


Table 4.1

Properties of the fibreglass composite

Properties	Ratios
Mechanical properties (according to LVS EN ISO 527)	
Threshold of resistance to tensile stress (longitudinal)	275-488,4 Mpa
Threshold of resistance to tensile stress (transversal)	51.6 Mpa
Threshold of compression resistance (longitudinal)	275-488,4 MPa
Threshold of compression resistance (transversal)	113.4 MPa
Threshold of bending resistance (longitudinal)	275-488,4 MPa
Threshold of bending resistance (transversal)	75.6 Mpa
Elasticity modulus	18,5 – 30,1 GPa
Deviation modulus	2.9 GPa
Poisson ratio (longitudinal)	0.35mm/mm
Poisson ration (transversal)	0.15mm/mm
Relative elongation	1.7 – 2.0 %
Physical properties (according to LVS EN ISO 527)	
Barcol's hardness	45
Water absorbing capacity	0.6% Max
Density	1.66 – 1.93Mg / M³
Linear expansion ratio (longitudinal)	$8 * 10^{-6}$ 1/K
Thermal conductivity (effective conductance) (perpendicular)	0.58 W/MK

5. Description of Transparent Noise Barriers

A transparent noise barrier is made of shockproof glass with the thickness of 13.5 mm, P2A protection class.

On customer's request a transparent noise barrier may be fitted with silk-screen printing lines to ensure protection from birds.

A fragment of a transparent noise barrier with silk-screen printing lines

Table 5.1

Properties of Shockproof Glass

PROPERTIES	***Ratios***
THERMAL AND PHYSICAL PROPERTIES (EN 673)	
Ug Ratio (W/(m_2.K))	5.4
OPTICAL PROPERTIES (EN 410)	
Light transmission (t_v)	86
Light reflection (r_v)	8
Luminous transmission index – RD65 (R_a)	97
ENERGETIC PROPERTIES (EN 410)	
Direct energy transmission (t_e)	66
Energy reflection (r_e)	7
Total energy absorption (a_e)	27
Shading ratio (SC)	0.84
UV transmission (UV)	0

In developing the design of the noise barriers, company Compor took into account the fact that the glass should be such as to prevent the spreading of fire. Transparent noise barriers do not reflect light that can interfere with traffic safety. The glass is produced so as to ensure that no evaporation or smoke comes from the glass when it is exposed to fire and other processes.

6. Combined Noise Barriers from Panels and Shockproof Glass

In cases of combining a **noise barrier** with the transparent section, the shockproof glass and panel are fixed by means of special elements: angle sections made of the fibreglass composite.

All panels can be equipped with **safety ropes**. In case of an accident the barrier remains fixed to the structure.