

ACRYLIC TRANSLUCENT PANELS

Providing excellent design
and blending with the scenery

Acrylic translucent panels are finding an increasing range of applications thanks to a variety of their excellent characteristics

Acrylic translucent panels have been used in many sound barriers thanks to their excellence in sound insulating, scenic, and daylighting properties. As the panels were successfully used years after years, their total economy, backed by safety and weather resistance, has been evaluated. Recently the panels are used in snow fences, windbreak fences, wave splash barriers, entrance/exit roofs of underground passage, and the raising of water cutoff walls.

Workability is one of the excellent characteristics of acrylic translucent panels. In fact, the panels can be worked into a variety of shapes, so that they can be used in a broad range of applications.





High transparency, with superb sound insulation and safety

Easy maintenance and recycling

Extremely high transparency that does not obstruct view

The initial light transmittance of acrylic translucent panels is as high as 92% (for panel thickness 12 and 15 mm), which does not obstruct view.



Sound insulation works stably from low to high-tone ranges

The standard panels are 12 mm and 15 mm, which are thick enough to provide stable sound insulation from low-tone to high-tone ranges. The sound transmission losses are, for example, 29 dB at 400 Hz and 34 dB at 1,000 Hz, which are all above the standard values of NEXCO.

■ Sound transmission loss (in dB)

200Hz	26dB
400Hz	29dB
1,000Hz	34dB
1,600Hz	35dB

Note: Values are for acrylic plate thickness of 15 mm.

■ Reference information: Standard values of sound transmission loss (dB) by East, Central, and West Nippon Expressway Companies (year 2009)

Frequency	Type	Light shielding plate	Sound absorbing plate
	400Hz		≥ 25 dB
1,000Hz		≥ 30 dB	≥ 30 dB

■ Basic specifications of acrylic translucent panels

	With antiscatter function		Without antiscatter function
Plate thickness	12mm	15mm	
Specific gravity	1.19		
Master plate size	2.0×2.0m	4.0×2.0m	
Nylon cord	Yes	No	

Note: Nylon cord comes in black or transparent.

Excellent strength and weather resistance enable prolonged use

Acrylic is superior in mechanical characteristics, such as tensile strength and bending strength, to polycarbonate. In addition, the weather resistance is nearly permanent, the mechanical characteristics decrease as little as 0.5% per year, and transparency remains as high as 96 to 98% of the initial value in ten years. These characteristics are combined to provide a very long useful life, which is an important economic factor.

■ Mechanical characteristics of acrylic plate (nylon cord included) - typical

Specific gravity	1.19
Tensile strength (N/mm ²)	77
Elastic modulus (N/mm ²)	3,310
Elongation (%)	9
Bending strength (N/mm ²)	110
Linear expansion coefficient (mm/mm/ °C)	7×10 ⁻⁵

■ Cargo load weight test condition

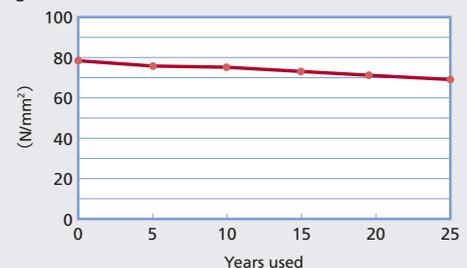


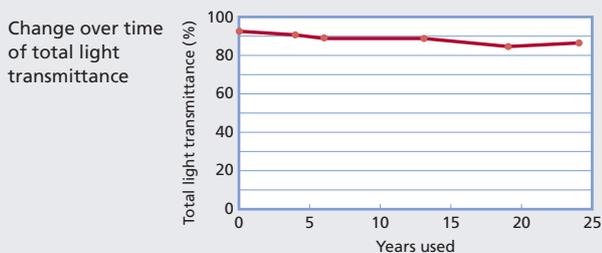
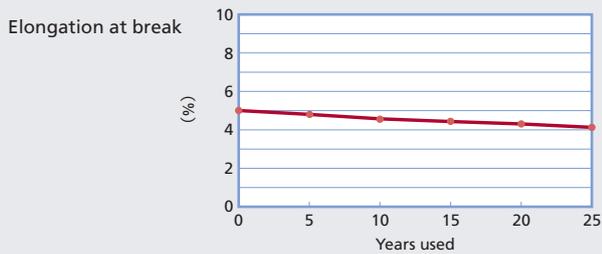
Before cargo loading

Loaded with cargo at 200 kg/m²

■ Change over time of acrylic plate

Tensile strength





Constructed to prevent scattering of fragments when exposed to a large impact

The panel is broken when exposed to a strong impact, but the antiscatter nylon cord incorporated in the panel prevents almost all fragments from being scattered.



Impact test with an iron ball



Impact test was conducted by dropping a weight of 300 kg from a height of 95 cm, giving an impact energy of 2.85 kJ. The panel was broken, but 99% of the fragments were prevented from falling thanks to the nylon cord. Impact tests using larger impact energy resulted in virtually no falling of fragments.

Flame retardance improved with addition of flame retardant

Acrylic itself is combustible, but it becomes semi-flame resistant when a flame retardant is added.

Combustion test

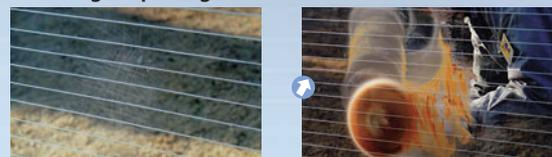


This combustion test simulates a vehicle fire on an acrylic translucent sound barrier. Acrylic translucent panels reinforced with 15-mm thick nylon cord were built to a height of 6 m with posts installed at intervals of 4 m. Twenty liters of gasoline was used, and the gasoline combustion time was set to 5 minutes. As a result, ignition occurred on the panel surface, but it ceased after the end of gasoline combustion. The panel meets the flame resistance standards of NEXCO.

Easy maintenance and straightforward recycling

Since the panel surface is flat and smooth like the glass surface, it is less prone to dust deposits and most dirt is washed naturally by rainwater, thus maintenance is streamlined. Thanks to superior weather resistance, the acrylic translucent panel usually is not applied with surface treatment, so that it can be washed and polished for damage repairs. In addition, the panel is easy in recycling as it is made of a single material.

Damage repairing



1 | Damage condition

4 | Buffing



2 | Surface adjustment with sandpaper



3 | Application of abrasive



5 | Repair completed

Sound barrier

National Route 4

Morioka, Iwate Pref.

Completed in April 2004

The full translucent type without a top frame provides no feeling of pressure to pedestrians and drivers alike. Photocatalytic treatment is provided for antifouling.



Sound barrier



Tokyo Gaikan Expressway

Misato, Saitama Pref.

(between Misato Junction and Misato-minami Interchange)

Completed in September 2004

A beautifully curved sound barrier. A full translucent type (partly acrylic translucent panels combined with sound absorbing plates) composite with balustrade, with no top frame. This type can also be installed on the rounded road segment.



Sound barrier

Shin-Tomei Expressway

Toyota, Aichi Pref.

(between Toyota-minami Interchange and Toyota-higashi)

Completed in March 2005

A full translucent type composite with balustrade. The structure with no top frame provides an excellent sense of openness. The acrylic translucent panel is pasted with a photocatalytic sheet as anti-blemish and anti-fouling measures.



Sound barrier

Yokohama Ring Expressway Route 2

Yokohama, Kanagawa Pref.

Completed in March 2005

The top is tilted inward. This is a full translucent type, partly including satin (opaque glass) to protect the privacy of inhabitants along the road. No top frame is installed.



Sound barrier



National Route 2 Bypass (between Aioi and Une)

Aioi, Hyogo Pref.

Completed in June 2007

Lush mountains range along National Route 2 Bypass. The full translucent sound barrier without a top frame lets the drivers feel and enjoy the nature.



Sound barrier

Shin-Meishin Expressway

Koga, Shiga Pref. (near Koga Tsuchiyama Interchange)

Completed in February 2008

A sound barrier consisting of acrylic translucent panels and sound absorption plates. Provides excellent sound insulation while maintaining the sense of openness.



Sound barrier

Fukuoka Toshi Expressway

Jonan-ku, Fukuoka Ref.

Completed in March 2008

This road runs through urban districts dense with buildings and houses on both sides. The acrylic translucent panels provide high sound insulation that minimizes the influences on the surrounding environment.



Sound barrier



Metropolitan Inter-City Expressway

Kuki, Saitama Pref.

Completed in March 2011

Framed acrylic translucent panel type. This structure can be constructed with the same method as for sound absorbing plates. It is combinable with sound absorbing plates.



Wave splash barrier

Port of Funagawa

Oga, Akita Pref.

Completed in March 2012

Used as a wave splash barrier in bad weather. The area directly inside allows for parking to enjoy the scenery. Hard coat is applied for protection from blemishes.



Water cutoff wall

Ishizaki River Cutoff Wall

Yokohama, Kanagawa Pref.

Completed in September 2005

A cutoff wall for protection from flooding. Here again, the translucence of the panel is utilized, permitting the sunlight to through to the offices and houses along the river.



Falling object preventive fence



Theme park accessway

Urayasu, Chiba Pref.

Completed in July 2003

The dot point feature makes the panel joints less visible, and the panels are translucent, allowing for fully enjoying the scenery around.



Falling object preventive fence

National Route 11, Kosaka Elevated Bridge

Matsuyama, Ehime Pref.

Completed in September 2006

When automobiles flip pebbles, the falling object preventive fence prevents the pebbles from flying out of the elevated bridge. The translucent structure without a top frame allows the driver to run with no feeling of pressure.



Windbreak fence

Umihotaru Parking Lot

Umihotaru, Kisarazu, Chiba Pref.

Completed in December 2004

Sea winds blow in as the entrance and exits of the parking lot are open. The acrylic translucent panels used as windbreak fences also serve to prevent crimes as they are translucent.



Shelter



Niita Shelter

Akita, Akita Pref.

Completed in September 2005

Acrylic translucent panels are used in the roof of the entrance/exit of this underground passage. It excels in daylighting, as well as expected crime prevention. Hard coat is employed for protection from blemishes.



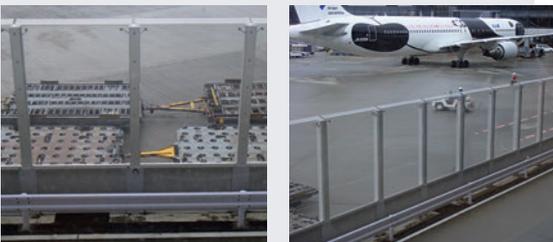
Blast fence

Blast fence

Narita, Chiba Pref.

Completed in March 2006

Due to its location and structure, the airport is prone to winds blowing through and dust scattering around. The translucent panels block dust from entering the roads and prevent slip accidents. They also preserve views in the airport.



Colored, opaque acrylic sound insulating panels

An assortment of colored, opaque sound insulating panels are offered to suit various environment conditions and usages.

■ **Basic specifications**

Plate thickness	12mm·15mm
Specific gravity	1.19
Color	7 colors: steel blue, sky blue, midnight blue, sea green, spring green, forest green, and smoky brown



High-rigidity acrylic sound insulating panel (PLS-NT)

The high-rigidity sound insulating panel (PLS-NT) consists of a conventional acrylic plate incorporating an inorganic fibrous material, with a result of a rigidity equivalent to that of a concrete plate. More lightweight than concrete, and five colors are selectable. In addition, the acrylic base provides more than 30 years of service life.

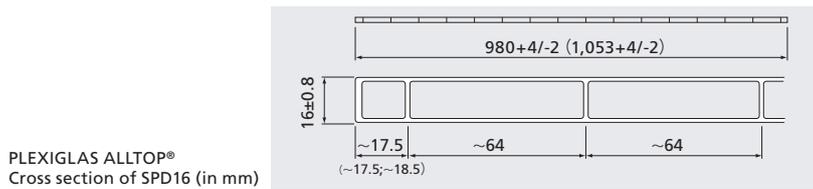
■ **Basic specifications**

Plate thickness	12mm·15mm
Specific gravity	1.67
Weight	20.04 kg/cm ² for 9-cm thick type (cf. 225 kg/m ² for concrete)
Color	5 choices: light gray, light blue, mint green, blue gray, and brown
Surface	Lustrous or matte (selectable). Matte surface provides reflection prevention. Antifouling (TiO ₂ photocatalyst) coating is possible.
Others	A scatter prevention type (incorporating nylon cord) is available on request for roads involving a bridge or side road.



PIEXIGLAS ALLTOP® SDP16

PLEXIGLAS ALLTOP® SDP16 is a high-impact acrylic (polymethylmethacrylate: PMMA) double-skin sheet designed with excellent transparency, heat insulation, and weather resistance. The high installation workability makes SPD16 an ideal sheet glass material.



Characteristics of acrylic translucent panel

Test item	Unit	Test method	Standard value
Tensile strength	MPa	JIS K 7162	(≥ 70)
Tensile fracture strain	%	JIS K 7162	(≥ 4)
Tensile elastic modulus	MPa	JIS K 7162	(≥ 3,000)
Charpy impact value (without notch)	KJ/m ²	JIS K 7111	(≥ 13)
Vicat softening temperature	°C	JIS K 7206	(≥ 105)
Heating dimensional change rate (contraction)	%	JIS K 6718-1	(≥ 2.5)
Total light transmittance	%	JIS K 7361-1	(≥ 90)
Yellowness		JIS K 7105	<= 7>
Haze value	%	JIS K 7136	<= 10>
Acoustic characteristic	dB	JIS A 1416	Transmission loss: 25 dB or more for 400 Hz, and 30 dB or more for 1 kHz

Notes: - Values in parentheses () are JIS standards.
 - Values in angle brackets <> are those observed after 5,000 hours of accelerated exposure test.
 - Test methods are as specified by JIS standards for methyl methacrylate sheets (JIS K 6718-1).

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