

# EXOTHERMIC CLEAR RESIN SHEET

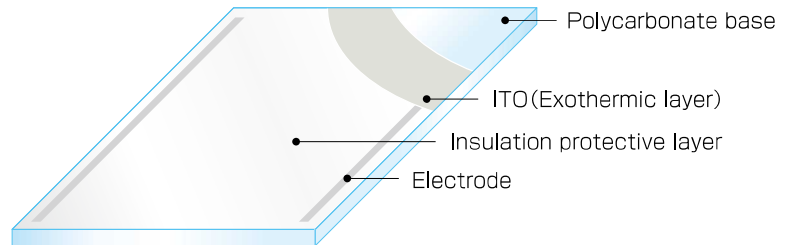
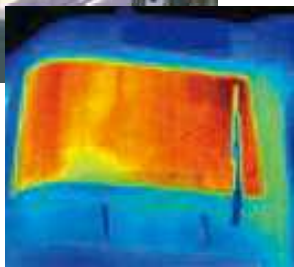
## CLEARHEAT®



**Exothermal Polycarbonate Plate**

**Patent Pending**

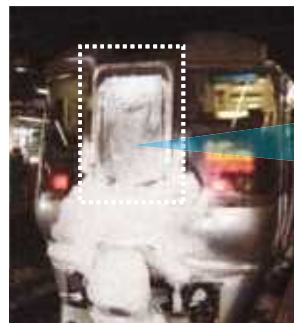
CLEARHEAT®, by demand, has been developed with more powerful abilities of exothermal properties and dew condensation prevention for the polycarbonate resin window which has been experienced as anti-window breaking measure in the railway vehicle.



- Melting snow effect and the prevention of dew condensation: the thawing ability is verified under  $-30^{\circ}\text{C}$  circumstances.
- High Quality of Transparency: Parallel ray transmittance over 80% ( $550\text{W}/\text{m}^2$ )
- Ability of Temperature Control Exothermic Performance  $\Delta 10^{\circ}\text{C} \sim \Delta 60^{\circ}\text{C}$  Electricity consumption is customizable as customer's request.
- The exothermal function was proved it still worked under the falling weight test (Weight 500g x Height 5m)



Before installed  
(Window covered with snow)



After installed  
(Window Magnified)



### Melting Snow Process

Snow at the exothermal window surface is thawed when running.



\*Figures shown are fixed from actual values or calculated values, and are not guarantees of actual performance.



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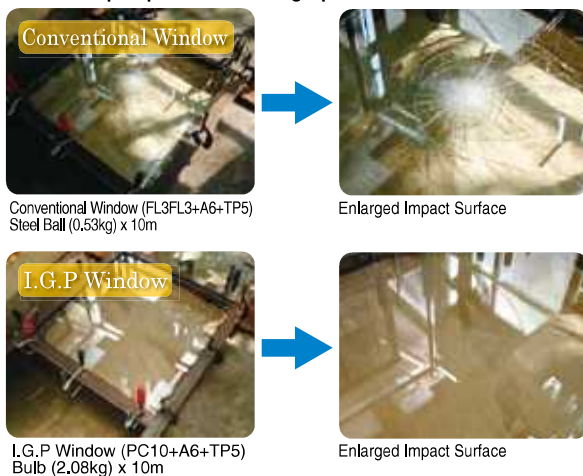
I.G.P (Insulation Glass & Polycarbonate) is a type of window constructed from a layer of polycarbonate incorporated into the glass unit, which results in increased impact resistance, stable product quality, improved resistance to condensation, and reduced installation time.

	Outline Diagram	Photographs of Actual Use	Features
2-layer Unit Window			<ul style="list-style-type: none"> <li>◎ Impact Resistance (To prevent window cracking)</li> <li>◎ Lightweight</li> <li>● Heat Insulation</li> <li>● Noise Isolation</li> <li>● Transparency (Weather resistant)</li> <li>● Exceptional Air Tightness</li> <li>● Condensation Resistance</li> <li>● Scratch Resistance</li> <li>● Certified Incombustible from Train Materials Fire Test</li> </ul>

## Impact Resistance (Window Crack Prevention)

The external layer is constructed of polycarbonate resin panel, which has an impact strength that is more than 30-times stronger than tempered glass, providing an effective prevention of window cracking. The I.G.P glass shows particularly strong impact resistance against objects that impact from an angle.

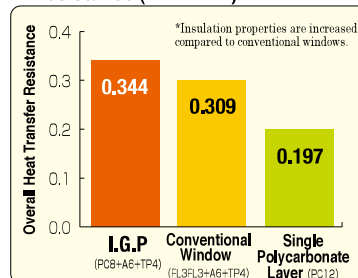
### ◎Ball Drop Impact Test Photograph



## Heat Insulation

Constructed with the polycarbonate resin layer on the exterior, the thermal conductivity of the I.G.P windows is 1/4 that of glass. Additionally, the multi-layered construction provides exceptional resistance to overall heat transfer. Therefore, the I.G.P windows should reduce the need for heating during the winter period. (Contributing to CO<sub>2</sub> reduction.)

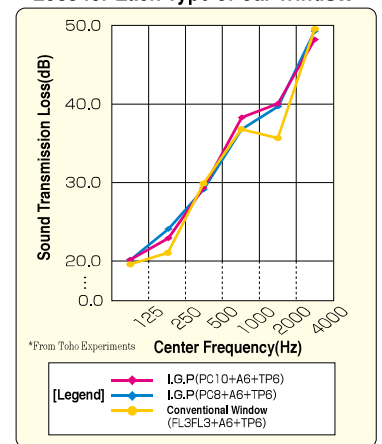
### ◎Comparison of Overall Heat Transfer Resistance (m<sup>2</sup> · K/W)



## Noise Isolation

The combination of different materials (glass and polycarbonate) not only reduces the weight of the window, it also preserves noise isolation at a higher level than conventional windows.

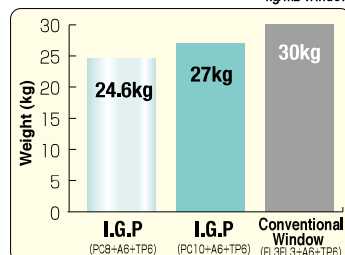
### ◎Comparison of Sound Transmission Loss for Each Type of Car Window



## Lightweight

### ◎Comparison of Car Window Weight

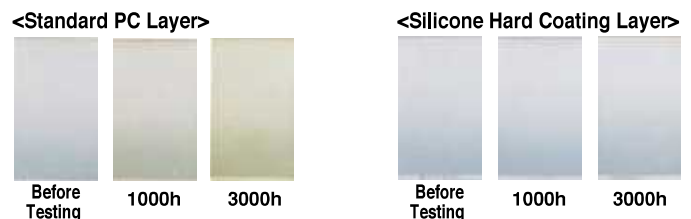
The polycarbonate resin panel is approximately 1/2 the weight of glass, enabling considerable weight reduction of the car.



## Transparency (Weather Resistance Discoloration)

A UV protective treatment is applied to the surface of the polycarbonate making it less likely to discolor compared to standard windows.

### ◎Sunshine Weather Meter Accelerated Weathering Test



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