UTILITY MODEL PATENT

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Title

High-Rigidity Insulating Glass Unit

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Abstract (57):

The high-rigidity insulating glass unit, intended as a translucent construction element for buildings, comprises two or more glass panes that are hermetically bonded together. It includes a rigid reinforcing profile firmly embedded between the glass panes along their edges, and optionally a perforated spacer frame that is rigidly connected to the reinforcing profile and bonded to the glass panes.

Description

Field of the Utility Model

This utility model relates to the field of industrial building materials and in particular to the manufacturing of high-rigidity insulating glass units. It is applicable in frameless curtain wall facades, windows, and translucent building components like floors and ceilings.

Prior Art

A similar structure is known from Ukrainian Patent No. 33278, which involves hermetically bonding multiple panes of glass. However, the drawback is that the outer glass bears the wind load while the inner panes are passive. This results in insufficient rigidity, limiting their use in structural facades. The solution requires full integration and rigidity among all panes.

Summary of the Utility Model

The objective of the invention is to enhance mechanical properties and enable full load sharing between panes. This is achieved by bonding a rigid reinforcing profile between the panes and optionally integrating a perforated spacer frame. The materials used must meet specific mechanical property requirements including:

a) Modulus of elasticity: $4\times10^{7}\ \mathrm{N/m^2} \le E \le 3\times10^{10}\ \mathrm{N/m^2}$

b) Poisson's ratio: $0.15 \le \eta \le 0.45$

c) Tensile strength limit: $1\times10^{6}\ \mathrm{N/m^2} \le \sigma \le 3\times10^{8}\ \mathrm{N/m^2}$

Detailed Description

The insulating glass unit includes two or more glass panes vertically assembled with inert gas or air sealed inside. A reinforcing profile and a high-strength adhesive ensure structural integrity. This configuration eliminates the need for vertical support elements, reduces installation time, and enhances the overall aesthetic of the glass surface. The resulting structure behaves as a monolithic glass block with improved wind resistance and durability.

Claims

1. A high-rigidity insulating glass unit, comprising two or more glass panes hermetically bonded with a rigid reinforcing profile inserted between the panes and optionally a perforated spacer frame rigidly connected to the reinforcing profile.

2. The unit of claim 1, wherein the reinforcing profile is bonded to the glass using a high-strength multi-component adhesive.

3. The unit of claim 1, wherein the mechanical characteristics of the materials meet the following criteria:

a) Modulus of elasticity: $4\times10^{7}\ \mathrm{N/m^2} \le E \le 3\times10^{10}\ \mathrm{N/m^2}$

b) Poisson's ratio: $0.15 \le \eta \le 0.45$

c) Tensile strength: $1\times10^{6}\ \mathrm{N/m^2} \le \sigma \le 3\times10^{8}\ \mathrm{N/m^2}$

4. The unit of claim 1, wherein the reinforcing profile and adhesive can be transparent or opaque depending on design needs.

5. The unit of claim 1, wherein the reinforcing profile is made from various materials fulfilling the above mechanical criteria.

Certification

This patent was registered in the State Register of Patents of Ukraine for Utility Models on 27 March 2017, and issued under the authority of the State Intellectual Property Service of Ukraine.

Signed:
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