

Sloped and Overhead Glazing, Skylights and Point-Supported Canopies

Introduction

Glass which slopes more than 15° from the vertical is considered sloped glazing by the major model building codes. Laminated glass is the preferred product for sloped and overhead glazing, because the glass is retained in the opening, even

when broken, reducing the possibility of injury from falling glass. Costly and unsightly screens are therefore not required. Laminated products are widely used in malls and in atriums in hotels and offices.

Description

Laminated glass for use in sloped and overhead glazing can be used monolithically or fabricated into insulating glass units. Insulating glass units typically consist of an outboard lite of heat-strengthened glass that resists accidental damage caused by falling objects, and an inboard laminated glass that captures any fragments. Tempered glass is not normally recommended for the outboard lite as small broken particles can easily slide down the outside of the roof and onto the ground in the event of accidental damage.

This type of laminated glass often incorporates heat-strengthened or tempered glass to meet the structural performance requirement, so that heavy snow loads and high wind loads can be accommodated. In addition, when tinted or reflective glass is used to control the solar heat gain, it is usually necessary to use heat-strengthened glass to avoid the possibility of thermal breakage. When heat-strengthened or tempered glass is used in a laminated glass, the minimum interlayer thickness is generally 0.060" (1.52 mm).

Capabilities

Oldcastle Glass® can calculate the most suitable glass for use in any given application. However, it is the responsibility of the design professional to calculate and provide the equivalent design load. This calculation must take into account the correct combination of snow load (if applicable),

wind load and dead load. Without the equivalent design load, Oldcastle Glass® must rely on the conservative limits recommended by the American Architectural Manufacturers Association (AAMA) for four-side uniform support.

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Capabilities (continued)

AAMA Guidelines for Overhead Glazing

Designation in inches	Glass Type	Outboard Lite in inches	Air Space in inches	Inboard Construction Glass-PVB-Glass in inches	Maximum Size sq. ft.	Weight lbs/ft ²
1/4	Annealed	–	–	1/8 - 0.030 - 1/8	12	3.42
3/8	Annealed	–	–	3/16 - 0.030 - 3/16	18	5.05
1/2	Annealed	–	–	1/4 - 0.030 - 1/4	24	6.67
5/16	Heat-strengthened	–	–	1/8 - 0.060 - 1/8	25	3.58
7/16	Heat-strengthened	–	–	3/16 - 0.060 - 3/16	40	5.21
9/16 ⁽¹⁾	Heat-strengthened	–	–	1/4 - 0.060 - 1/4	40	6.83
13/16 ⁽¹⁾	Heat-strengthened	–	–	3/8 - 0.060 - 3/8	40	10.09
1 1/16 ⁽¹⁾	Heat-strengthened	–	–	1/2 - 0.060 - 1/2	40	13.33
7/8	Annealed	1/8	1/2	1/8 - 0.030 - 1/8	12	5.05
1 1/16	Annealed	3/16	1/2	3/16 - 0.030 - 3/16	18	6.67
1 1/4	Annealed	1/4	1/2	1/4 - 0.030 - 1/4	24	8.29
15/16	Heat-strengthened	1/8	1/2	1/8 - 0.060 - 1/8	25	5.21
1 1/8	Heat-strengthened	3/16	1/2	3/16 - 0.060 - 3/16	40	6.83
1 5/16	Heat-strengthened	1/4	1/2	1/4 - 0.060 - 1/4	40	8.45

These are conservative designs assuming the glass is horizontal with maximum snow load. Detailed engineering design particularly on sloped glazing can often increase the maximum allowable size.
(1) These products are recommended for point-supported canopies.

Point-Supported Canopies

Point-supported canopies are commonly used as features at entrances to offices, stores and residential properties. They are defined as overhead glazing where the glass is supported by fasteners that pass through holes in the glass and that cannot be offered in annealed glass due to high stresses. The support structure can be either above or below the glass. This type of design is specifically excluded from ASTM E1300 *Standard Practice for Determining the Load Resistance of Glass in Buildings* and needs careful, specific engineering design. Oldcastle Glass® regularly supplies this type of glass but insists that a thorough engineering design should be completed.

Oldcastle Glass® offers the following design guidelines for point-supported glass:

1. The glass in these applications is typically designed as a nonenclosed structure as the wind load acts both as an uplift on the upper surface and a pressure on the lower surface. Adding this wind load to the snow load and dead load can result in very large loads. Assuming that a high wind will blow considerable amounts of snow off the canopy, it is standard practice to use a design load calculated as the greater of:
wind load + 1/2 snow load, or 1/2 wind load + snow load.

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Capabilities (continued)

2. The maximum stress on point-supported canopies may not be at the point of maximum bending moment. The holes and fasteners often create large local stresses that must be accounted for. Fasteners must therefore have a flexible capability so that local loads do not develop as a result of deflections.
3. Deflection is often the limiting design criterion on these types of applications. If one is designing for strength, a safety factor of 5 should be used.
4. It is extremely important that the holes are sized to give adequate clearance from fasteners. It is common in laminated glass to experience a small amount of slippage between the two lites, and therefore extra clearance is often used to avoid any problems.

Additional Important Information

Design Criteria

Details on the following important topics can be found in the Black Design Criteria Tab: Glazing Instructions, Thermal Stress, Deflection, Glass Design Loads, Glass Thickness Selection, Spontaneous Breakage of Tempered Glass, Roller Wave Distortion in Heat-treated Glass, Mock-ups and Warranties.

Specifications

A sample Section 08800 Specification for North America can be found in the Black Specifications Tab. Information specific to two-ply (two lites of glass) laminated glass can be found in Part 2 Products, 2.02 Materials.

For specifications on other laminated glass makeups, call 1-866-OLDCASTLE(653-2278) or log on to www.oldcastleglass.com and click on "Need Assistance with a Project," click on "General Inquiry" and enter your request.

Contact Us

For any additional information, including details, technical data, specifications, technical assistance and samples, or to speak with an architectural specialist, call 1-866-OLDCASTLE(653-2278).

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