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THE HYBRID (GREEN) SKYLIGHT/WALL SYSTEM – Patented

In the skylight industry there are two general categories...small units skylights and large (monumental) skylights.

Large skylights are typically glazed with multiple pieces of glass, most often two layers of glass sealed together at the edges. These are known as IG (insulated glass) units. They have become the most common glazing material for the monumental glass industry. Building codes typically require that the inner glass lites be made of glass which is tempered and laminated. Typically, it may consist of two pieces of 3/16" thick glass with a .060" thick plastic interlayer melted between the two pieces. Presumably, in the event of breakage, this combination is less likely to fall in pieces which will cut the objects (or people) on which it falls. Wall systems are usually of similar construction, except the inner lites are not laminated.

One of the ongoing problems with IG units is that they lose their seal with age. When they do, they fog up. In so doing, they look bad and they lose some of their insulating value.

An IG unit, using low-e treatment at the outer lite, and having the traditional 1/2" airspace, will generate an insulating R-value of about 3.57. This can be improved slightly by filling the "air space" with Argon instead of air.

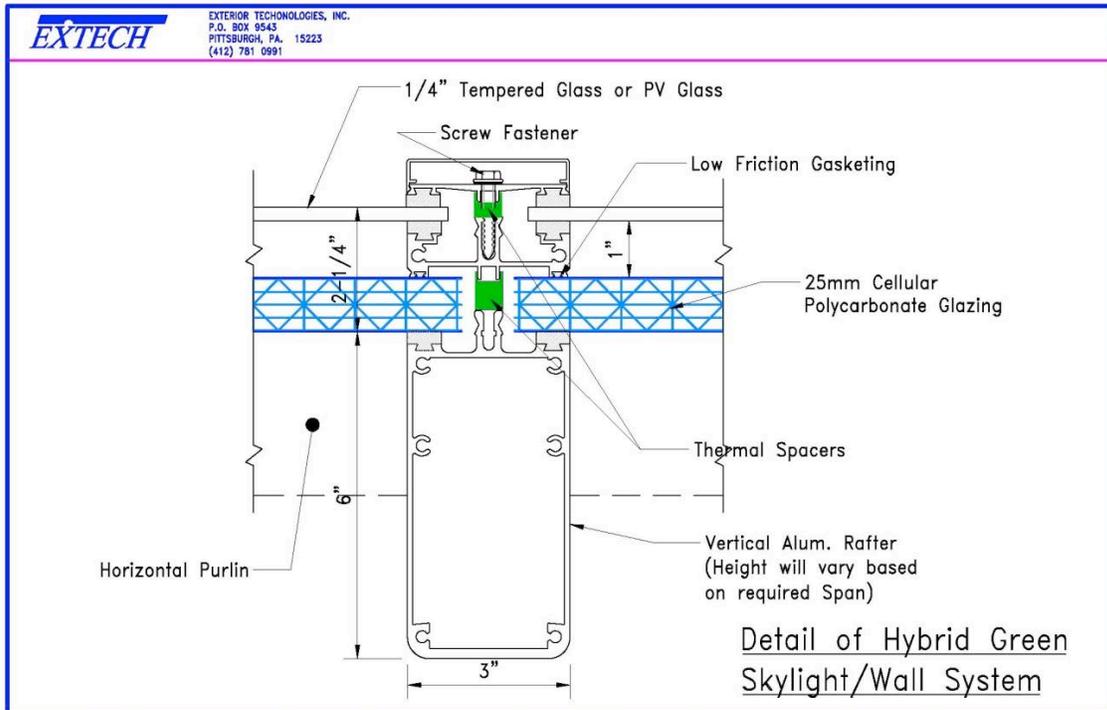
An alternate skylight/wall configuration, a hybrid design, is both greener and safer. It uses an outer lite of (for example) 1/4" thick glass with the same low-e treatment. However, instead of attempting a seal between that glass and another piece of glass, the inner lite is made of cellular polycarbonate, one of the newer technologies in glazing materials. Polycarbonate is a recyclable material known for its tremendous strength and impact resistance. By using this cellular material, typically 1" thick, an overall glazing R value can be generated in the range of 6.46.

There are other advantages to this hybrid system of glass and polycarbonate. The inner polycarbonate glazing, because it is cellular, will diffuse the light, therefore eliminating hotspots within the building. Further, this combination eliminates the possibility of a broken seal (since there is no seal). In addition, should the outer skylight glass be broken and require replacement, it is much less expensive to replace only the single piece of 1/4" thick glass than it is to replace an IG unit.

Consider replacing broken glass. When an IG unit must be replaced, there will be a large hole in the roof or wall until the replacement is complete. By comparison, with the hybrid design, the polycarbonate lite stays in place and serves to keep out cold (or hot) air during the repair process and it also serves to prevent materials from falling into the building while changing the broken glass.

One possible negative of this improved skylight/wall system is in the area of fire codes. Although 1" thick cellular polycarbonate is rated CC1 and Class C relative to the ASTM E-84 test, some building codes do not allow its use unless it covers less than 1/4 of the ceiling of a given room. The local code official has the final jurisdiction in these matters. Generally, he/she will approve polycarbonate for a large installation, assured by the fact that these materials are considered self-extinguishing and because they are used for total roofs and large wall areas throughout Europe and Asia.

The initial cost of the hybrid skylight/wall is, generally, in the same range as the cost of the old style. However, the hybrid system will be much less expensive on a life cycle basis. It has lower maintenance costs...and massive energy savings.



A sectional view through a rafter/mullion.



Outdoor testing of a 2'x4' mockup. Both plain glass and simulated PV glass were used (alternatively) for the outer lites. Both clear and opal 25mm cellular polycarbonate were used for the inner lites. Measurements were taken for light transmission, ambient temperature, temperature in the airspace between glazing materials, and shading coefficient.

The future is bright and green with the EXTECH Hybrid Green Skylight/Wall System.