

Fire Engineering®

Construction Concerns: Greenhouses

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By Gregory Havel

For www.fireengineering.com

At one time, greenhouses were used seasonally to start plants from seeds during the late winter so that they would be ready for gardens as soon as the soil was warm enough. These greenhouses (photo 1) were usually simple structures of wood and glass with side windows and a roof section that you could open for ventilation and to control the indoor temperature. In colder climates, they often had a wood or oil-burning stove or a small boiler to prevent freezing at night. Although most older greenhouses were made of glass in wood frames, some were built of steel frames with glass panes. Greenhouses were also used to house plants from outdoor summer gardens that were not hardy enough to survive snow and freezing temperatures.



(1) Photos by author.

September 10, 2018

With the increasing availability of plastics in the 1960s, greenhouses were built using plastic sheets. Photo 2 shows a greenhouse at a college that was built of corrugated fiberglass-reinforced plastic sheets supported on wood frames. This product was translucent and more resistant to breakage than glass, although it was combustible, which glass was not.



(2)

With the rapidly increasing price of energy in the 1970s and 1980s, greenhouses made of single-pane glass or plastic became expensive to operate. Greenhouses of extruded aluminum frames with double-pane insulating glass were developed and marketed. Photo 3 shows a greenhouse of this type, built in the 1990s, with manually-operated windows near the bottom of the wall and an electrically-powered roof section for ventilation. This greenhouse uses a high-efficiency gas furnace for heat in winter, when sunlight alone does not provide enough heat. The construction of these greenhouses is similar to the entrances and fronts of modern office buildings and mercantile occupancies, except that they are the primary structure rather than an accessory attached to a building of masonry or other material.



(3)

Also developed were greenhouses that were framed with round metallic tubing that supported flexible, translucent plastic sheeting. Sometimes, this was double-layered with air pumped between the layers to provide insulation.

During the past 15 years, other types of plastic glazing materials have been developed. Among these is a nearly-transparent, multilayered, flexible honeycomb of extruded polycarbonate plastic. Photo 4 shows the edge of a sheet of the double-layered polycarbonate honeycomb.

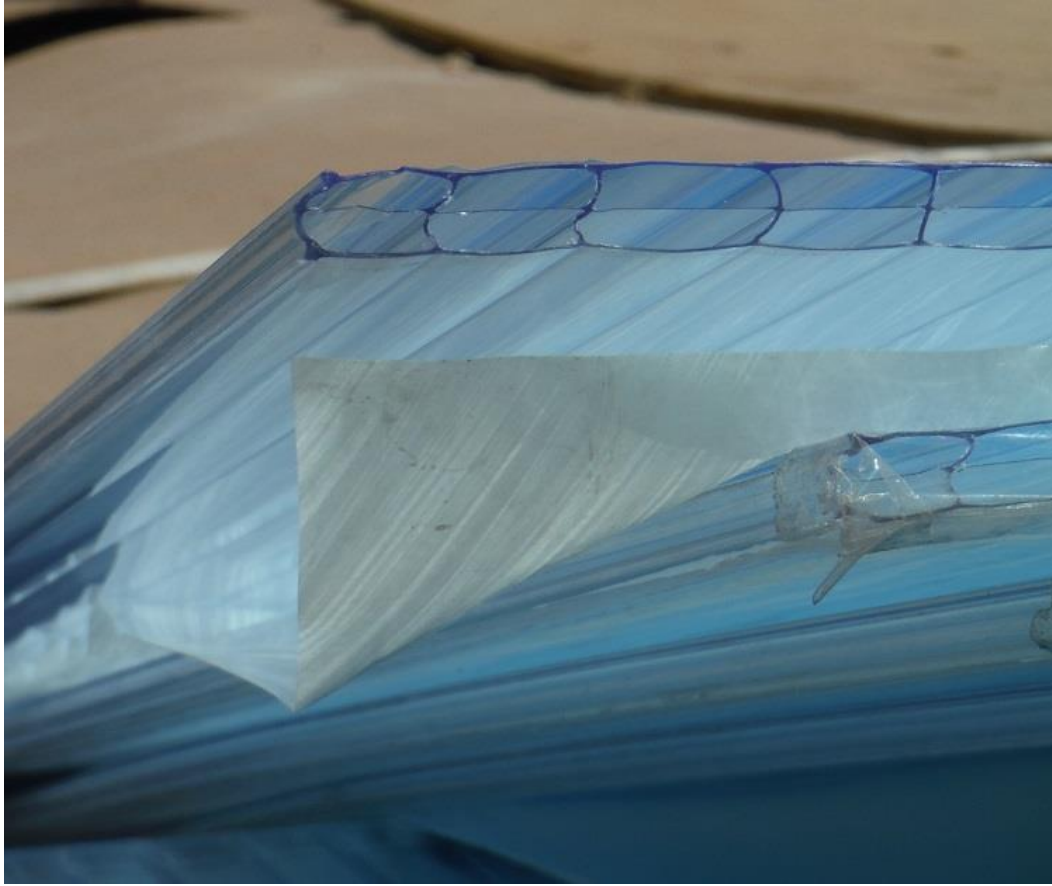
September 10, 2018



(4)

Photo 5 shows the edge of a sheet of the triple-layered polycarbonate honeycomb. Polycarbonate plastic has double the impact-resistance of polyvinyl chloride (PVC) plastic, although it is not as scratch-resistant. Without any coatings or tinting, it blocks about 97 percent of the ultraviolet spectrum (UV-A and UV-B). A thermoplastic material, it begins to soften at 297°F (147°C), and melts at 311°F (155°C). When it ignites, it burns with much smoke, which contains several toxic chemicals, including phosgene.

September 10, 2018



(5)

Photo 6 shows a section of wall of a polycarbonate honeycomb greenhouse. The edges of the polycarbonate panels are set in extruded aluminum channels and sealed with a silicone compound. The polycarbonate panels are attached to the framing with screws and washers. This photo also shows part of the operating system for a wall panel that you can open for ventilation and temperature control.

September 10, 2018



(6)

At a response to an incident involving a greenhouse, keep in mind that all greenhouses share the following common characteristics of whatever materials they are made:

- Greenhouses are designed to support only the live load of snow and ice accumulation and are not strong enough to use as work surfaces, even with roof ladders.
- Most greenhouses have a heat source that uses fuel (usually natural gas, LP gas, or fuel oil) that you will need to shut off if there is a fire. Some greenhouses may be heated by steam or hot water coils fed from a boiler in an adjacent building.
- Greenhouses that are used seasonally may be used for storage of tools, power equipment, and chemicals at other times. Be prepared for hazardous materials.
- If they are glazed with glass, this material can be broken from the ground even if they are made of multipaned insulating glass.

September 10, 2018

- If they are glazed with one of the plastic materials, these will melt or burn without the presence of firefighters to perform vertical ventilation.
- They are not designed to accommodate firefighters' use of them as work surfaces and are guaranteed to collapse under our weight. Stay off these structures!

For more information on greenhouses and the plastic materials used to construct them, internet search for "greenhouse," "greenhouse plastic," "greenhouse plastic panels," and "greenhouse polycarbonate panels."



Gregory Havel is a member of the Town of Burlington (WI) Fire Department; a retired deputy chief and training officer; and a 40-year veteran of the fire service. He is a Wisconsin-certified fire instructor II, fire officer II, and fire inspector; an adjunct instructor in fire service programs at Gateway Technical College; and safety director for Scherrer Construction Co., Inc. Havel has a bachelor's degree from St. Norbert College, has more than 40 years of experience in facilities management and building construction, and presents classes at FDIC and other venues.

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