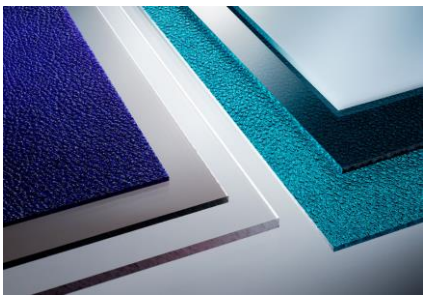
marlon fs
Laminating



Laminating to glass
There are two basic types of laminating for glass to polycarbonate: polyvinyl butyl (PVB) and resin lamination:

PVB laminated glazing.
This is two or more sheets of glass and polycarbonate which are bonded together with one or more layers of polyvinyl butyl (PVB).
The PVB interlayer is sandwiched between the glazing sheets. The assembly passes through nip rollers to expel air bubbles and ensure good contact between the layers. The assembly is then placed in a vacuum to remove any remaining air. Next the assembly is placed into an autoclave at about 80ºC to cure under heat and pressure. Non-autoclave films are becoming more widely available however these must be thermally cured at approximately 135ºC for a longer time.

Resins laminated glazing.
This is manufactured by pouring liquid resin into the cavity between two sheets of glazing which are held together until the resin cures.
Normally two part polyurethane adhesive (PUR) is used. This must be mixed slowly to reduce the formation of bubbles. The adhesive can be placed into a hard vacuum to accelerate the removal of any bubbles that do form. If the polycarbonate has been stored in a humid atmosphere it may be beneficial to pre-dry it in order to reduce the likelihood of moisture bubble formation during the curing process. The adhesive is poured onto the surface of one of the sheets and the second sheet is laid on top. The adhesive is viscous enough to prevent it from being squeezed out. The initial cure will take between 2-4 hours. This can be accelerated by heating the assembly to about 60°C. The sheet can then be handled. The final bond strength is only reached after 3-5 days.

General considerations.
All sheets must be clean and dry before laminating. Polycarbonate can be cleaned with isopropyl alcohol.

In some cases the polycarbonate may require a primer to protect it from the actions of the adhesives. The adhesive manufacturer should be consulted about appropriate: compatible adhesive, procedures and especially **health and safety measures**.

The laminating layer must be sufficiently thick to allow the differential movement between the layers due to the different coefficients of expansion.

Other glazing materials such as acrylic can be used in the lamination to provide a variety of properties for the finished glazing sheet.

Film lamination
The application of decorating foils or self-adhesive lettering or transfers is only suitable for flat or slightly curved sheets. It is recommended to use adhesive foils which do not produce stress in the sheet.

Outgassing and evaporation may cause partial separation of the self-adhesive film; therefore the sheets should be pre-dried overnight at a temperature of 70 - 80°C. Impurities such as dust particles can also lead to adhesion issues and produce flawed appearance. The sheet has to be cleaned or heat treated before application, to avoid stress cracks and adhesion problems. Preliminary tests are advisable.

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