



COLD FORMING OR BENDING POLYCARBONATE FILMS

Polycarbonate films are commonly used in a wide variety of graphic applications including labels, switch overlays signage and nameplates. In most of these applications the film is decorated on one or both sides, die cut and then fixed in the final application either by mechanical means or with a pressure sensitive adhesive. In the majority of these applications the film remains flat and performs very well. In some cases the film may need to be bent to conform to the surface to which it is attached. When any material is bent or formed cold it results in stress (stretching) of the surface on the outside of the bend. The amount of stress depends mainly on the stiffness of the material (flex modules), thickness and the bend radius (curvature of the final shape). Compression is another form of stress that may result when a screw is used to fasten components with the film in between. Polycarbonates sensitivity to a number of common chemical agents is directly related to its stress --the higher the stress the greater the sensitivity to a wider number of chemicals. When stressed polycarbonate comes in contact with an aggressive chemical the results can range anywhere from a slight surface hazing to a fracture completely through the film (stress cracks) depending on the degree of stress and the chemicals involved.

High stress can result in chemical stress cracking of polycarbonate film

High stress in polycarbonate is usually any level that is over 1500 psi. This is the equivalent of hanging a 15-lb. weight from a 1" wide strip of 0.010" film or bending the same film to a 1" radius (2" dia. circle). Below this level of stress polycarbonate film will survive for a long time in a normal environment. In aggressive (industrial) environments the film should be stressed less and/or protected with a chemical resistant coating like MARNOT as long as the coating prevents any aggressive chemicals from reaching the polycarbonate.

Unprotected polycarbonate film should NOT be cold formed to a radius tighter than 100 times its thickness

Given that both stress and chemical exposure are required to cause failure and that the environment is often difficult to control, removing stress may be the best way to prevent stress cracking. There are several ways to reduce stress (see "How to reduce stress in polycarbonate film applications" Tek Tip), most of which will alter the appearance of the part. The best way is to get involved early in development so that stress can be designed out. If stress cannot be removed and the part cannot be protected from the environment then a more chemically resistant film such as polyester should be used

Contact TEKRA if you have Questions about Chemical Compatibility