POLYCARBONATE

Polycarbonate is a tough, dimensionally stable, transparent thermoplastic that has many applications which demand high performance properties. This versatile thermoplastic maintains its properties over a wide range of temperatures, from -40"F to 280"F. It is available in three types: machine grade; window and glass-filled. It is the highest impact of any Thermoplastic, transparent up to 2" in special grades, outstanding dimensional and thermal stability, exceptional machinability, stain resistant and non-toxic with low water absorption. Machine Grade is relatively stress free to permit the most demanding machining. It is also available in glass-filled. This polycarbonate is perfect for high performance uses in tough applications over a broad temperature range. Window Grade is optically clear, providing total luminous transmittance and very low haze factor. The high impact strength makes it resistant to repeated blows, shattering and spalling.

Glass Filled Glass-reinforced polycarbonate is finding principal applications in designs where metals, particularly die-cast aluminum and zinc, are commonly used. The coefficient of thermal expansion is reduced by nearly 75%, thus equaling that of some metals. While glass-reinforced has less impact strength than standard grades, it is still tougher and more impact resistant than most other plastics and die cast aluminum.

ADVANTAGES TO POLYCARBONATE

Impact strength Polycarbonate is virtually unbreakable, making it extremely safe in areas where parts may be exposed to impact. When exposed to repeated heavy blow, the material tends to cold form rather than shatter.

Electrical Polycarbonate is excellent for electrical applications, because of its high dielectric strength and high volume resistivity which decreases only slightly as temperature or humidity is increased.

Machinability Parts can be easily machined from standard metal working tools. No special tools are needed, and finished parts can be polished to a high gloss. Water or water-soluble cutting oils should be used when machining polycarbonate, since some standard cutting oils will attack the material. Polycarbonate can be machined on standard metalworking or woodworking equipment. Its unique properties permit it to be machined without chipping, splitting, or breaking.

Annealing Polycarbonate slab (Zelux) has been stressed relieved using Liquo-Temp annealing process. In some instances where extensive machining is required, a secondary annealing of semi-finished parts is highly recommended. Secondary annealing can be accomplished by heating parts at 250"F in a desiccated air circulating oven for one hour per one inch of thickness. After heating, the oven should be turned off and allowed to cool to room temperature spontaneously.

Bonding Polycarbonate can be mechanically bonded by standard methods. It can also be cemented by using a solvent such as methylene chloride or adhesives such as epoxy, urethane and silicone. Polycarbonate and also be ultrasonically or vibrationally welded.

Removing paint or other materials Fresh paint may be removed by rubbing lightly with a cleaning material such as isopropyl alcohol, or VM-P grade naptha. Then the sheet should be washed immediately with a mild soap or detergent in warm water, and rinsed thoroughly with clean water. Grease and glazing compound may similarly be removed from the surface with the above mentioned cleaning materials. Weathered paint may be lifted off the sheet with masking tape. Razor blades or other sharp scraping tools should never be used.

MORE ADVANTAGES TO POLYCARBONATE

Formability Standard polycarbonate sheet is not heat formable; however, formable sheet is available on a custom basis. Standard Lexan polycarbonate sheet can be heat formed with proper pre-drying. Lexan sheets up to 114" may also be cold formed under special conditions.

Cleaning Kleenmaster Brillianize may be used. (Also see Novus) Products such as abrasive or highly akaline cleaners, acetone, carbon tetrachloride, benzene or leaded gasoline should not be used, and the sheet should not be cleaned in hot sun or at high temperatures.

Scratch Removal Craftics 20/20 Plasti-Polish Scratch Remover is often all that is required to subdue hairline scratches and minor abrasions. Any polish, however, should be tested first on a sample area of the polycarbonate sheet. San Diego Plastics stocks Craftics 20/20 in 8 ounce and 1 gallon sizes. (Also see Novus)

Decorating Polycarbonate products will accept painting, printing, or vacuum metalizing as decorating methods.

UV Stabilization Natural and Black Machine grade and Window grade are UV stabilized. Polycarbonate rod, machine grade, is not UV stabilized, but is available on custom quotation.

APPLICATIONS

Lenses, High temperature and pressure windows, Face shields, Industrial equipment and housing components, Medical equipment components, Instrument components, Electrical insulators and connectors, Aircraft & Missile components, Portholes in pressure chambers, Jet pump impellers and diffusers, Automotive parts, Card guides, Assembly line cogs

MECHANICAL PROPERTIES:

Specific gravity (ASTM D 792) : 1.20

Tensile strength, Ultimate (ASTM D 638) : 9,000 p.s.i.

Elongation at break (ASTM D 638) : 130%

Tensile modulus (ASTM D 638) : 3.1x10~5 p.s.i.

Rockwell hardness (ASTM D 785) : R118

Impact strength (73° F) (ASTM D 256) (notched) : 17.0 ft-lb/inch

Flexural strength (ASTM D 790) : 14,200 p.s.i.

Flexural modulus (ASTM D 790) : 3.4x 10~5 p.s.i.

Wear factor against steel 40 psi 50fpm : 2500x10~10

Coefficient of friction 40psi 50fpm : 0.38 Dynamic

THERMAL PROPERTIES:

Melting point : 310° F

Heat deflection at 66 psi (ASTM D 648) : 285° F

Heat deflection at 264 psi (ASTM D 648) : 270° F

Maximum serving temperature for short term : 275° F

Maximum serving temperature for long term : 240° F

Thermal conductivity (ASTM C 177) : 1.35 Btu-inch/hr-ft~2- ° F

Specific heat : 0.30 Btu/lb- ° F

Coefficient of linear thermal expansion (ASTM D 696) : 3.7x10~5

Applicable temperature range for thermal expansion : 0-200° F

ELECTRICAL PROPERTIES:

Dielectric constant at 60Hz (ASTM D 150) (73° F, 50% RH) : 3.2

Dissipation factor at 60Hz (ASTM D 150) (73° F) : 0.001

Volume resistivity (ASTM D 257) : 10~17 ohm-cm

Dielectric strength (ASTM D 149) : 380 v/MIL

MISCELLANEOUS:

Water absorption - 24 hours (ASTM D 570) : 0.15%

Water absorption - saturation (ASTM D 570) : 0.35%

Density (ASTM D 792) : 0.0434 lb/inch~3

Flammability (UL 94) : V-2

Weathering Resistance : Limited resistance (UV Sensitive)