

GLAZING, GRAPHICS, GUARDS

Johnston Industrial Plastics stocks many materials used in the graphics industry. You will find information about those plastics on their product pages. We supply many others on an as needed basis. If you do not see a product you are looking for listed here, please ask for availability.

ACRYLIC

Acrylic is a crystal clear thermoplastic material possessing excellent mechanical and chemical properties. Outstanding optical qualities and resistance to both sunlight and outdoor weathering make acrylic an ideal glazing material. Acrylic can be easily cemented, welded, thermoformed and machined, making it an extremely versatile material. It has FDA approval.

CEMENTING:

Solvent cementing using such cements as ethylene di-chloride, methylene di-chloride and glacial acetic acid can be used to produce corner or edge joints. The surfaces to be joined should be machined square and smooth (not polished). The capillary or the soak method of application should be used to soften the surfaces sufficiently to allow a strong bond to form. Insufficient softening or inadequate pressure could result in air bubbles. Excessive pressure is likely to cause stress crazing and/or cracking. Inadequate ventilation could result in crazing of the acrylic due to the presence of solvent vapours. Bodied cements, consisting of acrylic syrup and a catalyst, are generally used for larger area bonds or for greater bond strength especially when surfaces to be joined do not mate exactly.

FABRICATING AND MACHINING:

Acrylic can be machined easily to close tolerances using standard wood or metal working equipment. Transparency can be restored to machined material by polishing.

Acrylic is notch sensitive. If it is to be affixed by screws or bolts, holes should be polished. If it is to be affixed within a frame, edges should be radiused. These procedures should significantly reduce the possibility of stress cracking.

Forming or bending of acrylic can be achieved between 160° to 176°C (Cast) or 150° to 160°C (Acrylite FF). Uniform heating is important as excessive bowing may result from uneven heating. Overheating will tend to produce small bubbles in the material.

POLYCARBONATE

Polycarbonate offers an unusual combination of features including: good transparency, very high impact strength, dimensional stability, high and low temperature capabilities, good electrical characteristics and excellent fire rating.

MACHINING:

Polycarbonate should be machined with very sharp cutting tools. Power saws fitted with band, hack or circular blades can be used. Blade speeds are not as critical as with other thermoplastics due to high heat deflection and melting points. Band saw blades with 10 to 18 teeth per inch are satisfactory. Cutting speeds are 2500 to 3000 feet per minute up to 1/4" thick and 2000-2500 feet per minute over 1/4" thick. Tooth spacing for circular saw blades ranges from large for cutting thick sections to very small for thin ones. Blades with 10 to 12 teeth per inch are best for cutting 1/8" to 1/4" thick stock. Suggested speed range for circular saws is 6000 to 8000 feet per minute for sections less than 1/8" thick, bandsaws, routers, rotating knives, slotting cutters and shears are all preferred to circular saw cutting.

FORMING:

Polycarbonate sheet must be pre-dried at 125°C before it can be thermoformed. Drying time varies with thickness: 0.060" to 0.080" — 2 hours, 0.100" to 0.125" — 5 hours, 0.187" — 13 hours and 0.250" — 24 hours. The accuracy of drying temperatures is critical: $\pm 3^{\circ}\text{C}$. Excessively high temperature could cause distortion, excessively low temperature may have little or no effect. Thermoforming is normally characterized by higher than usual forming temperature 190°C to -218°C and rapid cooling. Its cooling or freezing performance is so fast that the sheet must be preclamped in place under the heaters. Transporting heated sheet from an oven to a mould and clamping device is not usually possible. Formed parts can be readily trimmed by punching, shearing, sawing or routing. Polycarbonate can be welded using Leister hot air equipment or cemented using MDC or Weld-On adhesives.