PROFILE PLASTICS®

Technical Article

Choose the right clear material for your application

Clear vacuum formed NICU Incubator cover

Material expertise gives Profile Plastics a technical edge over other thermoformers. That is especially important for developing clear parts. The company runs clear parts regularly.

There are 3 primary types of thermoplastics used to make clear parts. The properties of each type offer key benefits for different applications. However, those distinctions need different handling methods during forming.

This article considers each type, so you can select between them. Based on Profile's extensive experience, you'll see the benefits, limitations, and applications for each.

Polycarbonate

Polycarbonate, or PC, provides the most durability of any clear plastics. It offers great impact resistance. That makes it a popular choice for many applications like safety shields. It can also be used for twin sheet forming applications.

PC performs well in high temperature applications, but that makes it harder to form. Hot oil must go through the tool to keep the temperature higher than required for other clear materials. Even at 300°, the mold cools and stabilizes the part dimensionally.

However, it's not as resistant to chemicals. While it isn't UV safe, it can be UV coated for outdoor applications. Chemical stabilizers, or additives, which provide features like these influence material costs.

On the downside, PC is hygroscopic, attracting moisture. It needs to go into an oven to dry it out before thermoforming. The extra time and energy add cost.

PETG

Polyethylene terephthalate glycol is a cost-effective plastic sheet that features high chemical resistance. It withstands strong cleaning agents and disinfectants, making it ideal for medical or industrial applications.

Although not as tough as Polycarbonate, PETG is durable. It doesn't require pre-drying or use of oil-heated tools, which can make it more attractive than PC.

However, PETG is not UV resistant and will degrade under prolonged exposure to sunlight.

Profile uses PETG regularly. The raw sheets provide good, consistent quality. It can be twin sheet formed for structural parts. Depending on the application or type of part being formed, localized painting of sections of the part can be done afterward.

Acrylic

Vacuum formed clear medical diagnostics vial loader

Acrylic is the only clear plastic sheet available in cast form. It offers the best optical clarity. Cast acrylic is made by pouring the liquid acrylic into a glass mold—essentially two large sheets of glass. All other thermoplastic sheets are formed by extrusion.

Acrylic has good chemical resistance. It's also highly UV-resistant, making it one of the best plastics for withstanding prolonged exposure to the sun.

While the clarity can be superior, acrylic doesn't provide as much impact resistance. Additives that increase impact resistance are available, but they reduce clarity.

Extruded acrylic may have some imperfections but it costs less than cast. This material is good for use as mirrors, or for full-color distortion forming.

Parts made of acrylic can be polished. Shallow scuffs and scratches can be buffed out.

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Selecting Clear Thermoplastics

PROFILE PLASTICS	Acrylic	PETG	Polycarbonate
Optical Clarity	Best	Good	Best
Impact Resistance	Good	Okay	Best
Scratch resistance	Best	Good	Okay
Chemical Resistance	Good	Best	Okay
UV Resistance	Best	Okay	No Requires stabilizers
Cast or Extruded	BOTH	Extruded	Extruded
Formability	Good	Best	Better Requires drying
Cost	$$	$	$$$

Considerations

Profile works with Polycarbonate, Acrylic, and PETG all the time. All clear thermoplastics can be formed using vacuum, pressure, or twin sheet processes. All of them can be tinted.

However, some processes are better for different clear materials or different applications. Chemical additives and features like UV coating or Flame Rating add value but increase cost.

Conclusion

Profile has a great deal of experience in creating clear parts for customers. Learn more in this technical article.

Handling clear thermoplastics is just one element of our expertise. Learn more about the different types of plastic materials we use in our Materials Expertise page.

Lean on the team's knowledge to select the right quality, durability, and clarity for your own project. Remember to contact Profile to discuss your needs.

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