

DATASHEET

PC

Dimensional Stability to Heat

PC Sheets can withstand temperatures of up to 120°C depending on the application

Transformation

They can be sawn, edged and drilled without any furring. Crack-free holes can be easily made. They can be milled with conventional milling machines. A good clamping system is required. Laser cutting is not recommended.

Weathering

PC sheets are not protected against sunlight. However, the actual material itself possesses a certain resistance to outside weather so that it can be used in exterior applications where sunlight is of low intensity and does not permanently fall on the sheets. For exterior applications where the sheets are permanently exposed to ultraviolet light, a stabilised product, such as PC UV sheets, which are protected on both sides, are recommended. When used in exterior applications, the protective film must be removed immediately, since exposure to sunlight can cause permanent adhesion to the sheet.

PVC Profile Seals

PVC additives used in the manufacture of seals. Plastifying agents derived from phthalic acids that are used to provide the PVC with ductility; this Plastifying agent migrates to the surface and attacks the PC resulting in stress cracking general deterioration of the sheet properties.

Typical Properties

General Properties	Method	Unit	Test Result
Physical Properties			
Density	ISO 1183	g/cm ³	1.2
Mechanical Properties			
Tensile Strength to Deformation	ISO 527	MPa	60
Tensile Strength to Breakage	ISO 527	MPa	72
Elongation to Breakage	ISO 527	%	150
Elasticity Modulus in Traction	ISO 527	MPa	2,300
Resistance to Flexion	ISO 178	MPa	97
Charpy Impact Strength Notched (23°C)	ISO 180	kJ/m ²	55
Izod Unnotched (23°C)	ISO 180	J/m	No Breakage
Izod Notched (23°C)	ISO 180	J/m	950
Rockwell Hardness, M / R Scale	ASTM D-785		72/118
Optical Properties			
Light Transmission	ASTM D-1003	%	87-91
Refractive Index	ASTM D-542		1,586
Thermal Properties			
Maximum Service Temperature		°C	120
Vicat Softening Temperature (50 N)	ISO 306 B	°C	151
Heat Deflection Temperature (1.8MPa)	ISO 75-2	°C	143
Heat Deflection Temperature (0.45MPa)	ISO 75-2	°C	146
Coefficient of Linear Thermal Expansion	ASTM D-696	10(5)/mK	6.8

Chemical Resistance

Chemical	Satisfactory	Regular	Unsatisfactory
Mineral Oil	X		
Vegetable Oil	X		
Acetone			X
Acetic Acid	X		
Water	X		
Turpentine			X
Ammonia			X
Detergents	X		
Ethanol	X		
Petrol			X
Glycerine		X	
Methanol			X
Toluene			X

Reaction to Fire

Country	Code	Classification
Germany	DIN 4102-1	B1
France	NFP 92-507	M2

Handling

Cleaning

The sheets should be cleaned with a solution of warm water with a little neutral soap and rinsed with water employing a very soft sponge or chamois leather. If this is not sufficient, certain cleaning solvents may be employed.

Cutting

The common types of saws employed in wood or metal carpentry provide good results when sawing PC sheets: disc, band, sabre, jigsaw, hewing and handsaw. Disc or band saws produce the best edges and can perform almost all cutting operations. Blade shape plays an important role in sawing plastics. It is recommended to employ a band saw with separated teeth because the empty space will facilitate the exit of the cut chips. The best results are obtained using teeth without any inclination and also somewhat jumped. To prevent the plastic from cracking or melting, the blade must be very sharp, and the guide should be very close to the cut to prevent vibration.

Polishing

The sheet edges can be buffed using buffing paste, first with a rigid fabric disc and then with a soft cloth to produce the final finish.

Drilling

PC sheets can be drilled quite easily with a normal stand drill or even with a hand-drill using clean, sharp drill bits. Drill bits designed for use with plastics are recommended. It is occasionally possible to use ordinary drill bits, but they should be sharpened to reduce the depth or cutting angle. During the drilling operation, the sheet must be firmly held, but avoiding excessive pressure at the same time. The hole must be larger than the screw to allow for thermal dilation and contraction.

There must be a separation between the edge and the hole of at least twice the hole diameter. Speeds of up to 1,750 rpm are preferred for small drill holes and for larger holes, whereas speeds as low as 350 rpm are advised. The use of compressed air is recommended to prevent overheating, especially in cases where sheet thicknesses exceed 5 mm.

Gluing

Among the recommended adhesives are those based on solvents, hot melt, silicone, two-component polyurethane based, two-component epoxy based and adhesive tapes.

The following should be taken into consideration when selecting an adhesive:

- Chemical compatibility with the PC sheets
- Aesthetics of the finished joint
- Dilation and contraction with temperature changes
- Fragility, rigidity and flexibility
- Alterability with respect to outside weather, where applicable
- Duration / useful lifetime
- Adhesive strength (adherence to the plastic)
- Final usage requirements

The surfaces to be glued should be cleaned with a soft cloth and alcohol to eliminate all dirt and grease.

For perfect gluing of the surfaces to be joined, they must fit together well (without exerting force and without leaving any cavities) and should also be smooth and unpolished.

Some adhesives can contract on drying. This effect can be compensated by cutting the joint at an angle, thus leaving space to be filled with a slight excess of adhesive.

Thermoforming

There are various thermoforming techniques that can be applied to PC sheets in order to obtain the desired shape once heated, using mechanical force, compressed air or a vacuum. Moulds can be made of plaster, water-cooled steel, cast aluminium or other materials, such as wood or epoxy. Pre-drying is necessary in a forced air circulation oven at 120 because moisture can produce bubbles or other problems in surface appearance. Drying time depends on sheet thickness.

For vacuum forming, the thermoforming temperature must be between 185 and 205°C depending on sheet thickness. For drop moulding, the thermoforming temperature must be between 145 and 160°C.

Bending

For hot bending, using two electric element heaters on both sides, (top and bottom), it becomes possible to bend at more precise angles. When the sheet reaches the correct temperature (above 155) a slight resistance will be noted to folding, this is when the sheet is easily bent. If it is attempted to bend the sheet before it has been sufficiently heated, cracks will appear that could lead to breakage. If, on the other hand, the sheet is over-heated, bubbles might appear along the section that is to be bent.

For cold bending, the maximum recommended angle is 90 for sheets having a thickness of less than 6 mm. This angle becomes 135 for sheets with a thickness greater than 135. It is often necessary to bend in excess in order to achieve the desired angle.