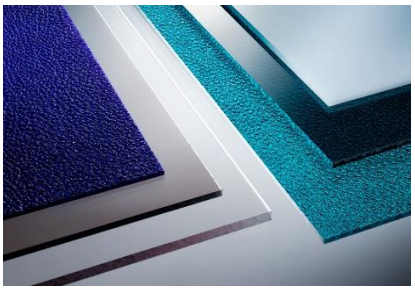
marlon fs

Thermoforming



The parameters for thermoforming will vary depending on the equipment being used. This information is for advice only. Experimentation will usually be necessary in order to achieve the best results from a particular thermoforming setup. Thermoforming will reduce outdoor weather performance of UV protected material. Consequently it is essential to have a well-controlled process, minimised heating time and to avoid excessive stretching due to heating or mould design. In practice some experimentation is required for the individual thermoformer to find his optimum conditions.

PROTECTIVE FILM SHOULD BE REMOVED BEFORE PRE-DRYING OR ANY THERMOFORMING PROCESS, AS OTHERWISE IT WILL ADHERE VERY STRONGLY TO THE SURFACE.

Line Bending

1. For line bending pre-drying is not normally required.
2. Recommended temperature between 155°C and 165°C.
3. The width of heated material must be approximately five times the sheet thickness.
4. Up to and including 4 mm thick can be bent when heated from one side only.
5. Over 4 mm it is necessary to heat from both sides.
6. Bending sharp internal corners should be avoided. Use a former radius at least equal to the sheet thickness.

Vacuum Forming

Components that are relatively simple and shallow in form are thermoformable from thermoplastic sheet heated to an soft and pliable state. Most industrial press and vacuum formers for thermoplastics are suitable. Best results are achievable from machines that control heat both sides of the sheet. Large area panels and thick panels need some air pressure support during heating to avoid sag. Male moulds are suitable for vacuum forming, female moulds for vacuum and pressure forming.

1. Prior to thermoforming, pre drying is essential as the material can absorb up to 0.25% moisture in humid conditions. Prior to drying remove the protective film. Sheets should be mounted vertically and air allowed to circulate. Thickness determines drying time.

Thickness (mm)	0.75	1	1.5	2	3	4	5	6	8	10	12	15
Drying time* (hours)	1	1	2	4	8	13	18	24	28	30	33	37

*Approximate drying time may vary depending on storage equipment

Pre drying temperature should be taken as about 120°C and the sheet thermoformed soon after drying as the sheets gradually reabsorb moisture when cooled to below 100°C.
If the material has been correctly stored in a dry place, the drying time can be reduced by one third.
Given fast and effective heating, e.g. by infrared heaters, pre-drying may be dispensed with. If this is not the case, the heating parameters are to be established by trial and error.

2. Heating to thermoforming temperatures of 175 - 200°C should be evenly applies to both sides of the sheet; all film having been previously removed. Higher temperatures enhance definition but at the expense of surface finish. Vacuum forming with air support is ideal. Parts should be allowed to cool in the mould to below 125°C before removal. Localised air and water-cooling should not be used as they can create stress and distortion in the finished product. Secure clamping of the material during forming is essential to avoid shrinking: components must be completely rigid before removing from the mould.

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