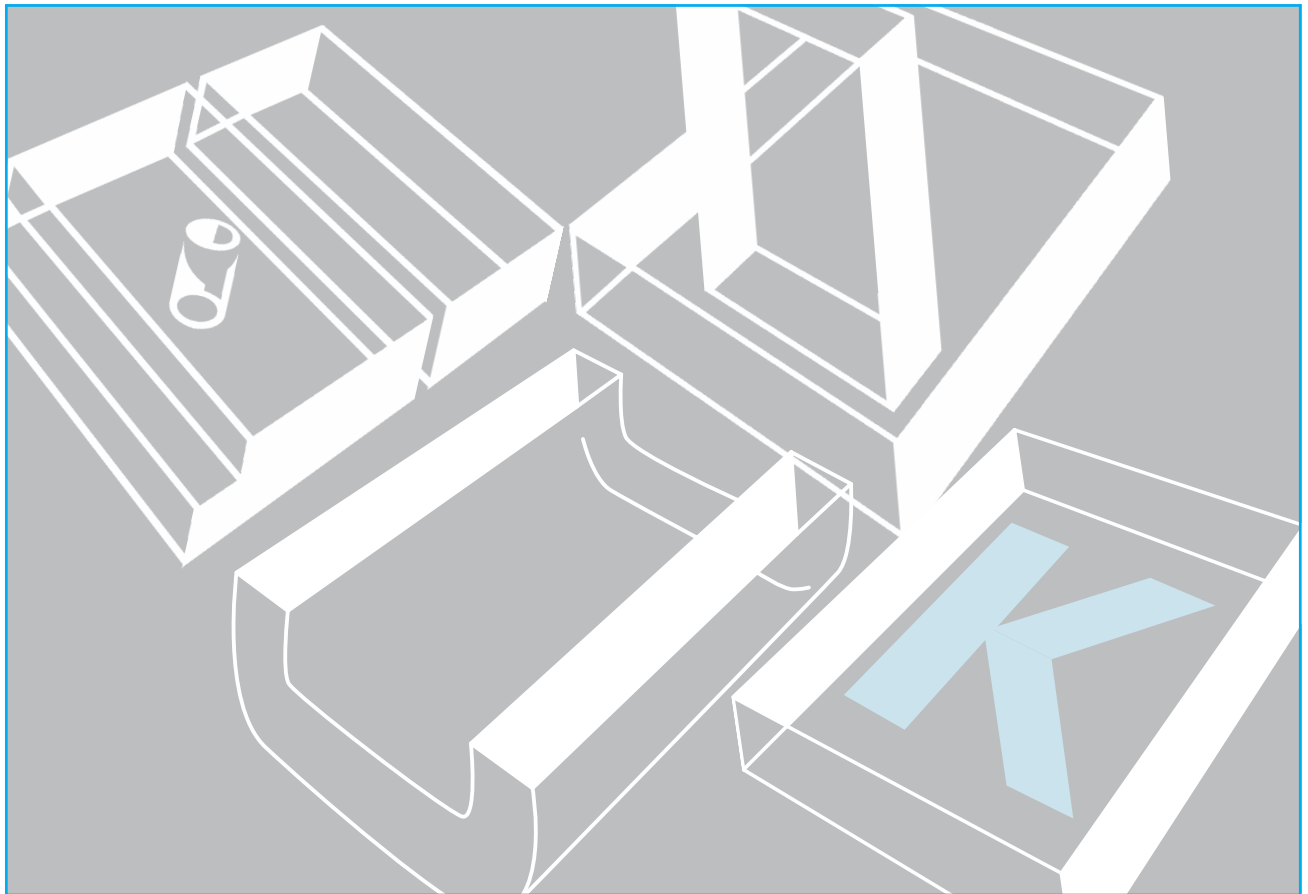


Guidelines for Workshop Practice

Fabricating Tips for PLEXIGLAS®



PLEXIGLAS® – the Material and Its Benefits

PLEXIGLAS® is our registered trademark for the world's first acrylic, a polymethyl methacrylate (PMMA), manufactured for the first time in 1933.

Since then, this high-quality plastic has been used not just for industrial applications (glazing in buildings, signage, countertop displays, sanitaryware, aircraft canopies, furniture etc.) but also in particular **by craftsmen and do-it-yourselfers for innumerable applications.**

Ranging from handicraft pieces through picture glazing to art objects. From balcony parapet through carport to patio roofing. The grades, colors, thicknesses, sizes and cut-to-size sheets of the many PLEXIGLAS® product families available from your local authorized distributor of PLEXIGLAS® are the source of unlimited inspiration for

creative users and a guarantee of individual and successful design.

PLEXIGLAS® GS (cast sheet production) is available as solid / flat sheets and blocks ranging in thickness from 2 to 160 mm, as tubes up to 650 mm and rods up to a diameter of 100 mm.

PLEXIGLAS® XT (extrusion) is available as flat / solid sheets (up to a thickness of 25 mm), textured sheets, mirror sheets, tubes, rods as well as corrugated and multi-skin sheets.

The sheets have high-gloss, matte or textured surfaces, are crystal-clear or diversely colored. Tubes and rods are clear or white and glossy or polished.

Multi-skin sheets made of PLEXIGLAS® are available in crystal-clear, brown or white as 8mm and

16mm thick double-skin sheets (SDP) or 32mm thick quadruple-skin sheets (S4P) in several widths.

Our sales range comprises special fabricating aids such as ACRIFIX® adhesives, and the comprehensive PLEXIStyle® product system with the innovative PROStyle® assembly system for glazing in private buildings.

PLEXIGLAS® solid / flat sheets

- are highly transparent (light transmission 92% for clear grades in a thickness of 3 mm);
- are very durable and weather-resistant;
- do not turn yellow or become brittle;
- pick up little dirt thanks to their perfectly smooth surface;
- are very light (1.2 kg/m² per 1 mm of thickness);
- and break-resistant to impact-



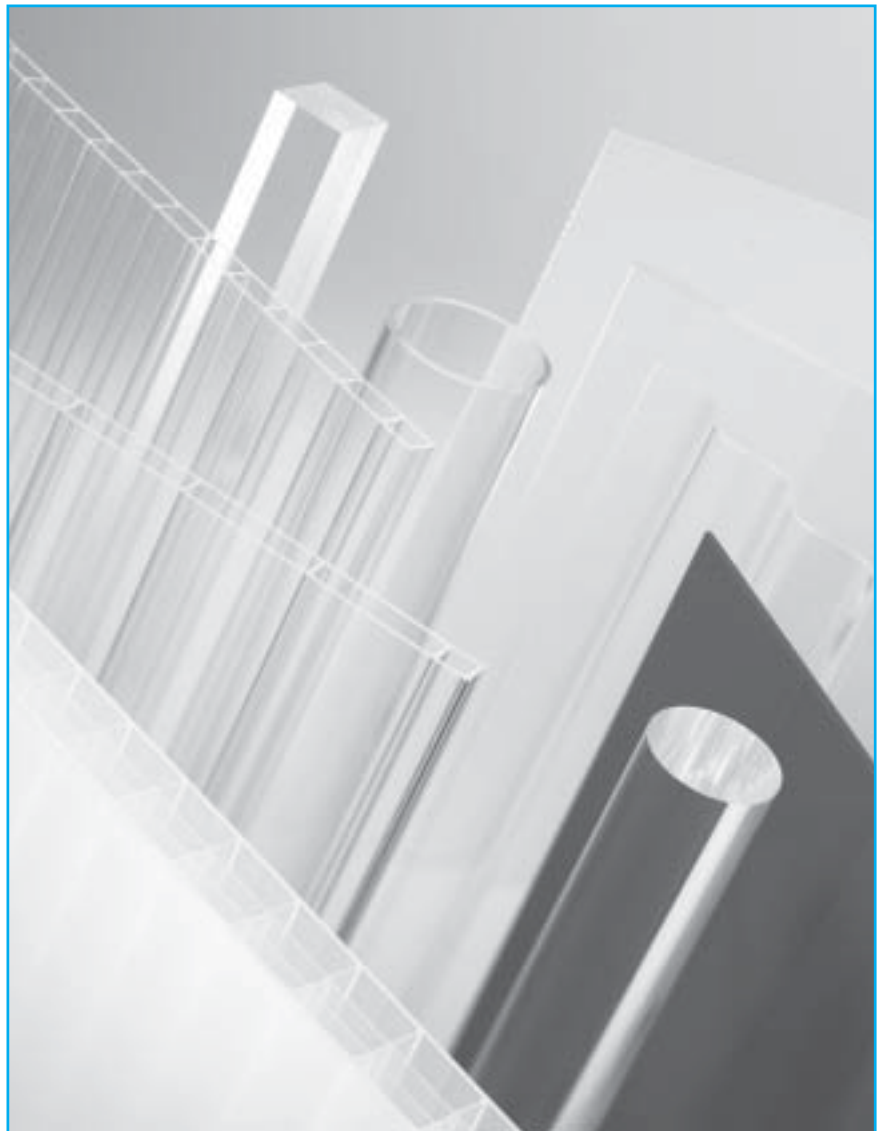
- modified (RESIST grades) and have a low level of splintering;
- are available with high-gloss, smooth or textured as well as attractive matte surfaces (SATINICE grades);
- can be machined with ease similar to wood and bond well;
- are thermoformable in various ways;
- and can also be installed cold-curved to minimum radii.

PLEXIGLAS® MIRROR XT sheets

- are available in clear, bronze and gold;
- are light in weight, break-resistant and have a low level of splintering;
- can be machined and bonded.

PLEXIGLAS® SP multi-skin sheets

- are light in weight and yet inherently rigid;
- offer application benefits and ease of installation as part of the comprehensive PLEXIStyle® system;
- are available in crystal-clear, sunshade colors or white and with decorative textures;
- provide good to very good thermal insulation;
- no condensate drip and clean drying with NO DROP coating on one side;



- available as impact-modified, easy-to-install PLEXIGLAS RESIST®¹ SDP 8 and SDP 16 → The "Tough" Sheet;
- or as UV-transmitting PLEXIGLAS ALLTOP®³ SDP 16, forming a water film on all sides and in the cavities so that condensate is almost invisible → The "Noble" Sheet;
- and the impact-resistant, immensely heat-insulating PLEXIGLAS RESIST®¹ S4P 32 → The "Snug" Sheet;
- the solar heat reflecting PLEXIGLAS HEATSTOP®² SDP 8, SDP16 and S4P 32 (highly insulating!) → The "Cool" Sheet;
- can be easily installed in "PROFESSIONAL" glazing systems or the work-safe PROStyle® system.

PLEXIGLAS® WP corrugated sheets:

- from the user friendly PLEXIStyle®

system are available in three profiles;

- are shock-resistant (RESIST) and easy to install → The "Tough" Sheet;
- are also available with HEATSTOP coating → The "Cool" Sheet;
- match cement corrugated sheets in profile 177/51 and can therefore be installed alternately with these.

¹⁾ Europ. Patent EP 733 754

²⁾ Europ. Patent EP 548 822

³⁾ Europ. Patent EP 530 617

PLEXIGLAS® – Simple Fabrication

Preparations

Transport protection:

During machining work, the masking film should be left on the sheet until the final step to protect its surface from scratches. If this is not possible, it should be placed on a soft clean material (e.g. felt).

Marking out:

Use a lead pencil or waterproof felt-tip pen for marking out on the masking film. Use a felt-tip pen if you mark out on the sheet itself. You can only use scribes in places which are discarded later on or are not visible. Only use prick punches very carefully if the mark is subsequently discarded or is drilled.

Cutting

Suitable cutting tools are:

- Circular table saws;
- Circular handsaws with unset blades; for carbide-tipped blades a so-called multi-tooth blade. For HSS circular saw blades, the tooth pitch should be about 5 mm, for carbide blades approx. 13 mm. Always use well sharpened blades which are only used for PLEXIGLAS®.
- Jigsaws;
- Scrollsaws;
- Hacksaws; as their blades are mostly set, they do not give very good edges (chipping!). For this reason, only use really "sharp" blades and establish the right cutting conditions by varying the number of strokes and feed rate.
- Scribing knives as parting aid for PLEXIGLAS, GS and XT basic grades, but not for impact-resistant PLEXIGLAS RESIST®.

Cutting with circular handsaws and circular table saws:

- The blade should protrude only slightly over the PLEXIGLAS® sheet.
- Work with a stop.

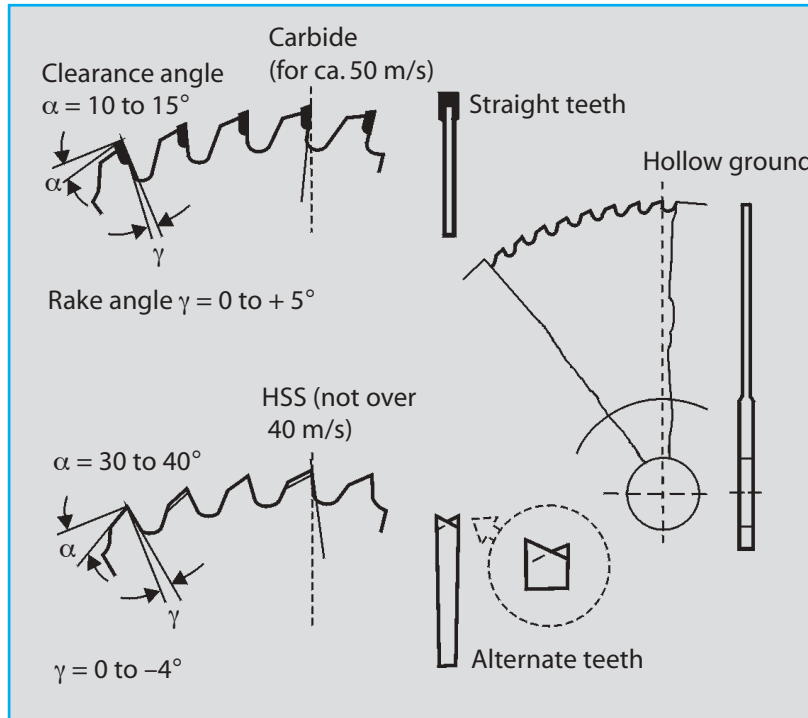
Jigsaw Cutting:

- Only tackle the workpiece with a running saw.
- Place the shoe firmly on the masking film of the sheet.
- Set an average cutting speed and adjust stroke action to zero.

- Select average feed rate.
- If possible, cool PLEXIGLAS® especially PLEXIGLAS® XT, from a thickness of approx. 3mm onwards with water or compressed air.

Cutting with scrollsaws and small hacksaws:

- Only possible up to a sheet thickness of about 4 mm.



- Carefully saw into the sheets with saw running.
- Make sure that cutting is exact and do not tilt the material.
- Fix the material to avoid flutter,
- Saw at an average feed rate.
- If possible, cool PLEXIGLAS® especially PLEXIGLAS® XT, from a thickness of approx. 3 mm onwards with water or compressed air.

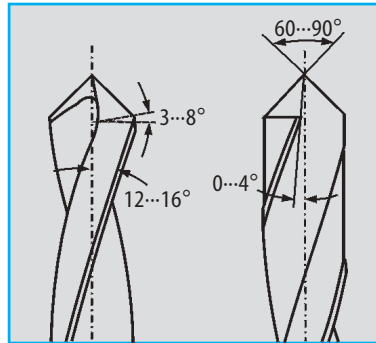


Scribing and Breaking:

- Possible with PLEXIGLAS® sheets (except for impact-modified PLEXIGLAS RESIST®) up to a thickness of 3 mm and a length of approx. 500 mm.
- Scribe workpiece several times (thickness in mm = number of scribes).
- Use a knife with a hook-shaped edge.
- Break workpiece along the scribed line over the edge of a table (protect hands with gloves or soft material) or press your thumb against the end of the sheet overhanging the edge.
- Broken edges which then need to be bonded have to be wet sanded at a right angle on a flat support.



If possible, do not use drills once used on PLEXIGLAS® for other materials later on.



When drilling:

- if possible, use drill stand;
- from a drilling depth of 5 mm onwards, cool with water or compressed air;
- when drilling deep holes, lift drill several times; preferably after each mm of drilling depth;
- a smooth, continuous chip flow is proof of the correct cutting speed and feed;
- reduce the feed rate when setting the drill on the material and just before the bit exits the bottom surface;
- for cutting holes up to approx. 60 mm, use a hole saw or "Slugger" cutter; if necessary, predrill centers with a suitable drill; cool with water or compressed air.

The rake angle for PLEXIGLAS® is 0 to -4°, the clearance angle 5 to 10°. The recommended cutting speed is approx. 250 m/min.

The best surface is produced using

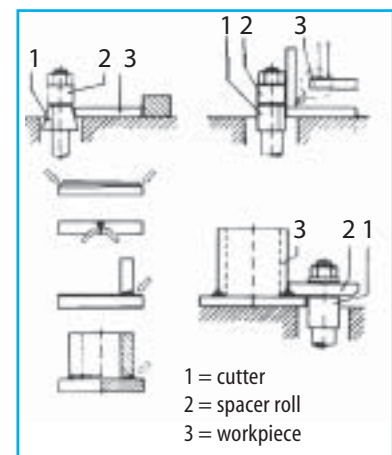
- a tool with large point angle,
- high cutting speed and
- low feed rate.

Cutting conditions are optimal if a continuous chip flow is created.

Routing / Milling

The following are suitable for PLEXIGLAS®:

- all commercially available universal routing machines, table routers, overhead and inverted routers; Note: Only use DIY machines with drill stand and stop!
- all cutters with fine or coarse toothing but higher circumferential speed;
- for engraving work by hand, DIY or dental routers mounted on a flexible shaft can also be used.



Drilling

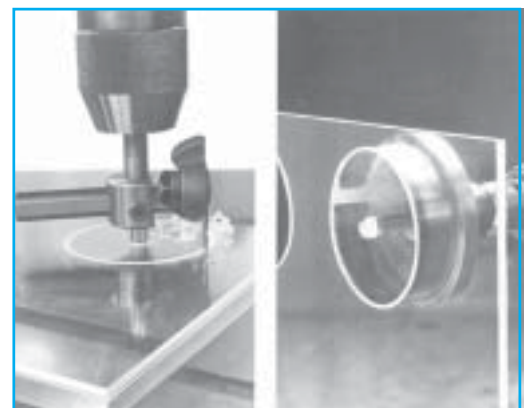
Drills suitable for PLEXIGLAS®:

- conventional twist drills with a point angle of 60 to 90°; the rake angle or both cutting edges must be ground down so that the drill **scrapes rather than cuts** (avoids cracking/chipping);
- conical drills (center drills, body drills) provide conical holes without chipping on the exit side;
- countersinks designed for deburring;
- step drills.

able drill; cool with water or compressed air.

Threadcutting in or on PLEXIGLAS® is done with commercially available dies or taps. Attention: **Risk of breakage due to notch effect!** This fastening method should be the last choice if no other is possible (throughhole, bonding, clamping).

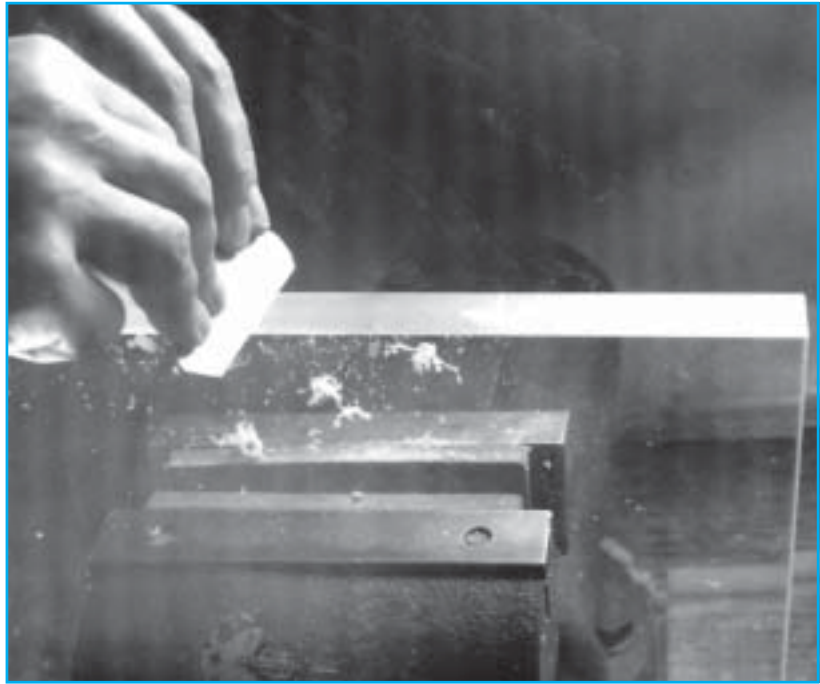
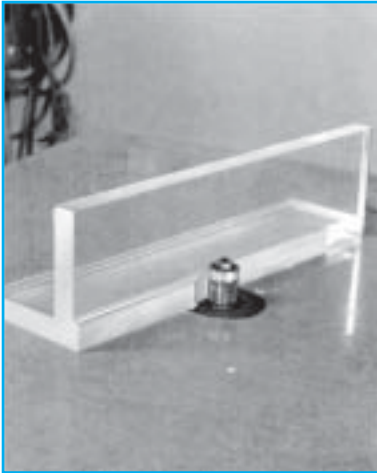
Turning



PLEXIGLAS® – Simple Fabrication

Filing, Deburring, Planing

- Cut edges of PLEXIGLAS® can be easily smoothed and deburred with a scraper.
- All conventional files and rela-



tively fine rasps are suitable for filing.

- All belt, rotational and orbital sanders are suitable, as well as abrasive paper for sanding by hand.

If the workpiece is clamped for machining, it has to be covered with a soft cloth (felt) on both sides, even if the masking film on the PLEXIGLAS® sheet offers some additional protection. When using a clamping jig, make sure there is only slight overhang (to avoid flutter / elastic recovery).

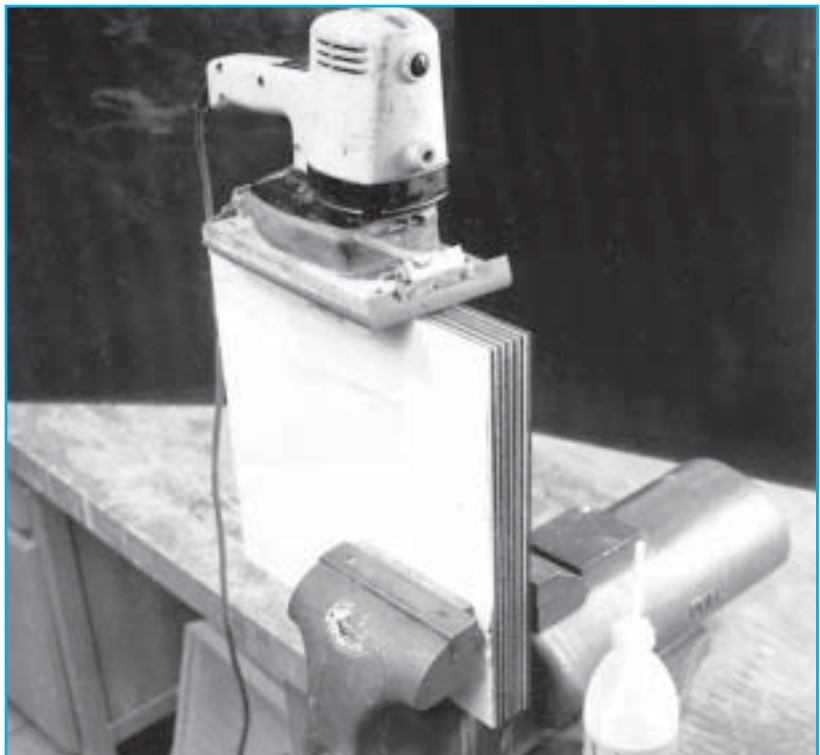
Sanding is best performed in three steps:

- (1.) coarse, 60 grit, dry or wet,
- (2.) medium, 220 grit, dry or wet,
- (3.) fine, grits 400 to 600, **only wet** (to avoid crazing).

All traces of the preceding sanding operation must be removed. In case of mechanical sanding, do not press the workpiece too long and too hard as the resulting frictional heat may cause stress build-up (followed by fine crazing later on).

Polishing

The edges and surfaces of PLEXIGLAS® GS and PLEXIGLAS® XT can be polished with ease.



- Only work with very soft polishing media (felt, cloth buffing wheel, glove lining fabric).
- Only apply polishing creams and waxes compatible with PLEXIGLAS®: Acrylglas POLIER & REPAIR Paste, UNIPOL®, REX® car polish.

Apply the polishing agent to the cloth, then you can polish by machine; avoid high frictional heat.

Manual polishing is possible, but a bit of a strain.

Installation

Installing (flat) solid and textured PLEXIGLAS® sheets:

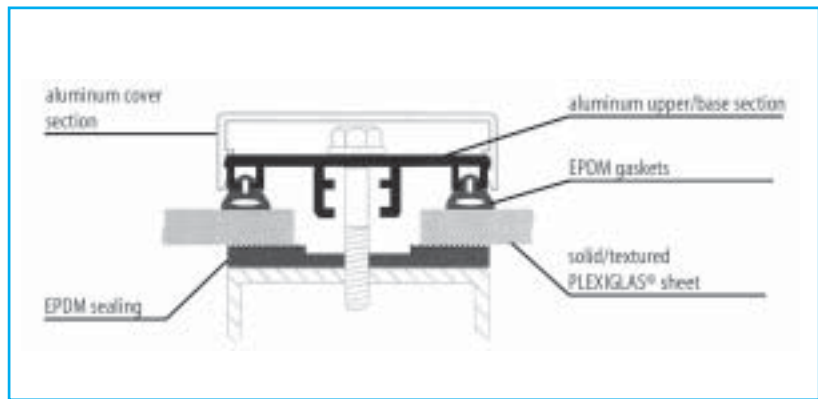
When installing the sheets, allowance must be made for expansion due to moisture and heat in practical use, i.e. 5 mm per meter of length and width for PLEXIGLAS® GS and XT, 6 to 8 mm for PLEXIGLAS RESIST®.

Therefore, drilling and subsequent screw union is only the **second-best** fastening method. **Clamping is always to be preferred.**

Clamping strips and screws for clamped fastening should only be tightened so that the sheets can still move. Use gaskets made of EPDM rubber or polyethylene foam or permanently elastic silicone rubber (for dimensions under 2 m) which have been tested for compatibility with PLEXIGLAS® – if not delivered with the respective clamping system.

The following applies on principle to installation in wood, metal or plastic frames:

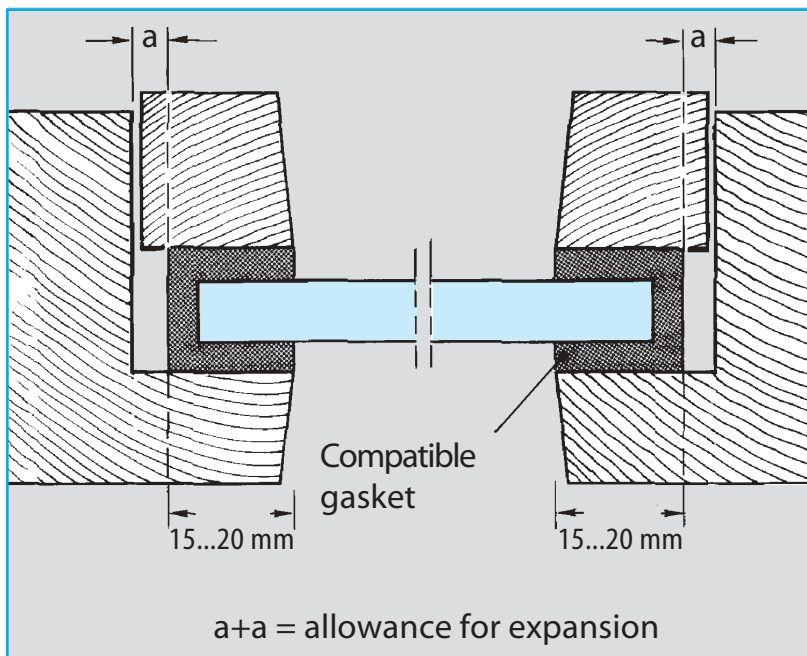
- Allow for expansion,



For example, the **PROFESSIONAL-BASE PLATE SYSTEM** is suitable for clamping solid and textured PLEXIGLAS® sheets from a thickness of 4 mm onwards. Its aluminum cover section (see picture) is screwed onto existing rafters in the direction

of the slope and fastens the sheets optimally between the upper EPDM gaskets and the lower EPDM sealing strip. Terminal angles on the eaves secure the sheets and clip-on cover sections make the screw heads invisible, i.e. improve the optics of the glazing.

Glazing size for PLEXIGLAS® GS and XT length x width (mm)	Minimum rabbet depth 15 mm	Rabbet depth 20 mm	Rabbet depth 25 mm
500 x 300	4	3	3
1000 x 700	8	5	5
1500 x 1000	10	8	6
2000 x 1200	12	10	8
1700 x 1700	12	12	10



Recommended sheet thicknesses:

The table provides approximate values (for deflection of max. 1/50 of the width, i.e. 2% for a wind load of, say, 1000 N/m²).

Opaquely colored PLEXIGLAS® GS and XT sheets can also be fastened with adhesive tape (e.g. SCOTCH MOUNT®). Make sure the support is clean and smooth.

You need to take special measures for installing PLEXIGLAS® SPIEGEL XT mirror sheets (see table). Please ask your local authorized distributor of PLEXIGLAS® for more details.

- Consider rabbet depth of frame (min. 15 ... 20 mm),
- Select the correct sheet thickness (see table).

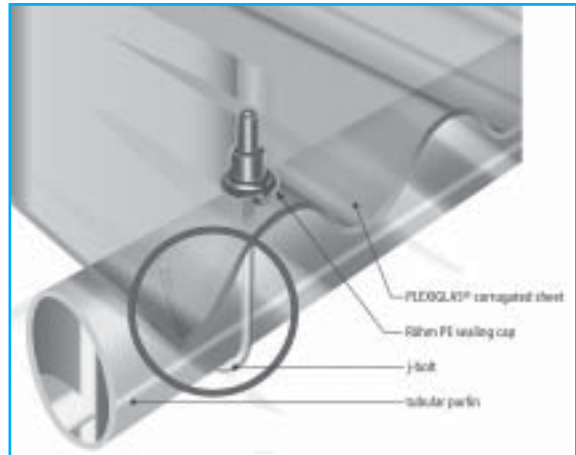
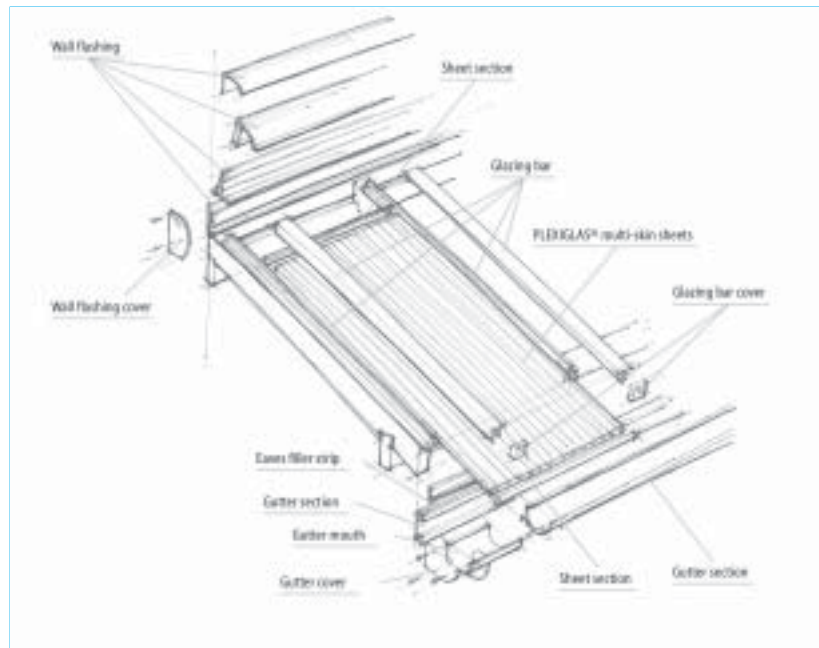
Cut size for PLEXIGLAS® SPIEGEL XT length x width (mm)	Thickness of adhesive tape	Example: SCOTCH MOUNT® Type	Spacing of adhesive tape
300 x 300	1 to 2 mm	4016	100 mm
1200 x 900	approx. 3mm	4008	300 mm

PLEXIGLAS® – Simple Fabrication

Installation of PLEXIGLAS® multi-skin sheets:

Our glazing systems **PROFESSIONAL CLAMPING SYSTEM** and **PROFESSIONAL THERMOGLAZING SYSTEM**, as well as the **PROFESSIONAL WALL CONNECTING SYSTEM** offer simple solutions.

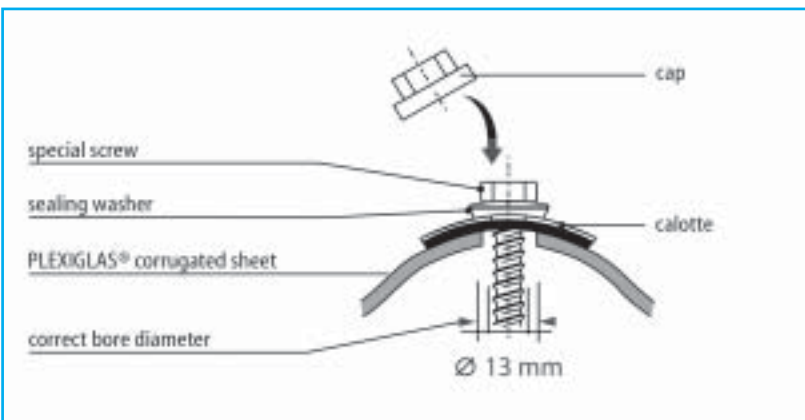
The **PROStyle®** assembly system for installation from underneath (see picture) is innovative, convenient and safe – particularly for private users. Correct installation in terms of material requires compliance with important instructions which are given in the **PROStyle®** documentation and in the publications "Example of Roof Glazing" and "Hints for Installing Multi-Skin Sheets".



We offer **PROStyle® Roof Sets** to customers who are interested in a multi-skin sheet roof and would like a ready-made solution (see also www.plexistyle.de).

Installation of corrugated PLEXIGLAS® sheets:

Important information is given in the "Installation Instructions" available from your local authorized distributor of PLEXIGLAS®. In contrast to solid or multi-skin sheets, pointwise fastening on purlins (= crosswise supports) is customary for corrugated sheets. Either j-bolts or screws with calottes are used for this. Installation is similar to installation of corrugated sheets with fiber-reinforced cementitious panels; the PLEXIGLAS® WP 177/51 profile can be installed as an opening for light entry in combination with these sheets.



Forming

Heating:

All solid PLEXIGLAS® sheets are suitable for forming but not multi-skin or corrugated sheets.

The protective masking on the PLEXIGLAS® sheet is removed before forming for practical reasons.

The forming temperature for PLEXIGLAS® XT is approx. 150 °C, for PLEXIGLAS® GS approx. 160 °C. The following serve as heat sources for **partial heating** – e.g. for line bending – :

- heating rod (perhaps also hot plate, covered with glass fabric except for an open central strip),
- IR radiator (strong infrared lamp).

The following serve as sources of heat when **heating the entire cut-to-size sheet**:

- airflow oven,
- oven,
- hot plate covered by an aluminum plate.

Heating time depends on the thickness of the material. From a thickness of 4 mm onwards, the material should be heated on both sides or turned several times.

Place the PLEXIGLAS® sheet to be heated on a level, non-glossy support and avoid direct contact of the sheet with the heating element by using an aluminum plate or allow an air gap of at least 1 cm. Watch the material during heating to avoid overheating.

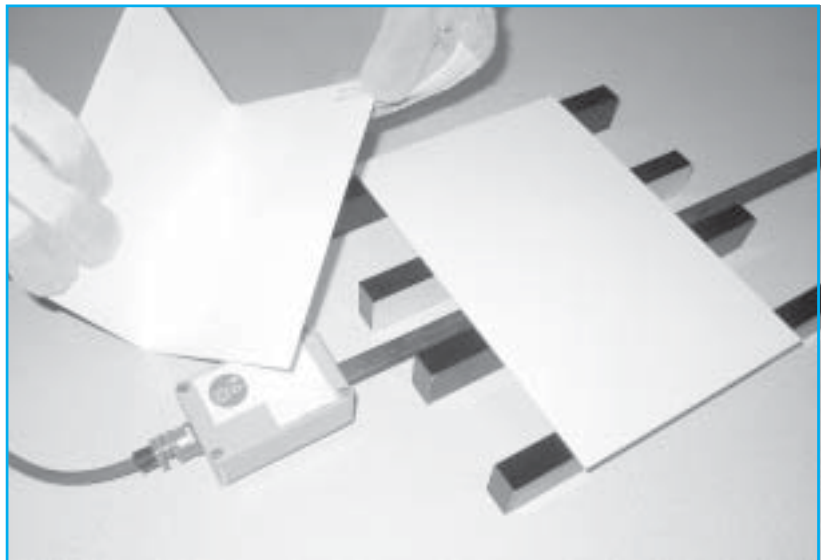
Preparations:

Edges should be polished – if required – before they are formed.

Thermoforming:

The workpiece is formed immediately after heating and held in the formed position by hand or by means of an appropriate jig until it has cooled down (below approx. 60 °C). No special force is required for forming (otherwise the material has not yet reached the optimum temperature!).

When line bending, we recommend bending the sheet sides



slightly more than required as they may spring back slightly when cold. Where the side length is shorter, the entire sheet should be heated, otherwise there is a risk of warpage.

Tools for drape forming should be covered with glove material (to avoid mark-off on the molding) and should have holddown strips for the heated sheet. For complex moldings, a forming station is required with a male and female mold between which the sheet is clamped. Other forming methods are thermoforming or blow molding but require greater technical expertise. You should engage pro-

fessional PLEXIGLAS® fabricators to do this.

After forming, the PLEXIGLAS® workpiece can be further processed as usual.

PLEXIGLAS® – Simple Fabrication

Bonding

Bonding with solvent adhesives and reaction adhesives:

PLEXIGLAS® – particularly colored material – is bonded generally and most simply with ACRIFIX® 116 * similar to general-purpose adhesive. Finely sanded edges are needed for precise bonding of accurately fitting adherends. The joint areas are cleaned with lighter gas before the adhesive is applied. Ventilate the room well, do not smoke and avoid skin contact!

Apply ACRIFIX® 116 thinly from a tube (or PE bottle) onto one PLEXIGLAS® part, join parts together immediately and fix, e. g. with adhesive tape. You can handle the parts after about 1 to 2 hours even if they finally harden only after several days.

Crystal-clear cut-to-size sheets of PLEXIGLAS® are most securely bonded with ACRIFIX® 192, which is applied directly from the tube, is gap-filling and hardens when exposed to daylight or fluorescent lamps.

Where fit has to be most precise, superglues based on cyanoacrylates are also suitable (e.g. K-TEL® Wunderkleber), or else pressure-sensitive adhesives for opaquely colored material (e.g. UHU® KONTAKT 2000). Clear bonds with in some cases very good adhesion are also achieved with PLEXIGLAS® using UHU® Allplast. Processing is the same as for ACRIFIX® 116.

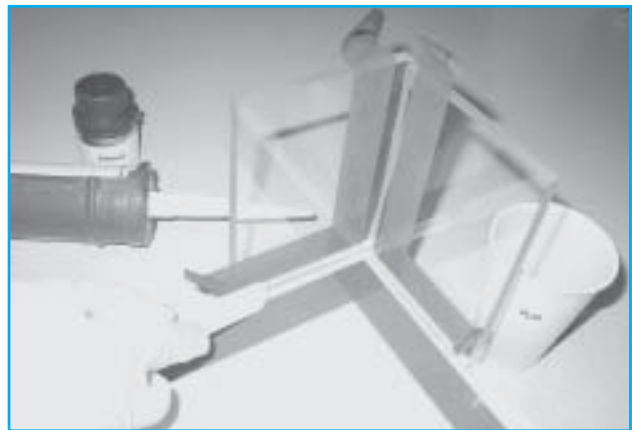
Bonding with silicone rubber:

Types such as SILPRUF®, PERENNATOR® V 23-11, 43-9, BOSTIK® 3050 etc. which are suitable for PLEXIGLAS® can be used for this. You must comply with the manufacturer's instructions and avoid any vapors emitted penetrating cavities in the multi-skin sheet.

Silicone rubber (like other types of adhesive) should not be applied to acrylic which has been cold-curved (risk of stress cracks!).

Method:

- clean and prepare adherends surfaces so they are free from dust and dry;
- enclose the joint area precisely (e.g. with TESAFILM®);
- treat surface or edge with primer (comply with manufacturer's instructions);
- fix parts in position;
- apply silicone rubber with pressure;
- smoothen adherends with a damp medium (soapy water);
- detach enclosing strips before a skin forms;
- choose joint with large surface area;
- manufacturer's instructions for curing should also be observed.



Bonds obtained in this way are permanently elastic!

Types of adhesive which can be used for bonding PLEXIGLAS® and other materials are:

	PLEXIGLAS®	Metal	Stone	Ceramics	Hard plastics (PS, ABS, PVCu)	Rubber
PLEXIGLAS®	A S (C)	S (C)	S (C)	S (C)	A S (C)	C K

A = ACRIFIX® 116 or 192

S = silicone rubber

C = cyanoacrylate (superglue)

K = contact adhesive

() = for small adherends and where fluctuations in application temperature are low

* ACRIFIX® adhesives and product specifications are available from suppliers and fabricators of PLEXIGLAS®.

Cleaning and Care

PLEXIGLAS® has a perfectly smooth surface to which dirt does not cling easily.

Dusty parts are wiped down with water, a soft cloth or sponge. Never rub when dry!

Scratches can be polished away (see "Polishing").

For thorough cleaning, we recommend cleaning agents such as intensive plastic cleaner from Burnus, DER GENERAL®, PLASTABELLA® or UNI-GLANZ® 3. Der Antistatische Kunststoff-Reiniger (AKU) from Burnus – available from all authorized distributors and fabricators of PLEXIGLAS® offers additional benefits:

- It prevents static charging and therefore attraction of new dust.
- This makes PLEXIGLAS® really easy to care for.
- It is also suitable for other plastics.

Apply cleaner to a soft cloth and clean the surface in criss-cross movements. Allow the film which develops on the surface to dry. Do not rub dry.





Certified to DIN EN ISO 9001 (Quality)
and DIN EN ISO 14001 (Environment)

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PLEXIGLAS DAYLIGHT,
PLEXIGLAS FREE FLOW,
PLEXIGLAS HEATSTOP,
PLEXIGLAS RESIST,
PLEXIGLAS SATINICE,
PLEXIGLAS SOUNDSTOP,
ACRIFIX,
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