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1. Product description

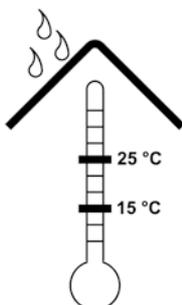
- pRaL® is an acryl-based Solid Surface Material (SSM) in a mixture with aluminium hydroxide. By combining these ingredients a very hard material is obtained which can be sawn, thermoformed and fabricated to create seamless designs.
- pRaL® consists for the most part of natural materials, as a result of which it is suitable for contact with foods and has no harmful effects on the user.
- pRaL® is moisture resistant, it is non-toxic and does not degrade with use.
- pRaL® offers an aesthetic, sustainable and functional solution for interior fittings and furniture design.
- pRaL® can be fabricated using conventional furniture-making tools.
- pRaL® is available in different thicknesses:
 - 3mm to be bonded flat onto a core board (e.g. worktops).
 - 6mm for vertical use (e.g. bath panels, wall cladding).
 - 12mm for vertical and horizontal use.
 - 18mm for self-supporting applications.

2. Safety instructions

- Ensure local health & safety regulations are applied.
- Wear suitable, close-fitting working clothes.
Wearing of jewellery (e.g. rings, watches, etc.) is to be avoided.
- Wear eye protection when sawing, machining and sanding.
- Wear hearing protection in noisy working conditions (e.g. sawing, machining, sanding and polishing).
- Wear a dust mask when sanding and polishing.
Ensure there is effective dust extraction when sawing, sanding and polishing.
- Wear protective gloves when using adhesives, cleaners, etc.
- Ensure there is proper ventilation in the workshop and on site, especially when using adhesives.
- Ensure that any electrical equipment is earthed and properly maintained.
- Remove adjusting keys or spanners before using a machine.
- Keep the workshop clean and tidy.
- Ensure that your workpieces are always stable and secure before proceeding to work with them.
- Observe the fabrication instructions and adhere to safety at work and fire prevention measures.

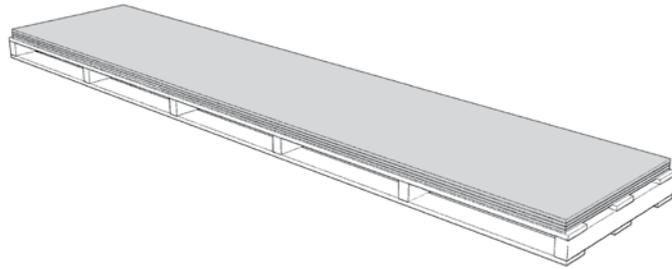
3. Transport and storage

- The product must not be stored in the open air; a temperature of at least 10°C should be maintained.

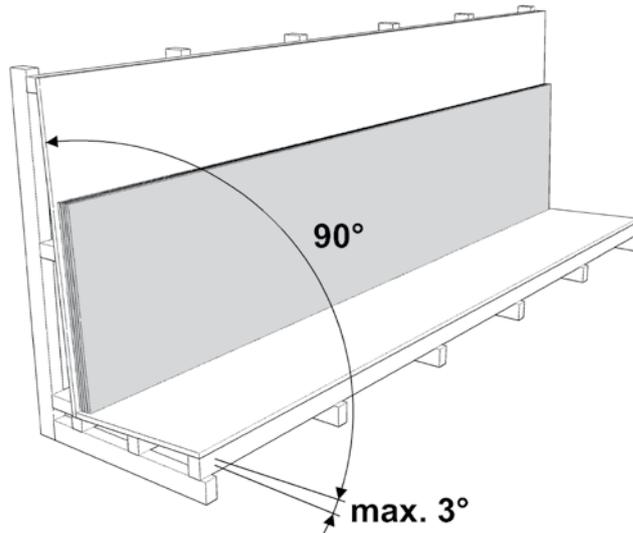


A well-ventilated and sheltered storage location at a temperature between 15 and 25°C is ideal.

- Transport and storage of sheets during delivery is best done horizontally, on a flat and ventilated pallet or base; this is in order to avoid distortion and stresses in the material.



- In order to save space, loose sheets can be placed vertically on a purpose-made stand.

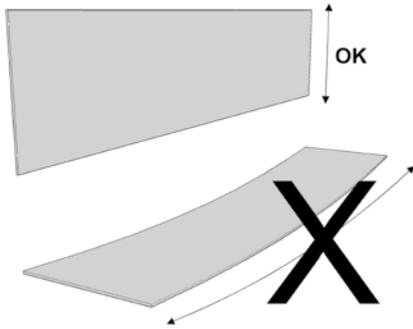


- At the time of delivery check that the pRaL® sheets and accessories are in good condition. Also check to ensure that the last four digits of the batch number of the sheets delivered are identical. This is necessary in order to be absolutely certain that the sheets intended for the same job or to be used on the same surface are of the same shade number. pRaL® sheets from a different batch / production run, may exhibit minor differences in colour from one to another. pRaL® sheets are delivered with protective film on one face.

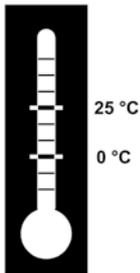
pRaL	
COLORE: COLOUR:	2071
SPESORE: THICKNESS:	12 mm
FORAMTO: DIMENSION:	3600 x 760
NUMERRO: NUMBER:	851340 3 030008 513407
LOTTO N°: BATCH N°:	E-299-6981
QUALITA: QUALITY:	<i>I.</i>
DATA: DATE:	06.07.06
COMMENTI: COMMENT:	
ABET LAMINATI Viale Industria 21 12042 Bra (CN) - ITALY Tel. 0172/419111	



- pRaL® sheets are to be manipulated vertically by two or more people in order to avoid stressing the sheets whether or not fabricated and in accordance with local health & safety regulation.



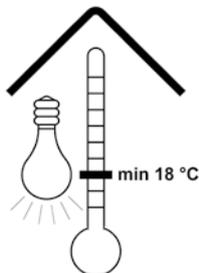
- Suction pads can be a very useful aid in manipulating sheets.
- Adhesive-bonded components such as upstands, washbasins, corners, etc. require protection in transit in order to absorb any impacts.
- Components are to be well and expertly secured for transport in order to prevent damage.
- pRaL® adhesive must be stored in a dark room at a temperature of 0°C (5°C = ideal) up to a maximum of 25°C.



- pRaL® adhesive has a shelf life of 6 months after its date of packaging. This date is shown on the adhesive cartridge.

4. Fabrication conditions

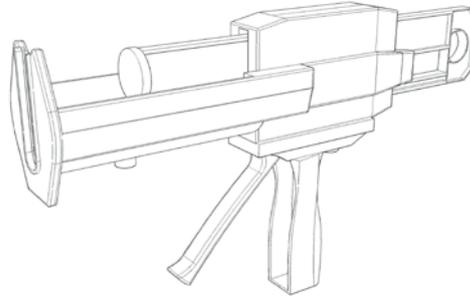
- Workshop temperature must not be less than 18°C.
- The working space must be dust-free and ventilated.
- The workshop should be well lit.



- pRaL® sheets require to be acclimatised to ambient temperature and humidity before fabrication. It is therefore advisable to transfer the sheets from the storage location to the workshop around 24 hours before fabrication.
- Before any cuts are made, the colour shades of the various pRaL® sheets should be checked to ensure that the components that are fitted in the same surface originate from the same batch. (Refer to the batch number on the pRaL® sheets).
- The pRaL® sheets must be clean.
- The workbenches on which pRaL® is to be fabricated must be perfectly flat and clean.

Tip: workbenches with an HPL (High Pressure Laminate) surface have the benefit that pRaL[®] adhesive does not stick to them.

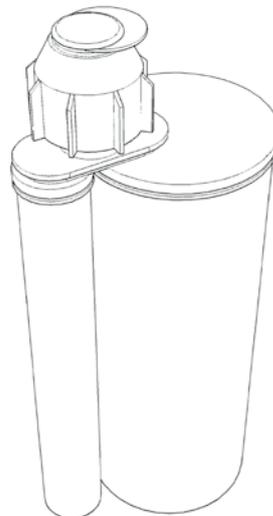
- Tools should be laid out close to the workstations.
- NB: Specific pRaL[®] adhesive is required to be used to glue pRaL[®] components to one another. pRaL[®] adhesive is a two-part adhesive supplied in special cartridges for which a dedicated adhesive gun needs to be used. The pRaL[®] adhesive gun is available to order.
(Tip: do not forget to order the adhesive gun for the first pRaL[®] job!)



- A mixer needs to be attached to the end of the pRaL[®] adhesive cartridges in order to mix the two adhesive components properly.
Attention: First squirt of the glue from a new cartridge (and after replacement of a mixer) should not be used (+/- 20 cm continuous squirt), in order to make sure that glue and hardener will be well mixed.
(Tip: Do not forget to order extra mixers for the job in hand, allowing for one mixer per glued joint to be made).

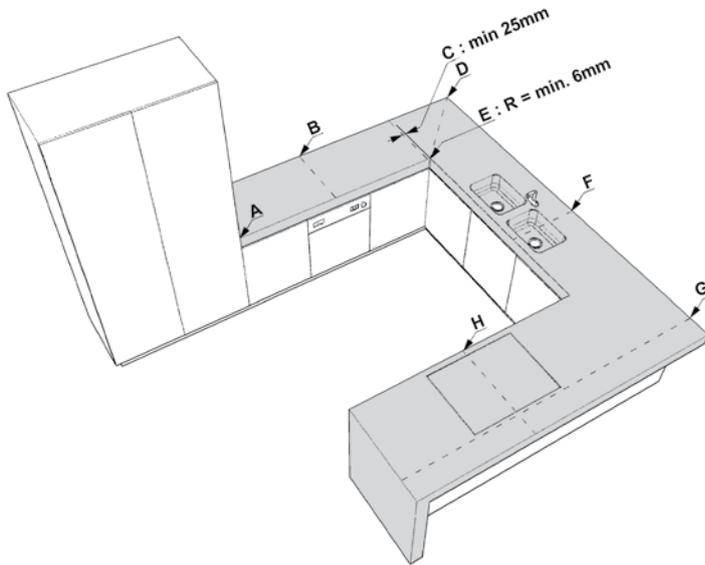


- Order sufficient pRaL[®] adhesive of the right colour (each pRaL[®] colour code has its corresponding colour-specific adhesive code). Adhesive consumption: allow a maximum of 10 linear metres of adhesive joint per adhesive cartridge.



5. Position of seams

- Objectives :
 - Smallest possible number of seams
 - Least possible amount of surplus adhesive
 - The material is to perform at its best in terms of quality.
- Joint positioning :



- A: Leave clearance between a pRal® worktop and an obstacle, allowing for 1 mm/m of expansion.
- B: Do not position any seams above a dishwasher (75 mm minimum).
- C: Position seams at a minimum of 25 mm from inside corners.
- D: All seams must be edge or butt joints. This means always at right angles or parallel to the panel direction (no diagonal joints).
- E: Internal angles must be rounded off in all cases to a minimum radius of 6 mm.
- F: Do not position seams at cut-outs and bonded shapes (basins and sinks).
- G: With an overhanging shelf do not position any seams parallel to the direction of the overhang. Unsupported overhangs must not exceed 200 mm.
- H: Position seams as far as possible from the cooktop as possible (75 mm minimum). Always apply insulating aluminium adhesive tape to the underside of the worktop.



Most seams are best prepared in the workshop, in order to minimise the number of seams that will have to be finished on site. Machining the seams in the workshop ensures it is done in optimum conditions which usually means a better end-result. Another factor to be taken into account is the weldiness of the components when being transported to and installed on site.



All seams need to be reinforced with a reinforcing strip fitted underneath.

6. Cutting and sawing

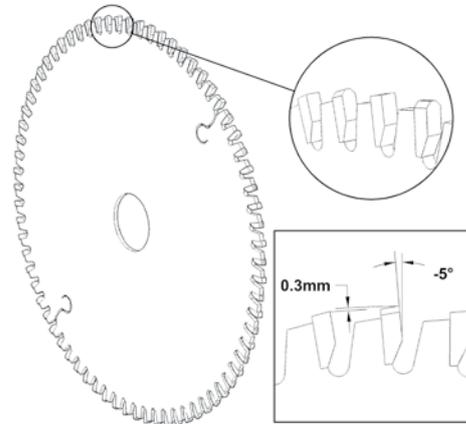
6.A Saws

- All types of panel saws (vertical or horizontal)
- Beam saws
- Hand-held circular saw
- Drop saw (with or without adjustable angle)

6.B Saw blade

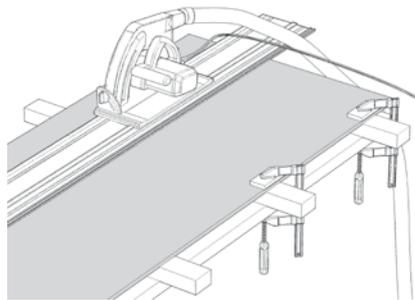
- Hard metal insert teeth
- c. 8 teeth/25 mm diameter
- 5° cutting angle
- Suitable for hard plastics and/or soft metals

Blade D (mm)	No. teeth	Blade thickness (mm)	Tooth width (mm)
200	64	2.2	2.8
250	80	2.6	3.2
300	96	2.6	3.2
350	108	3	3.6

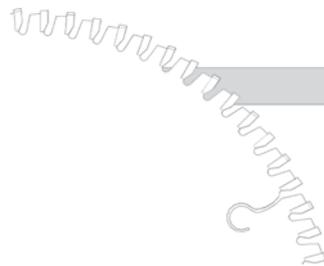


• 6.C Cutting

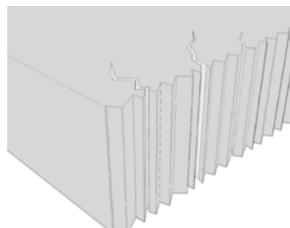
- o For manual cutting it is best to secure the pRaL® panel to be cut to size on a horizontal and stable base. A proper guide held securely should be used in all cases.



- o Ensure that the sole plate of the hand-held circular saw or the beam saw table is always clean, in order to avoid scratching the pRaL® panel.
- o Care needs to be taken when determining the depth of cut to ensure that a minimum of 2 and a maximum of 3 teeth are engaged in the pRaL® panel.



- o It is recommended to leave a couple of mm when cutting to allow for cleaning up the saw-cut in order to achieve a perfect finish.
- o Do not use a band-saw or reciprocating saw as they can cause hairline cracks along the cutting face which may result in fracture if the assembly is subjected to stress and/or temperature shocks.



7. Machining, routing, drilling and screwing

praL

• 7.A Routers

- o Bench-top router
- o CNC router
- o Top router
- o Biscuit jointer

• 7.B Cutter varieties

- o Carbide cutters (also known as hard metal or Widia cutters)
- o Diamond cutters
 - Increased service life: 30/1
 - Increased output
 - Higher purchase cost: 14/1
 - Consistent cutting quality



Cutters with continuous straight flutes are to be preferred in order to ensure that the finished edge is given a smooth surface (do not use burrs).

• 7.C Cutter types

- o Trimming cutter



- o Edge cutter



- o Grooving cutter



- o Rebate cutter with guide bearing



- o Bevel cutter with or without guide bearing, top or bottom



- o Contour cutters with guide bearing



- o Non-drip edge and splashback cutter



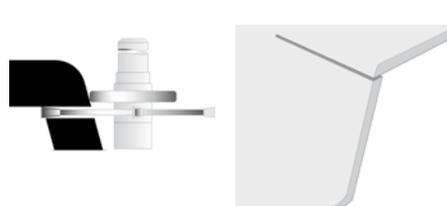
- o Moisture barrier or barrel cutter



- o Tapered plug cutter



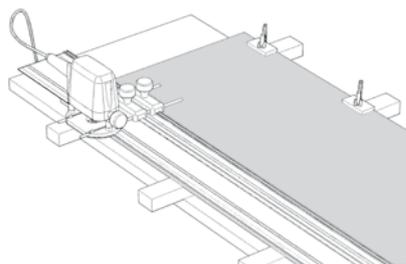
- o Biscuit cutter



Cutters with a plastic rather than metal guide bearing are to be preferred, in order to avoid machining cracks in pRaL® components.

• 7.D Machining

- o For manual cutting it is best to secure the pRaL® panel to be machined on a horizontal and stable base. A proper guide held securely should be used in all cases.



- o Ensure that the sole of the top router or the table of the router bench is always clean in order to avoid machining scratches on the pRaL® components.

- o The minimum radius on all cut-outs or grooves in pRaL® should be 6 mm

• 7.E Drilling

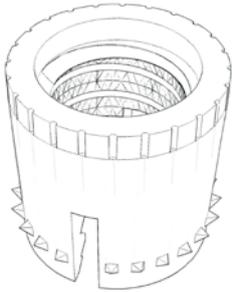
- o Drilling machine
 - Pilar drill
 - Router
 - CNC router
- o Type of drills
 - Lip and spur drills
 - Standard twist drills
 - Dowell drills

- Concealed hinge cutter
- Hole saw

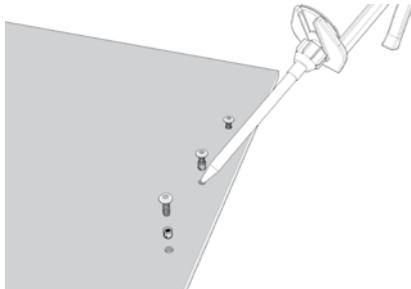
- Drilling
 - o Always use a top router or pillar drill to drill holes:
 - holes < 12 mm: lip and spur drills, dowell drills or standard twist drills
 - holes 12->50 mm: hole cutter with centre point and concealed hinge cutter
 - holes > 50 mm: hole saw, carbide tipped or high-speed steel (HSS)

• 7.F Screwing

- o Never screw directly in pRaL® SSM.
- o Screwed connections in pRaL® SSM should only be made using threaded inserts



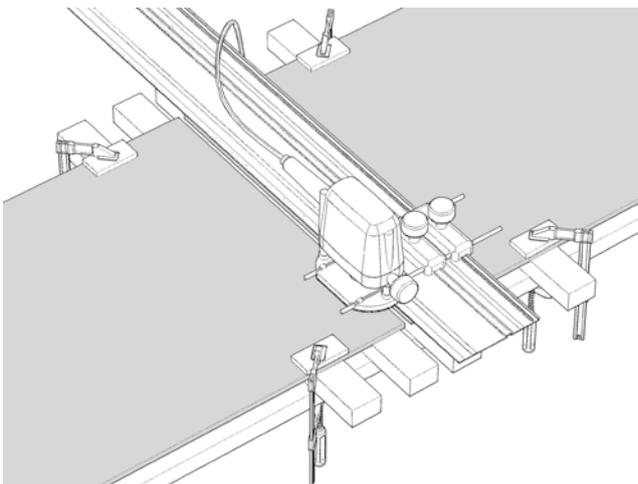
- o These threaded brass inserts are glued with pRaL® glue into a pre-drilled blind hole that is slightly deeper than the length of the insert. The hole diameter is to be that of the expanded insert. For this reason the bolt is screwed into the insert first and then pressed into the hole filled with pRaL® adhesive. The pRaL® adhesive ensures excellent adhesion and also ensures that the insert is hidden from view. After the adhesive has cured the bolt is unscrewed and surplus pRaL® adhesive cut away.



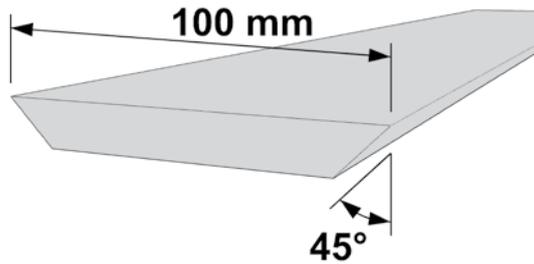
8. Fabrication instructions - 12mm pRaL®

• 8.A Glued butt joint (components to be glued in the same plane)

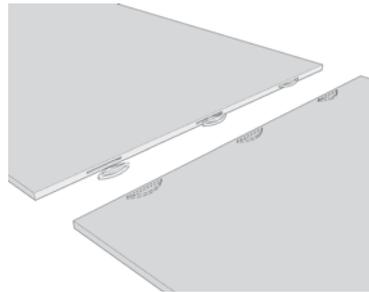
- o Ensure in every case that the two edges to be butt-joined are flat and a perfect fit. Use the mirror cutting method for this.



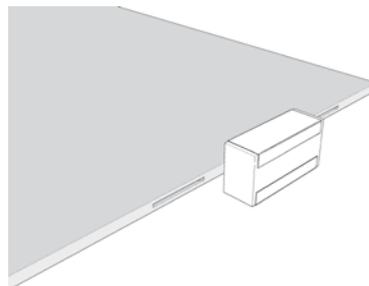
- o Always fit a pRaL® reinforcing strip 100 mm wide under every joint, with a 45° chamfer over the full length of the glued joint.



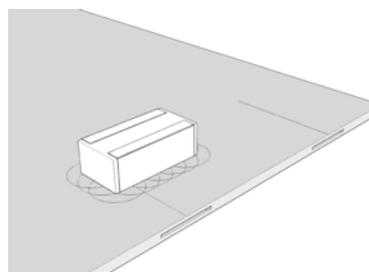
- o Tip: Cut in biscuits in order to get both components to be glued together in the same plane. Use translucent plastic biscuits for this purpose.



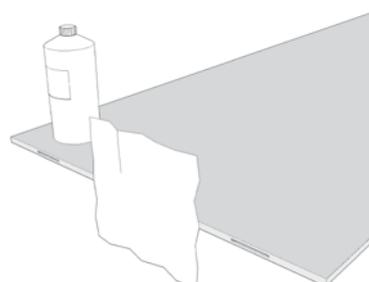
- o Tip: In case of edges showing rough cutting or milling, sand the two edges to be butt-joined and the surface of the reinforcing strip with 150/180 grit sandpaper. Use a sanding block to ensure sanding is flat and to prevent the edges from being rounded off.



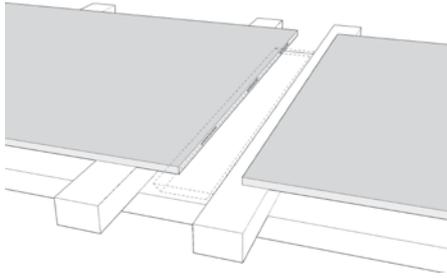
- o Ensure there are no pencil lines, imprints or other marks on the pRaL® surfaces to be glued (or in places where the adhesive might exude). The solvent effect of the adhesive will bring the pigmentation of the marks to the surface and make the joint visible.



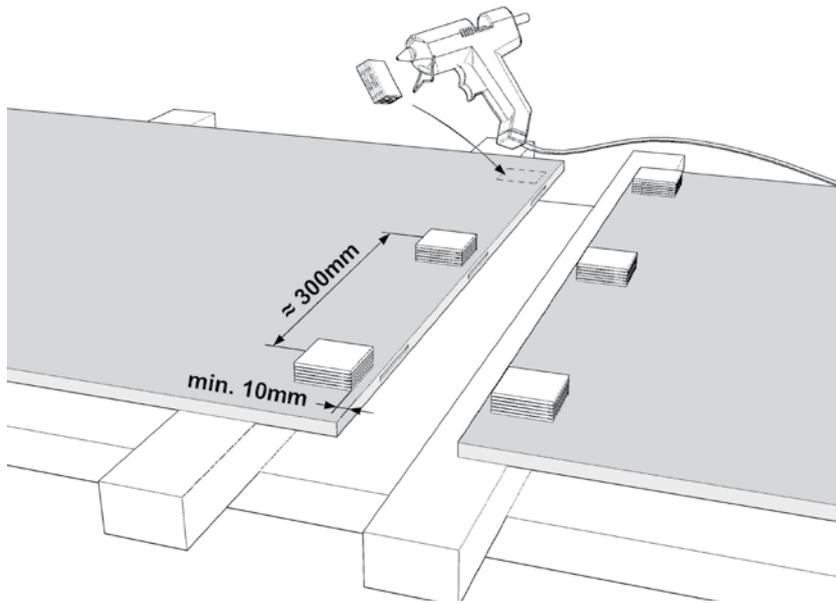
- o Clean the pRaL® surfaces to be glued with a degreaser or with a degreaser or a degreaser/silicone remover if you use silicone sprays on the workshop floor. Do this using a clean white cloth.



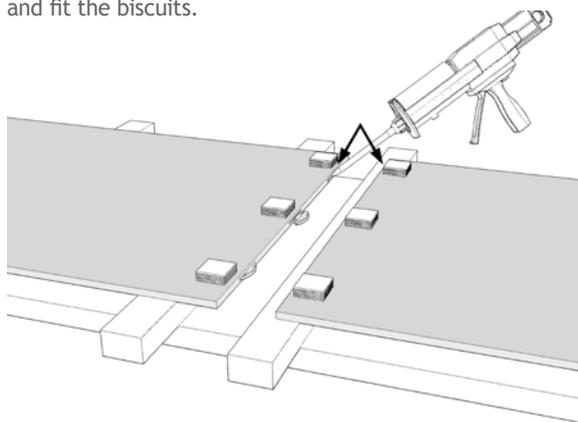
- o Ensure that the two pRaL® components to be glued are in perfect horizontal alignment and in the correct position. Also ensure that the pRaL® reinforcing strip can be placed under the glued joint.



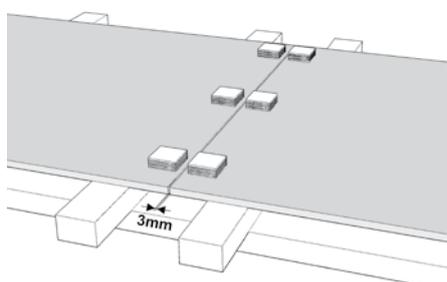
- o Apply hot-melt adhesive, 50 x 50 x 18 to 25 mm thick plywood blocks to the pRaL® components either side of the glued joint. Set the blocks at approximately 300 mm apart and a minimum of 10 mm from the adhesive joint.



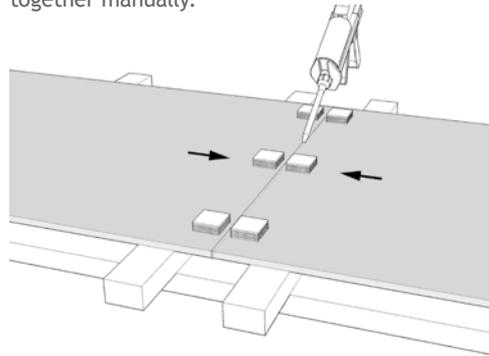
- o If jointing biscuits are being used: Inject pRaL® adhesive into the biscuit grooves and fit the biscuits.



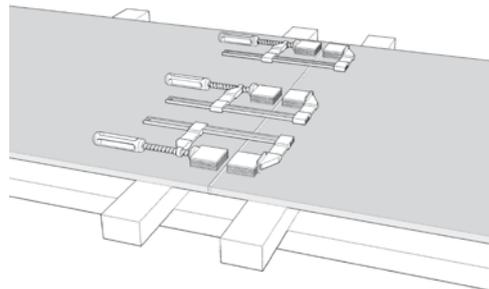
- o Slide the two pRaL® components to be joined directly opposite each other, leaving a 3 mm gap between them.



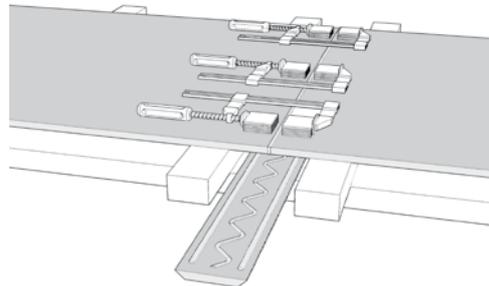
- o Fill the joint with the colour-specific pRaL® adhesive and press the pRaL® components together manually.



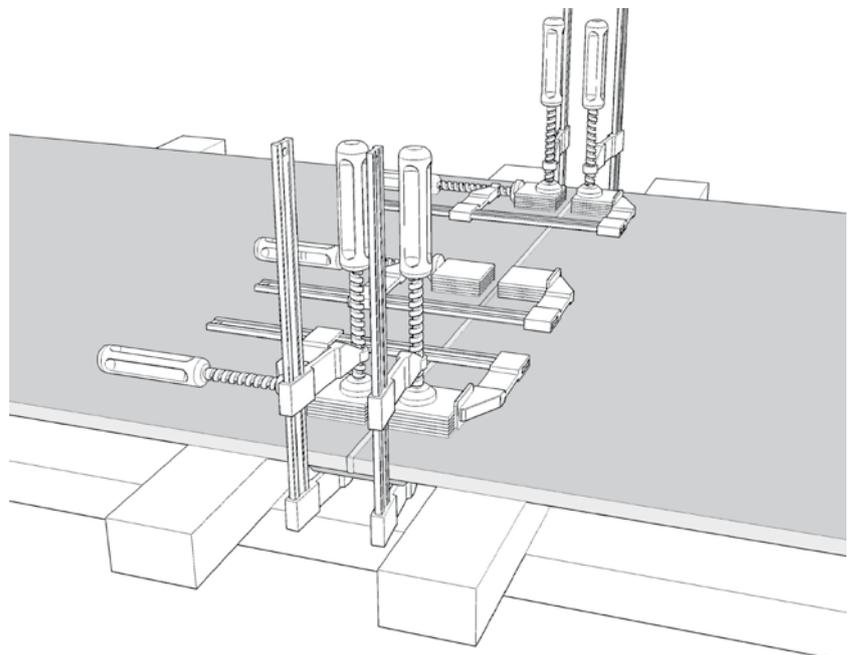
- o Clamp the components together tightly with jointing clamps using the previously glued plywood blocks, such that the adhesive is forced out of the joint everywhere. Retain as little adhesive as possible in the joint.



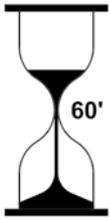
- o Apply the pRaL® adhesive to the pRaL® reinforcing strip and position it centrally under the joint.



- o Clamp the pRaL® reinforcing strip to the workpiece by means of jointing clamps using the previously glued plywood blocks.



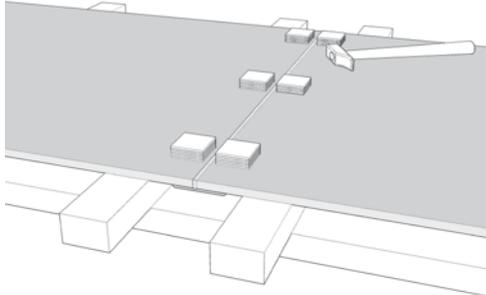
- o Leave the pRaL® to cure for 45- 60 minutes.



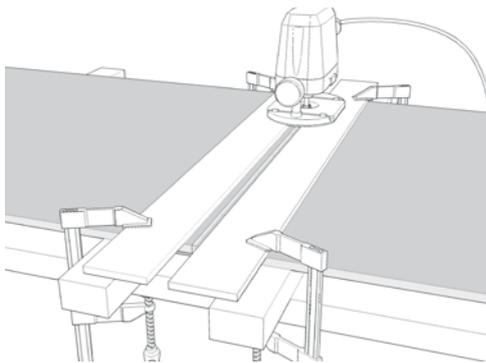
It is recommended to wait approx. 2 hours before to continue handling or working the joint parts.

pRaL

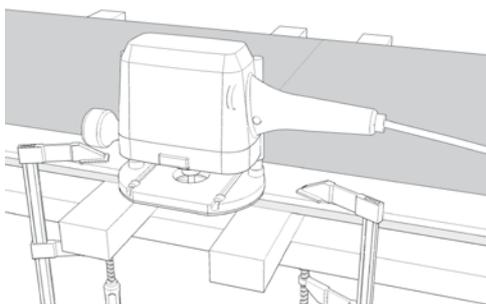
- o Remove all jointing clamps and knock the plywood blocks off using a hammer. Take care not to damage the surface in this operation.



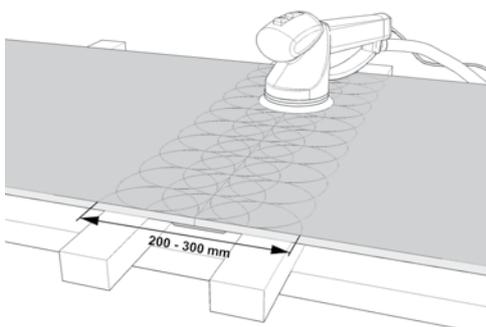
- o Grind off surplus cured pRaL® adhesive as close as possible to flush with the surface, using two battens underneath in MDF or solid plastic, of exactly the same thickness, as a guide and a spacer for the top router. Use a copying ring, size 30 mm for instance, between these two battens: this can be a handy aid.



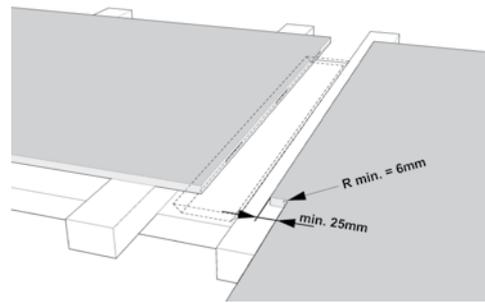
- o The butt edge can be cleaned up using a cutter with a top guide bearing plus an MDF or solid plastic guide.



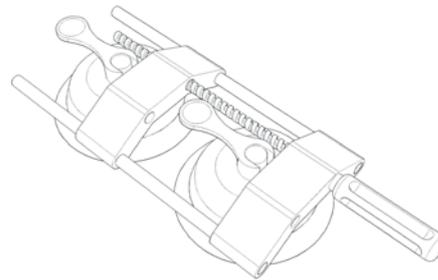
- o Sand the surface smooth with an orbital sander. The sander should be fitted with a hard sole-plate such that the wave effect when sanding is reduced to a minimum. For the same reason the surface to be sanded should extend 10 to 15 cm either side of the glue-line.



- o A right-angled corner joint (pRaL® panels in the same plane) is produced using the same method as described above. Care just needs to be taken to ensure that the glue-line is positioned a minimum of 25 mm from the corner and that this corner is rounded rather than sharp, with a minimum radius of 6 mm.

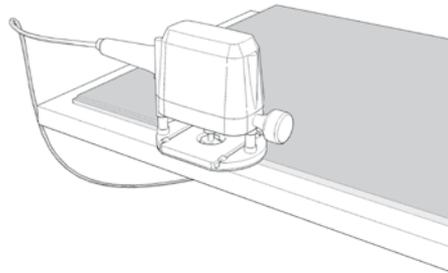


Jointing clamps with suction pads (e.g. Bessey) can also be used instead of plywood blocks glued on using hot-melt adhesive.

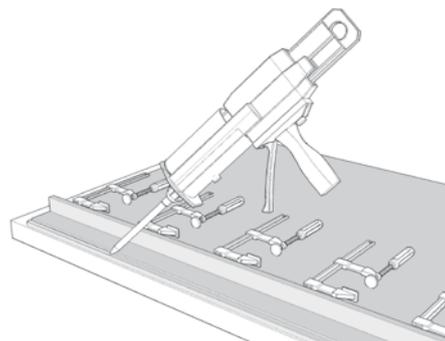


• 8.B Backsplash

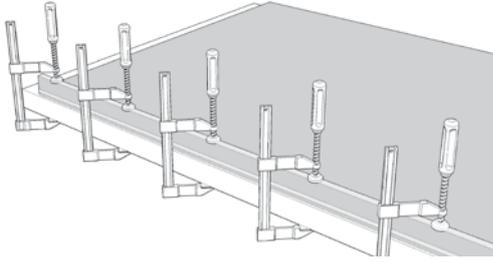
- o Rebate or recess method:
 - With this method a rebate of approximately 4 mm deep is cut into the horizontal pRaL® panel, around 0.2 mm wider than the thickness of the pRaL® backsplash. This is best done with a rebate cutter.



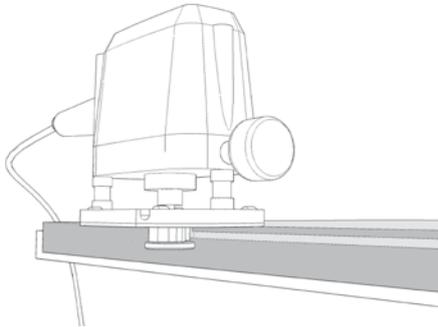
- Cut the pRaL® backsplash to be glued on to the right size + 1 mm to allow for finishing the cuts in order to remove all traces of sawing.
- Do not forget to sand the pRaL® components to be glued, remove all marks and to degrease everything before applying the adhesive.
- Place the pRaL® backsplash to be glued upside down in front of the rebate and lay out all the jointing clamps for the joint ready for use. Allow for one jointing clamp every 15 to 20 cm.
- Apply sufficient pRaL® adhesive along the centreline of the rebate.



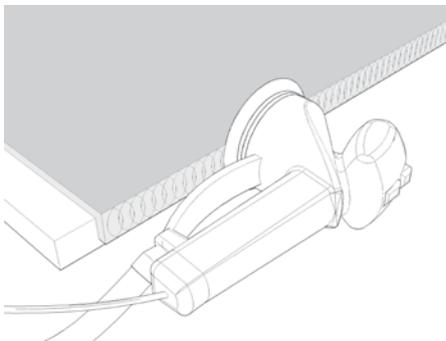
- Position the pRaL® backsplash and press it against the back of the rebate.
- Tighten the assembly lightly in a couple of places and check for squareness with a set square. At the same time check that the pRaL® backsplash is pressed down firmly against the back of the rebate.
- Next, fully tighten all the jointing clamps (one every 15 to 20 cm) such that the pRaL® adhesive is squeezed out of the joint.



- The jointing clamps can be released after the curing of the glue and the pRaL® glue-line can be machined flat using a straight cutter with a guide bearing.

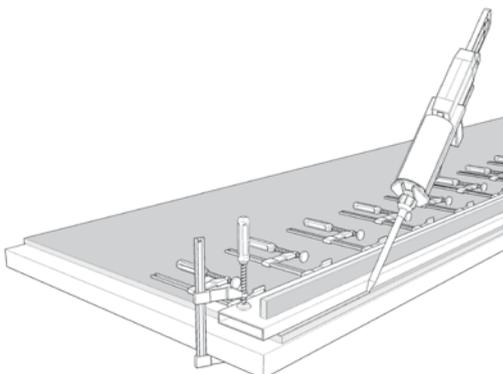


- Sand the pRaL® glue-line smooth with an orbital sander fitted with a hard sole-plate and P280 grit paper, in a rotary action. Take care when sanding smooth to ensure that the pRaL® backsplash is not rounded off.

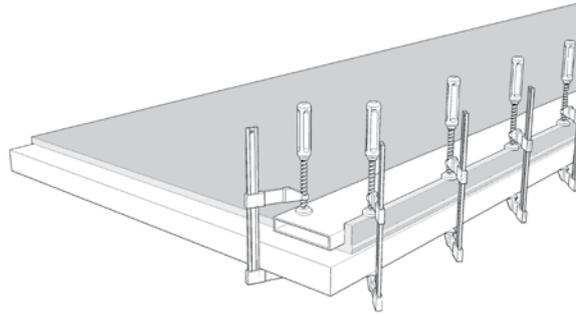


o Guide method:

- This method is virtually identical to the preceding one, the difference being that an aluminium guide is placed behind the pRaL® backsplash instead of the rebate being cut out.
- Do not forget to clean, sand and degrease the pRaL® surfaces to be glued.
NB: all marks must be removed.
- Place the guide in the correct position. Allow around 0.5 mm extra material which will be machined off with the surplus pRaL® adhesive.



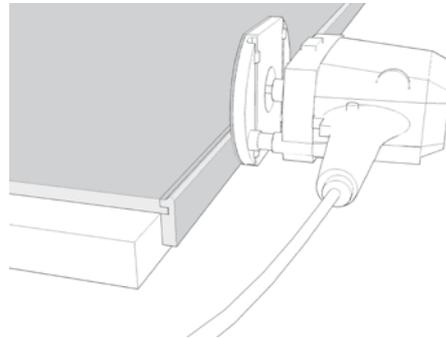
- The pRaL® backsplash is clamped in the same way as was done in the preceding method. Do not forget to remove and to clean the aluminium rule immediately once the workpiece has been clamped since the pRaL® adhesive actually bonds to aluminium as well.



- Machining and sanding smooth are carried out using the same method as described above.

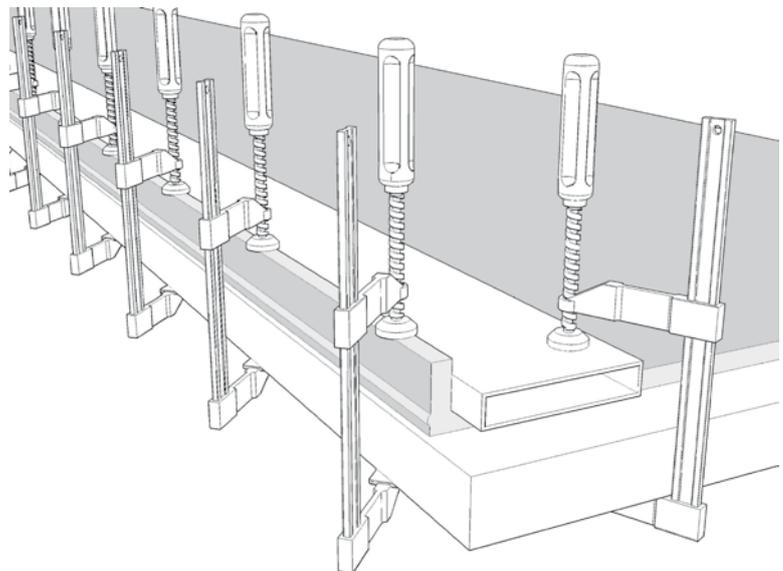


A pRaL® backsplash can also be fitted with a moisture barrier (no drip edge). This requires a rebate and groove technique to be used and the protruding section to be cut round.

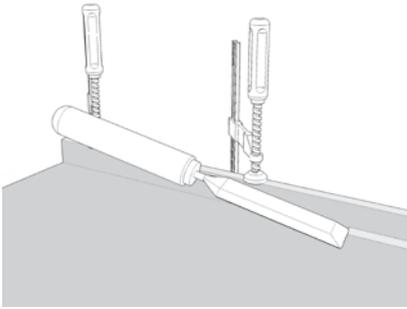


• 8.C. Wall seal moulding (curved up-stand)

- o Right-angled wall seal moulding:
 - Cut a pRaL® edge strip to the desired height of the wall seal moulding. Allow 1 mm extra so the surface to be glued can be machined. Increase the allowance if the top edge of the wall seal moulding needs to be smoothed off.
 - Use the same procedure as for gluing a pRaL® backsplash with the guide method (see page 17).



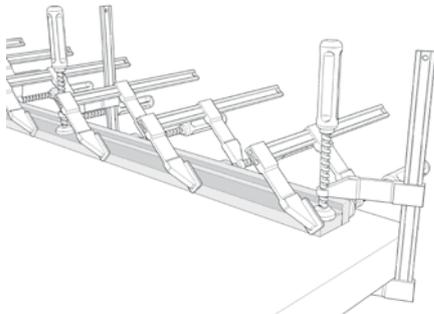
- Remove the aluminium guide section after the pRaL® edge strip has been clamped and clean the guide thoroughly.
- 10 to 15 minutes later, once the pRaL® adhesive has started to cure, cut off the surplus adhesive with a sharp wood chisel so the corner is clean and ready for sanding.



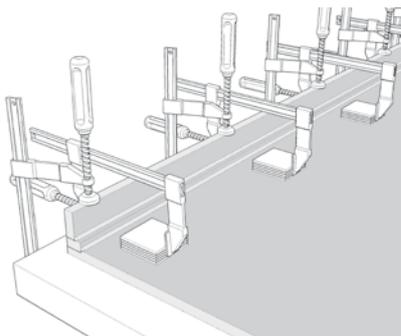
- Once all the glued joints are cured, remove the jointing clamps and cut away the pRaL® adhesive bead as described in the previous section.

o Wall seal moulding with inside corner rounded off.

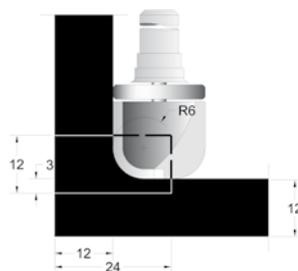
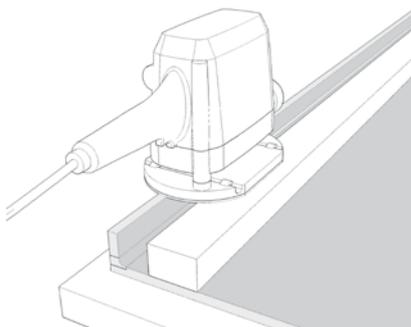
- Cut a pRaL® edge strip to the desired height of the wall seal moulding. Allow 1 mm extra material for each butt edge to be machined.
- Cut off a pRaL® strip to match the thickness of the pRaL® sheet (12 mm) + the radius of the desired rounding in the corner + 2 mm minimum / 3 mm maximum.
A 6.4 mm radius, 19 mm diameter moisture barrier or barrel cutter fitted with a guide bearing can be found at most router cutter manufacturers.
- Glue the small pRaL® strip to the pRaL® edge strip in the approved manner.



- Cut a rebate into the pRaL® worktop to match the width of the pRaL® strip + 0.5 mm and to a depth of 2 mm minimum / 3 mm maximum.
- Glue the pRaL® wall seal moulding to the pRaL® worktop. Clamp the assembly both vertically and horizontally using plywood blocks previously glued on using hot-melt adhesive.



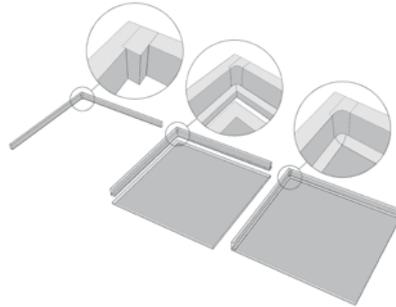
- The clamping arrangement can be released after curing of the glue and the rounded inside corner can be machined with a moisture barrier or barrel cutter.



- Sand the glue-lines smooth by hand.

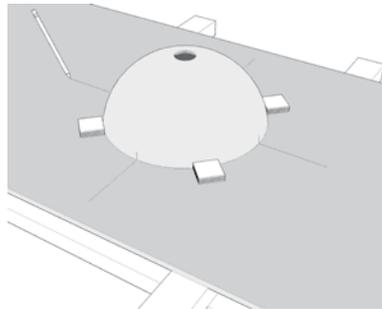


If you wish to create a wall seal moulding with a rounded off inside corner in a corner configuration, then it is best to glue the pRaL® edge-strip into a corner joint first. The inside corner is then assembled in the same way and rounded with a spherical cutter of the same diameter as the moisture barrier or barrel cutter which will be used later when gluing to the pRaL® worktop.

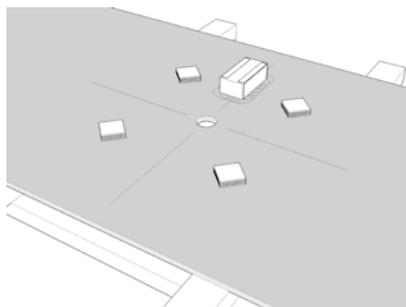


• 8.D Assembly of pRaL® basins and sinks (undermounted models)

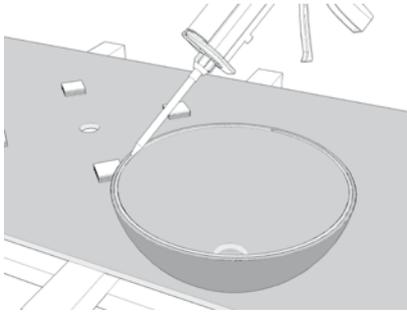
- o Place the pRaL® basin or sink upside down on the underside of the pRaL® worktop or table leaf.
- o Position the pRaL® sink accurately.
 - To do this draw a cross in pencil on the underside of the pRaL® worktop, the lines of which extend at right angles to the centre of the side of the sink and the intersection of which is the centre point of the final positioning of the sink.
 - Next, mark the outermost points at right angles to each other with a pencilled line on the edge of the sink.
 - Place the sink such that the marks on the sink match the marks on the worktop.
 - Transfer the position of the overflow straight down onto the worktop.
- o Glue small pRaL® or wooden blocks along the sink edge using holt-melt adhesive.
 - For rectangular sinks glue on 2 blocks in turn per corner.
 - For round or oval sinks glue on 4 blocks positioned at right angles to one another, but rotated by 45° relative to the datum cross drawn in pencil.



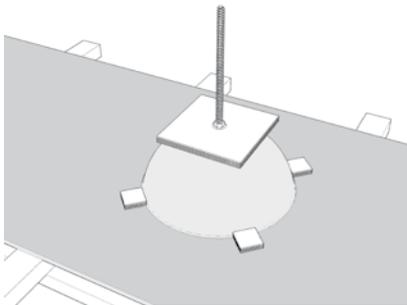
- o Remove the sink and make a hole in the pRaL® worktop, directly below the sink waste outflow.
- o Sand off all pencil lines on the worktop as well as on the sink. Clean and degrease the components to be glued together.



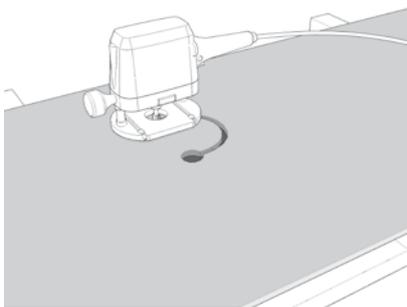
- o Apply a continuous fine bead of pRaL® adhesive onto the inner and outer edges of the sink.



- o Take care not to spill pRaL® adhesive in the sink. Should this occur, remove the pRaL® adhesive at once.
- o Turn the sink over and position it in a single movement between the blocks previously glued on with hot-melt adhesive.
- o Clamp the sink down by passing a threaded rod through a pre-drilled hole in the pRaL® worktop and through the waste outlet of the sink. Use a plywood sheet both sides to distribute the clamping force over the full surface area.



- o If the waste outlet is not in the centre of the sink, it is best to apply additional clamping force to the edges.
- o Leave the pRaL® workpiece undisturbed during the cutting process in order to prevent the joint from moving or breaking.
- o Release the clamping arrangement after one hour and turn the pRaL® worktop with the pRaL® sink over.
- o Cut out the section of the pRaL® worktop above the sink, starting from the pre-drilled hole using a profile cutter fitted with a nylon bearing guide.



- o Sand and polish to the desired level of gloss.
This can be carried out manually or by machine with a small soft sanding sole-plate.
Take good care not to round off the edge too much.

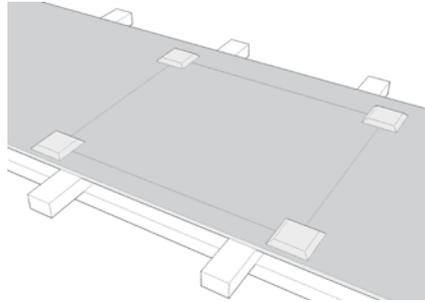


• 8.E Fitting a cooktop

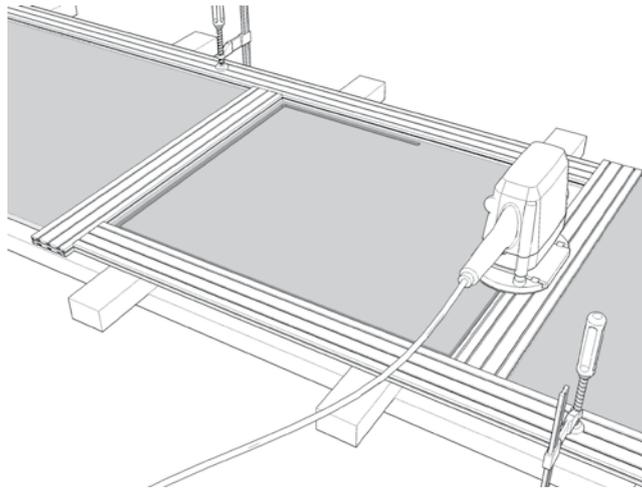
o Surface mounting method:

- The cooktop being used must enable a minimum clearance of 6 mm to be provided all round relative to the specified cut-out in the pRal® worktop.
- Draw the cut-out on the underside of the pRal® worktop.
- Glue a 150 mm square piece of pRal® with its edges chamfered at 45°, in each corner. When gluing ensure that approximately 50 mm protrudes from the cut-out.

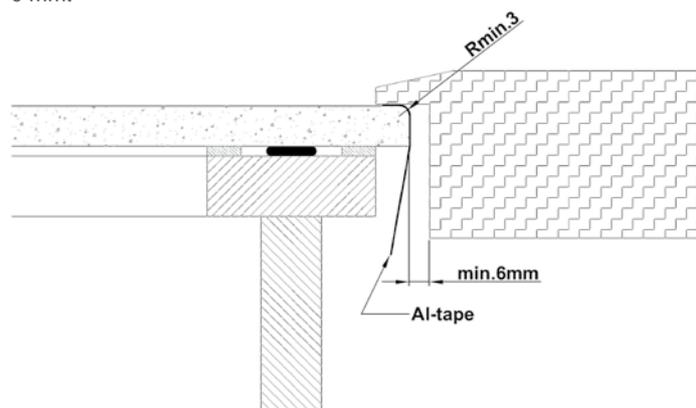
Tip: an ideal reinforcement will be obtained by gluing pRal® strips (minimal thickness 24 mm and width 50 mm) alongside the cut-out.



- Turn the pRal® worktop over.
- Make a template that enables the cut-out to be effected with a minimum clearance of 6 mm on all the part of sides of the cooktop which is to be sunk into the worktop.
- Ensure that the corners are cut out to a minimum radius of 6 mm (12 mm cutter).



- Insulate the raw edge of the cut-out with aluminium adhesive tape or with self-adhesive ceramic insulation (Kaowool).
- When using aluminium adhesive tape it is recommended that the tape is allowed to hang such that the part hanging loose acts as a cooling fin.
- The cut-out should be rounded off around the top edge to a minimum radius of 3 mm and a minimum of 6 mm needs to be allowed between the cooktop casing and the pRal® worktop. The inside corners of the cut-out are to be at least 6 mm.



- We advise against flush fitting, since an improperly positioned saucepan can transfer heat from the cooktop to the pRaL® worktop, with the attendant risk of distortion, discoloration and/or splitting.
Sunken fitting is totally inadvisable due to the lack of effective heat evacuation.
- The distance between the cooktop and a pRaL® upstand also needs to be taken into account.
With a ceramic or induction cooktop a minimum distance of 70 mm will be sufficient, a gas cooktop requires at least 150 mm.

9. Sanding and polishing

9.A Sander

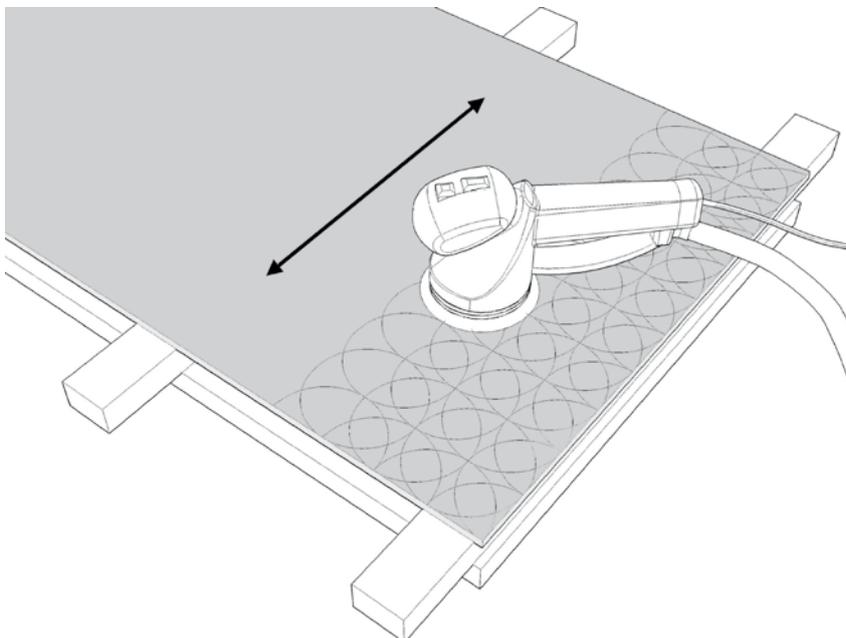
- o Orbital hand-held sander for surfaces
- o Triangular or linear sander for inside corners

9.B Sandpaper

- o P grit sandpaper (timber industry)
Grits range from P12 to P2000. The higher the grit the finer the sanded surface.
- o μ value emery paper (vehicle bodywork industry)
Values range from 180 μ to 0.05 μ . The lower the value the finer the sanded surface.
- o Scotch-Brite™ (3M) or Platin2 (Festool) sanding block.
- o Approximate comparative table of P grit and μ values.

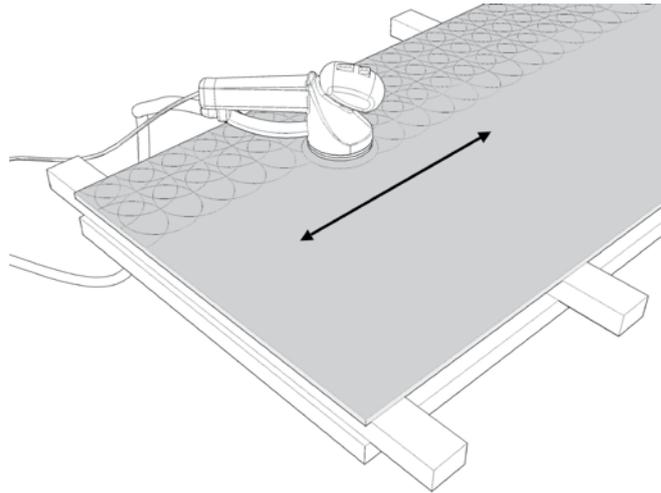
9.C Sanding and polishing method

- o Surplus pRaL® adhesive needs to be cut off prior to sanding.
- o Surfaces must be clean.
- o pRaL® sheets are supplied from the factory, one side sanded with an industrial belt sander to P320 grade, which is characterised by a fine lined structure running lengthwise along the pRaL® sheet. NB: after delivery and fabrication, pRaL® sheets require to be sanded and polished to the desired level of gloss.
- o For the best result an orbital sander fitted with a hard sanding sole-plate is used.
- o For general sanding: make small circular movements across the pRaL® sheet and ensure that the surfaces being sanded overlap sufficiently (half the previous pass).

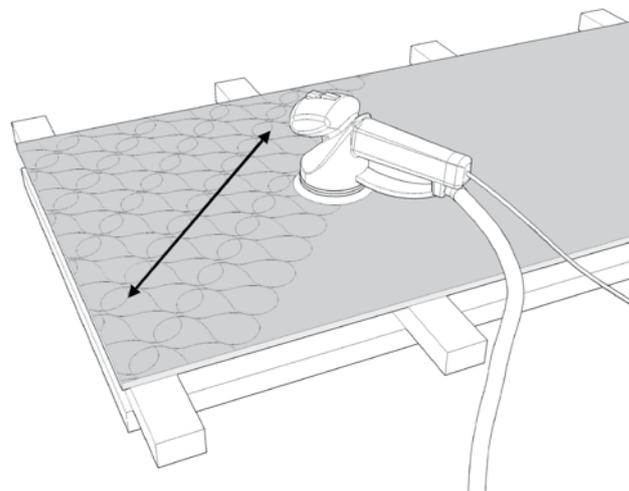


FEPA GRIT (P)	MICRONS (μ)
P12-P60	-
P80	180 μ
P100	150 μ
P120	120 μ
P150	100 μ
P180	80 μ
-	70 μ
P220	-
P280	50 μ
P320	-
P360	40 μ
P400	-
P500	-
P600	35 μ
-	30 μ
P800	-
P1000	20 μ
-	15 μ
P1200	-
P1500	12 μ
P2000	9 μ
-	5 μ -0.05 μ

- o Next, repeat the sanding action with the same grit in the lengthwise direction of the pRaL® sheet.



- o For final sanding and finishing it is best to use the polishing method: namely a random figure-of-eight action diagonally across the pRaL® sheet, in a smooth, not too abrupt action.



- o You will need to clean the pRaL® surface after each step.
- o Replace the sanding disks in good time. Saturated sanding disks will leave an uneven finish on the sheet surface.
- o Always start sanding with the coarsest grit. Then switch to a finer grit according to the desired finish: matt, satin, gloss, high gloss.

MATT			SATIN			GLOSS			HIGH GLOSS		
	P	μ		P	μ		P	μ		P	μ
#	280	50	#	280	50	#	280	50	#	280	50
#	400	40	#	400	40	#	400	40	#	400	40
∞	Platin2 S400(Festool)		∞	Vlies A280(Festool) Scotch-Brite7447(3M)		∞	Vlies A280(Festool) Scotch-Brite7447(3M)		∞	Vlies A280(Festool) Scotch-Brite7447(3M)	
			∞	Vlies S800(Festool) Scotch-Brite7448(3M)		∞	Vlies S800(Festool) Scotch-Brite7448(3M)		#	Vlies S800(Festool) Scotch-Brite7448(3M)	
			∞	Platin2 S1000(Festool)		∞	Platin2 S1000(Festool)		∞	Platin2 S1000(Festool)	
						∞	Platin2 S2000(Festool)		∞	Platin2 S2000(Festool)	
									∞	Platin2 S4000(Festool)	
									∞	Polishing paste with felt and/or sheepskin	

: first latitudinal and then longitudinal movement
 ∞ : figure-of-eight movement (final sanding / polishing)

- o Ensure movement, pressure and speed are uniform.
Excessive pressure on the machine will result in a highly uneven surface finish.
It is best to allow the weight of the sander itself to apply the pressure on the pRaL® sheet, all you need to do is to keep the machine stable and guide it.
- o A matt finish is the easiest to achieve and the least susceptible to visible traces of wear.
Conversely, this finish is more sensitive to potential stains.
- o Scratches are most obviously visible on a gloss or high gloss finish, especially highly pigmented and dark colours such as red and black.
- o Scratches are less visible on matt speckled colours than on glossy flat colours.
- o Highly pigmented and dark colours such as red and black show up at their best in a gloss or high gloss finish (minimum finish: satin).
This finish also offers the best resistance to potential staining.
On the other hand this finish is highly sensitive to visible traces of wear and scratches.

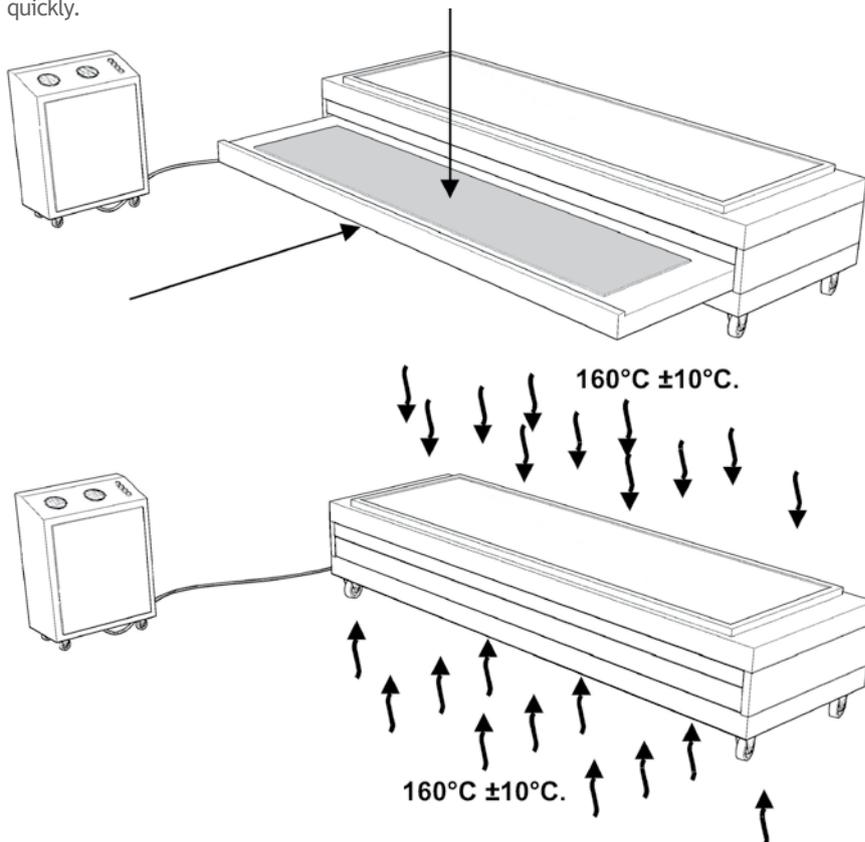
10. Thermoforming

• 10.A Thermoforming machines

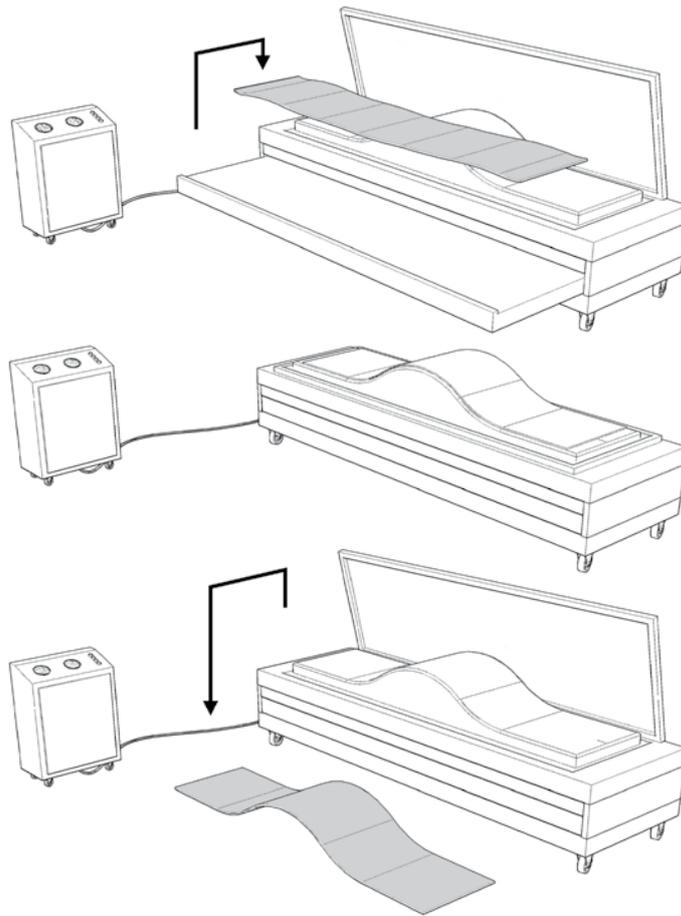
- o Preheating oven for full pRaL® sheets (Elkom, Albin Kraus, etc.)
- o Preheating oven for pRaL® strips (Albin Kraus, etc.)
- o Membrane press (Elkom, Albin Kraus, etc.)
- o Combined systems.

• 10.B Thermoforming method

- o pRaL® sheets are thermoformable at a temperature of $160^{\circ}\text{C} \pm 10^{\circ}\text{C}$.
- o Thermoforming must always be done with appropriate tooling.
- o The entire pRaL® workpiece is to be heated up evenly.
Local heating (e.g. with a heat gun) is ruled out.
This can lead to cracks, splits, blisters and discoloration.
- o A test piece must be produced in every case in order to calibrate the oven as regards heating time and temperature.
These may depend on the unit being used. Placing thermocouples in and on the pRaL® test piece can help in determining the parameters.
- o The workpiece is to be heated up evenly and on both sides simultaneously.
The preheating oven must not be too hot, so the core of the sheet heats up gradually as well. Splits, cracks, blisters and discoloration may occur if the sheet is heated too quickly.



- o Thermoforming is always carried out in a mould by a membrane press.



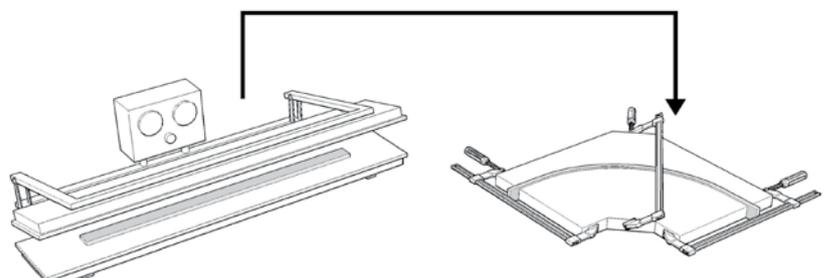
- o In order to obtain the correct radiuses the pRaL® workpiece requires to be bent slightly beyond the required point, since the material will have a tendency to spring back slightly. Producing a test piece is recommended for this.
- o In order to obtain a good thermoforming result, the pRaL® workpiece needs to be allowed to cool in the mould down to approximately 80°C.
- o Three-dimensional thermoforming with highly pronounced shapes can be best obtained with a pressure forming machine.
- o Achievable radiuses will depend on the thickness of the pRaL® sheet and its colour (possible discoloration with radiuses which are too tight). The values in the table below are for information only.

SHEET THICKNESS (MM)	HEATING TIME (MIN)	MIN. R (MM)
3	- 5	- 10
6	- 16	- 25
12	- 22	- 90

- o Temperatures in excess of 170°C can cause irreversible damage to the pRaL® material.

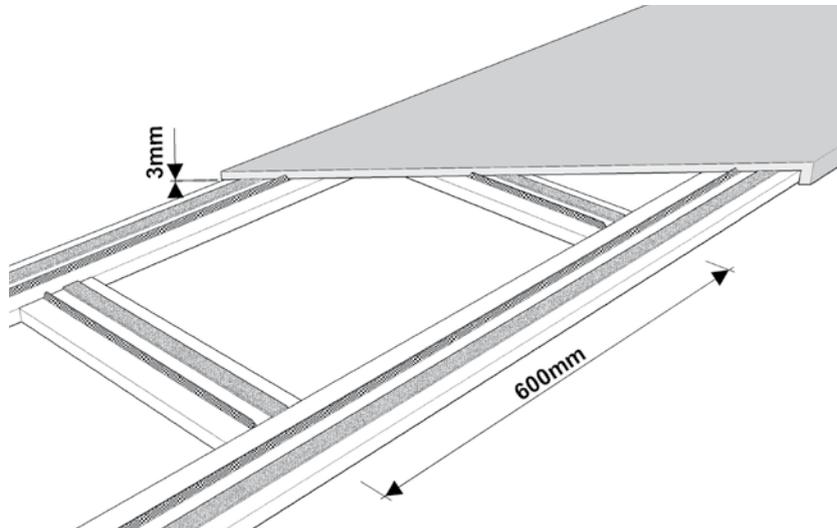


A preheating oven for strips can be used for pRaL® upstands and smaller pRaL® components and the pRaL® workpiece can then be clamped between a mould and counter mould.



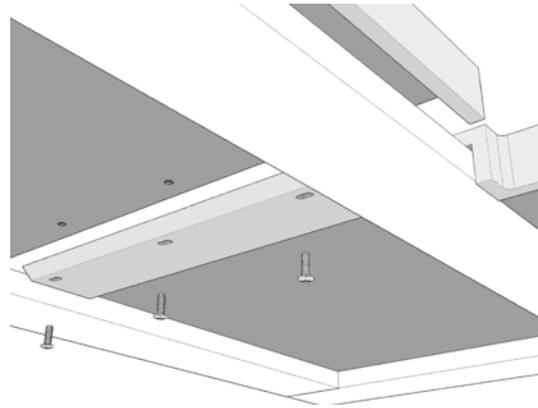
11. Installation on site

- Ensure that the site is free from dust and that the temperature is in accordance with the operating conditions.
- pRaL® panels need to be allowed to acclimatise for 24 hours in the environment in which they are to be assembled and/or glued.
- A framework must be placed on the supporting units with a distance between centres of 600 mm onto which the pRaL® worktop will be glued using a polymer adhesive.



- Ensure that the supporting units are perfectly aligned and the framework is 100% horizontal.
- pRaL® components are always glued to another material using a polymer adhesive in order to achieve the optimum bond and to allow for expansion/shrinkage.
- A polymer bond will not be at its optimum unless the adhesive has a certain bulk. It is therefore advisable to provide spacers of approx. 3 mm thick between the framework and the pRaL® worktop.
- Above all do not use double-sided adhesive tape, since the components can no longer be moved, which can be to the detriment of pRaL® worktop positioning or gluing the pRaL® components in situ.
- Always ensure that the surfaces to be glued are free from dust and degreased.
- Always allow 1 mm clearance per linear metre of pRaL® between fixed items such as walls, column cupboards, etc. and the pRaL® worktop. This joint can be subsequently sealed off with an MS polymer. It is advisable in this regard that the pRaL® components along the joints to be filled should be masked off with tape in order to ensure that no stains are left on the pRaL® worktop.
- Apply the polymer adhesive to the supporting framework in continuous pyramidal strips along the spacers.
- For the installation of a pRaL® worktop consisting of several components, it is best to glue the largest and/or the most awkward component into its final position.
- Always ensure that the reinforcing strips have been previously glued to the first pRaL® component to be fitted.
- To glue the joints on site you need to use the same techniques as described under heading 8.A “Glued butt joint”.
- When gluing the joint you can draw it tight using jointing clamps and plywood blocks applied with hot-melt adhesive (or jointing clamps with suction pads).
- Gluing the pRaL® reinforcing strip and clamping it under a pRaL® worktop on the other hand is difficult to carry out especially if the worktop is butted up against a wall. For this reason it is best to fit threaded brass inserts into the underside of the pRaL® component to which the reinforcing strip is to be glued.
- Slots are provided in the reinforcing strip. The bolts can be screwed into the inserts through these slots. Once the glued joint has been clamped to the pRaL® surface, the pRaL® worktop can be clamped to the reinforcing strip (with pRaL® adhesive applied to it) by tightening the bolts.

pRaL



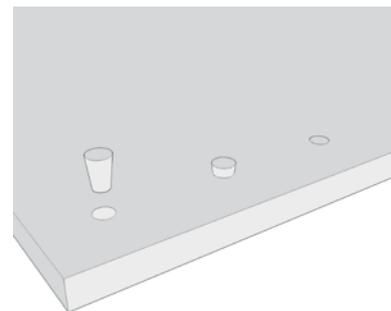
- After the pRaL® components have been fitted, the expansion joints need to be sealed off with silicone (or MS polymer). To do this apply masking tape to the pRaL® surface and on the wall, as close as possible to the joint such that the silicone does not leave any traces behind after it has been smoothed out. Remove the masking tape immediately after applying and smoothing the silicone.



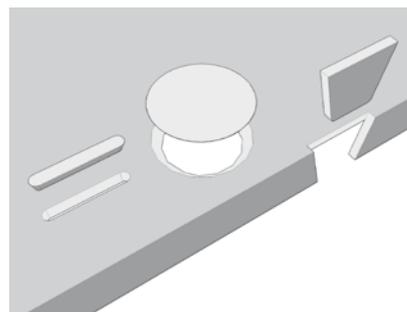
A correctly applied silicone bead must only touch two surfaces. Adhesion to a third or other surfaces can result in cracks forming in the silicone bead.

12. Repairs

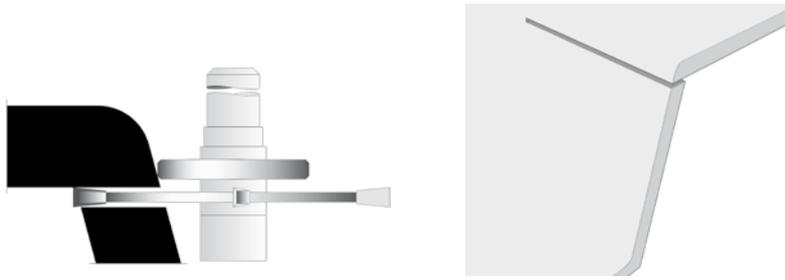
- Repairs should always be carried out locally by cutting away the damaged area and gluing in a pRaL® insert.
- It is therefore advisable to give the customer any surplus from the fabricated pRaL® sheets to the customer for any future repairs (= the same batch number).
- Repairs by just applying pRaL® adhesive, or using the pRaL® adhesive as a filler are absolutely inadvisable. Such repairs will subsequently discolour (the repair will therefore be visible) and may split.
- Very isolated damage (pitting or small deep scores) can be repaired with cutter specifically designed for this purpose which are used to cut a tapered hole in the pRaL® component. The hole is filled by means of a fitted plug in pRaL® material.



- More substantial damage is to be cut out with a tapered tool and can be repaired by gluing in a fitted pRaL® piece.



- A pRaL® basin with a visible or split glue-line can be cut free using a special disc cutter and glued back in again (with pRaL® adhesive). NB: this is not a simple operation, it requires both the worktop and the sink to be held perfectly in position.



pRaL

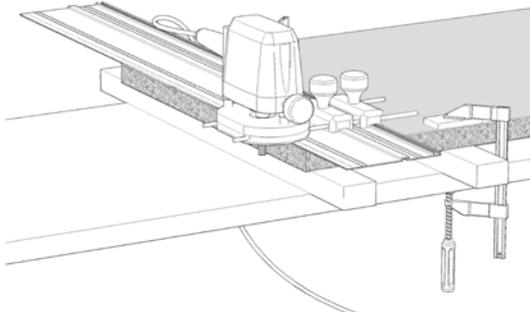
13. Fabricating instructions for 3mm pRaL®

• 13.A General

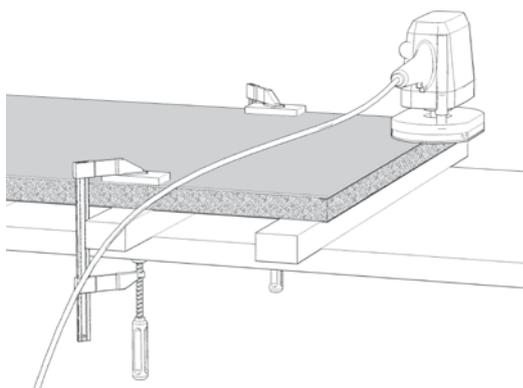
- o pRaL® sheets in thickness 3 mm are not self-supporting and therefore always require to be bonded to a wood-based substrate (e.g. chipboard) with a PVAc adhesive.
- o If there is no 3 mm pRaL® glued to the back of the panel, then there needs to be at least a laminate backing provided. Without backing, the composite panel will cease to be in balance (eventual warp) and must therefore have provision for being very solidly secured to a supporting structure. The minimum thickness of the substrate for single-sided pRaL® bonding is to be 25 mm.
- o The bonding is to be carried out in an industrial process using an adhesive roller applicator and a panel press.
- o The correct parameters with regard to pressure, temperature and clamping time for bonding 3 mm pRaL® to a substrate are to be established by trial and error in consultation with the adhesive supplier.
- o Bonding 3 mm pRaL® sheets thus requires a certain amount of expertise and is more appropriate to a production run.
- o 3 mm pRaL® applications should be restricted to specific uses such as single worktops, straightforward racks and units.

• 13.B Glued butt joint (components to be glued in the same plane)

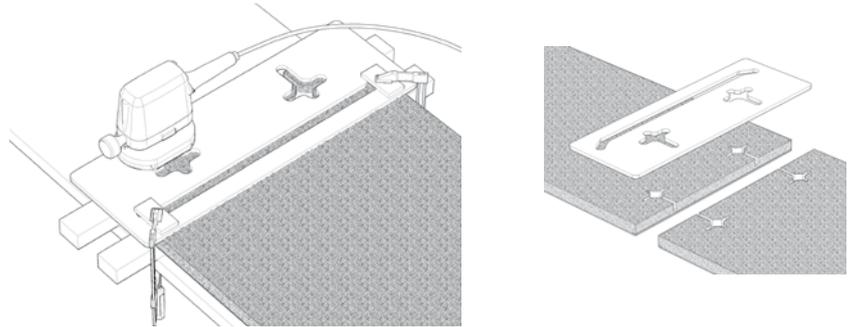
- o Always ensure that the two edges to be butt-joined are flat and a perfect fit. They must be cut straight and square.



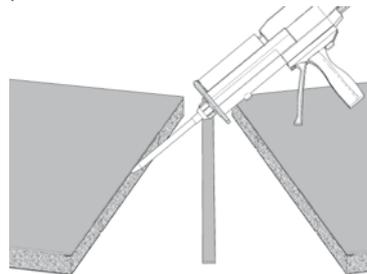
- o Gluing in a 3mm pRaL® tongue ensures level positioning of the two 3mm pRaL® components. The tongue will also ensure that the pRaL® adhesive remains close to the surface and does not run down when the joint is clamped. The pRaL® tongue will also reinforce the joint between the two pRaL® surfaces. It is therefore important when cutting the groove for the pRaL® tongue (with a 3.2 mm disc cutter fitted with a guide bearing) to ensure that all adhesive residues under the 3 mm pRaL® have been removed. You can safely cut away 0.1 to 0.2 mm on the underside of the pRaL® component.



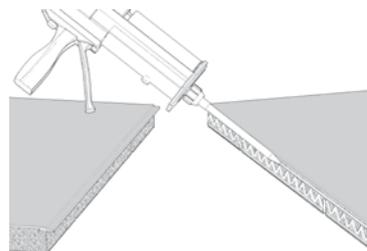
- o Cut openings for the sheet jointers on the underside; two of these for a sheet width of 60 cm is sufficient. Cut them to a sufficient depth such that when the glued faces are clamped, the clamping force is greatest on the visible side. Accordingly, it is recommended that the jointing clamps are positioned at or beyond the mid-point across the thickness of the sheet.



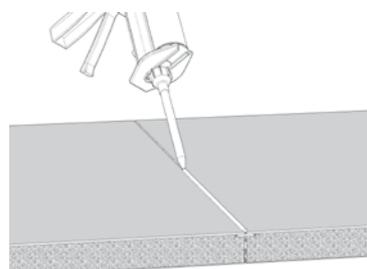
- o Sand off both pRaL® edges with 150/180 grit. Take care not to round off the edges.
- o Vacuum all the dust away.
- o Clean the pRaL® edges with a degreaser or with a degreaser or a degreaser/silicone remover if you use silicone sprays on the workshop floor. Do this using a clean white cloth.
- o Ensure there are no pencil lines or other marks remaining on the surfaces to be glued (or in places where the adhesive might exude). The solvent effect of the adhesive will bring the pigmentation of the marks to the surface and make the joint visible.
- o Ensure that the two components to be glued are in perfect horizontal alignment.
- o As an option, plywood blocks can be glued with hot-melt adhesive to the pRaL® surface in order to provide additional clamping on the glued joint.
- o Apply pRaL® adhesive in one of the two grooves and slide the 3 mm pRaL® tongue into place.



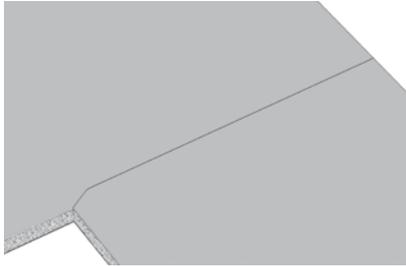
- o Apply pRaL® adhesive to the opposite butt edge of the timber substrate, in the form of upper and lower beads of adhesive with a zigzag bead running between them, as well as in the groove opposite for the pRaL® tongue.



- o Position the two components to be joined opposite one another with a 3 to 4 mm gap between them. Apply a further bead of adhesive in the joint: this should ensure a seamless joint.

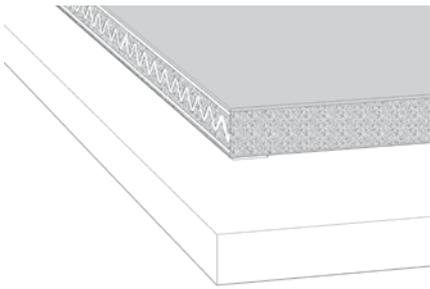


- o Press the two components together by tightening the sheet jointers and, if appropriate, by tightening the clamps on the blocks fastened with hot-melt adhesive.
- o Leave the pRaL® adhesive to cure for 60 minutes.
- o Cut away the surplus pRaL® adhesive and sand the surface smooth with an orbital sander as previously described for fabrication of 12 mm pRaL®
- o The same method is used for a corner joint. However, the joints of the two pRaL® components feature a specific cut-out using a cutting template of the two components to be joined.

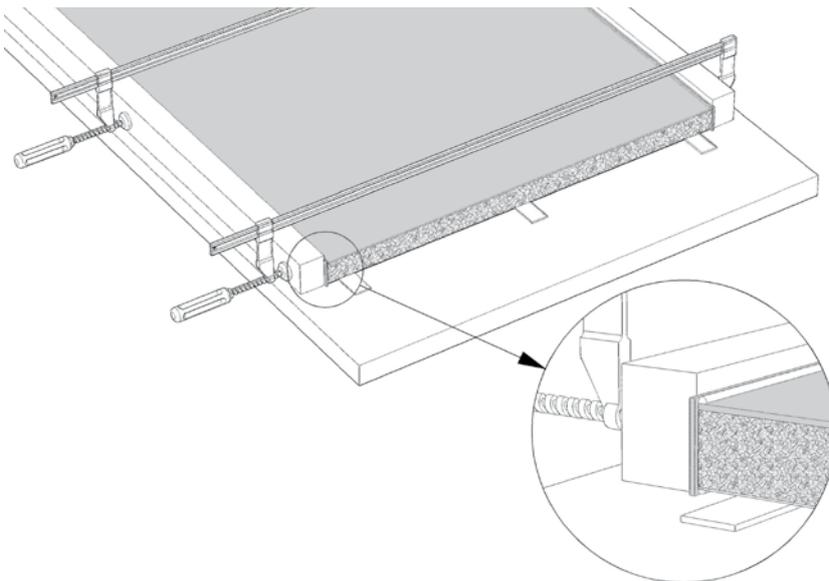


• **13.C Applying an edge strip**

- o Ensure that the edges have been cut flat and square.
- o Cut pRaL® edge strips 6 mm wider than the thickness of the edge to be finished.
- o Prepare clamping battens and 'G' adhesive clamps or edge adhesive clamps.
- o Sand the components to be glued and clean them with a degreaser.
- o Apply pRaL® adhesive to the edge strip in the form of upper and lower beads of adhesive with a zigzag bead running between them.



- o It is best to place the worktop on spacer strips (around 3 mm) for this job.
- o Apply and clamp the pRaL® edges strips.



- o After the curing of the glue, cut the edge strip to size and sand it.

• **13.D Sinks and hob**

- o With 3 mm pRaL® worktops we recommend that surface-mounted units only are used in order to prevent water infiltration and cracking.

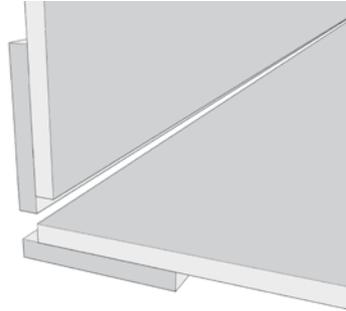
14. Fabrication instructions for vertical applications (e.g. walls)

• 14.A General

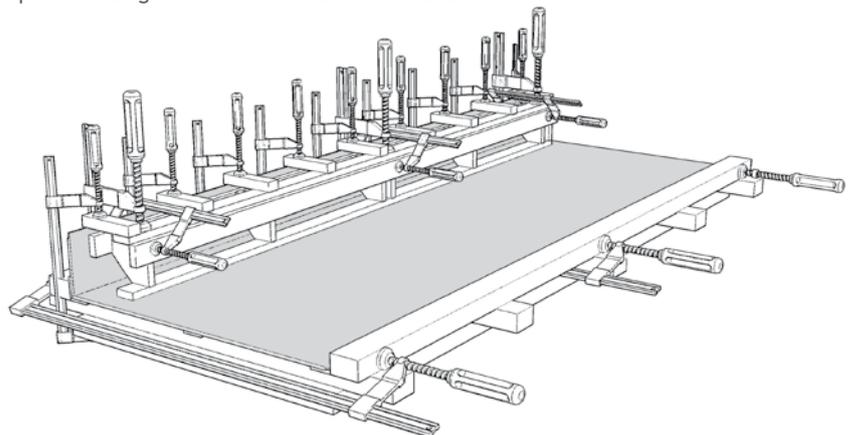
- o pRaL® in 6 mm thickness is generally used for wall cladding. 12 mm pRaL® may also be used but the panels are heavier and parts are therefore more difficult to fix and to fabricate.
- o Vertical wall panels (e.g. in wet rooms) are fabricated in the same way as horizontal panels. Accordingly, remember:
 - To cut the panels to the correct size.
 - To finish the edges to be glued.
 - To fit reinforcing strips behind the joints.
 - To cut in biscuits or fit a pRaL® tongue.
 - Always to clean, degrease and sand pRaL® components to be glued before jointing.
 - It is recommended to carry out gluing in the workshop as far as possible. The greatest level of difficulty is in installation on site: it is unavoidable in some cases, for gluing to be required to take place on site in the vertical position.
 - Ensure that the site is always dust free and the temperature for fabrication is at a minimum of 18°C. Operations that need to take place on site and that generate dust can best be carried out in a separate room.

• 14.B Preparation in the workshop

- o If one or more corners are to be provided in the design to be implemented, it is recommended that the most difficult part of the corner arrangement be assembled beforehand in the workshop to make up a single unit.
- o A corner arrangement needs to be fitted with a reinforcement in the corner. This can be achieved by gluing a 50 mm wide strip of 6 mm pRaL® on the back of the corner panels with a 5.5 mm overhang.

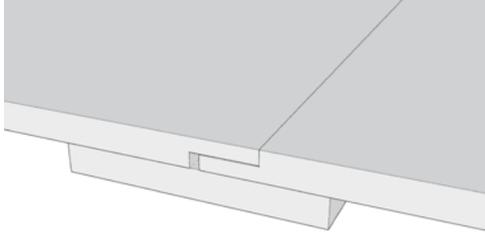


- o The two prepared panels will then require to be glued together perfectly square. It is recommended that a jig be made for this which can act at the same time as a structure to transport the corner unit. Also ensure that the inside corner is still accessible in order, once the adhesive has cured to a limited extent (after 15 to 20 min.), to remove most of the adhesive residue with a sharp wood chisel. In this way subsequent sanding work can be reduced to a minimum.



- o A thermoformed corner is also an option.

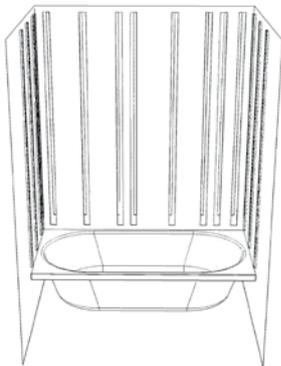
- o If long lengths of wall require to be clad, it is recommended to glue the panels together in the workshop in order to reduce the amount of gluing needed on site. This will require a reinforcement behind the joint in 6 mm pRaL® as well as a 3.1 mm machined tongue and groove rebate: this creates a joint which will position the panels perfectly in respect of one another. Gluing and clamping the workpieces is to be done using the same method as described for gluing a glued butt joint in 12 mm (chapter 8.A).



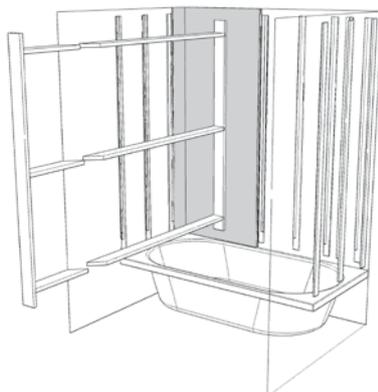
- o The reinforcing strips can best be glued in the workshop to one of the two pRaL® wall panels to be joined together.

• 14.C Installation on site

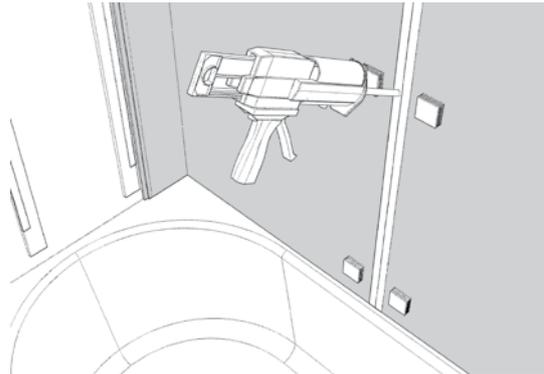
- o Ensure that all horizontal surfaces (showers, baths, floors, bathroom cabinets, etc.) are protected with plastic film secured with paper adhesive tape.
- o Secure battening of a minimum thickness of 6 mm to the wall (screwed or glued). This battening must be capable of accepting the thickness of the reinforcing strips.
- o A wall batten is to be fitted every 300 mm and either side of a reinforcing strip.
- o Ensure that these battens are aligned in order to take up any unevenness in the wall to which they are attached.



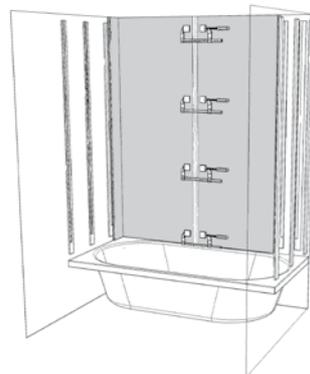
- o Start by fitting a corner section. Apply a bead of MS polymer adhesive to the battening. Fitting a 3 mm strip as a spacer to the battening ensures a better bond, since an MS polymer adhesive will only deliver optimum performance if it has sufficient bulk.
- o Ensure that the section is lightly keyed in order to be able subsequently to apply a horizontal MS polymer joint.
- o Keep the corner unit in place by wedging it with planks from a wall opposite or a structure between the floor and the ceiling.



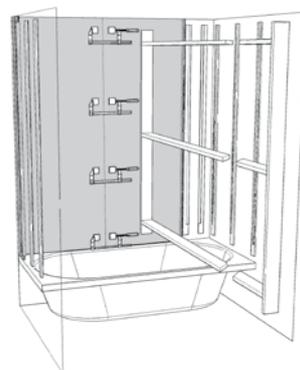
- o Allow the polymer adhesive to cure for 24 hours, thus providing a sound base for subsequent work.
- o Attach plywood blocks with hot-melt glue to the pRaL® corner unit and the pRaL® wall panel to be glued to it. Fit blocks every 500 mm. If suction pad jointers are used this step is obviously not required.
- o Apply masking tape either side of the joint in order to keep any adhesive runs off the pRaL® surface.
- o Apply the MS polymer to the backing wall battens in line with the pRaL® wall panel to be glued on.
- o Apply pRaL® adhesive to the preassembled pRaL® reinforcing strip of the preceding (corner) panel and position the pRaL® wall panel such that there is still a 3 mm gap in the joint.
- o Do not forget to key the pRaL® wall panel for the MS polymer joint which has yet to be made between the horizontal section and the pRaL® wall.
- o Inject the pRaL® adhesive from the bottom upwards into the open joint.



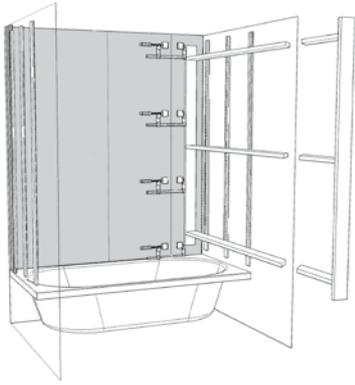
- o Next, clamp the two pRaL® wall sections together with jointing clamps using the plywood blocks fastened with hot-melt adhesive.



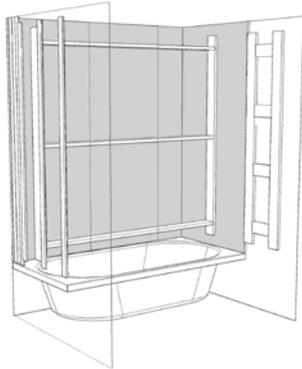
- o Keep the pRaL® panel in place by wedging it with planks from an opposite wall or by means of a structure between the floor and the ceiling.



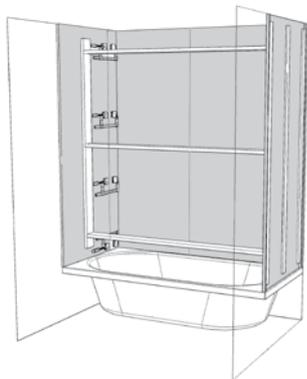
- o Allow the pRaL® adhesive to cure slightly and remove the masking tape.
- o After 15 to 20 minutes (while the adhesive is not completely cured) the adhesive residues can be removed with a sharp wood chisel (do not scrape).
- o Repeat this process for each pRaL® wall panel to be glued to the preceding one.



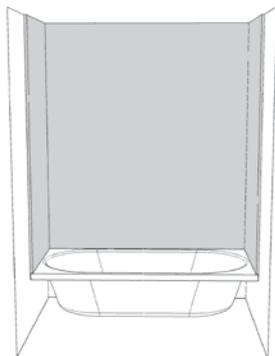
- o If there is another corner to follow, it should be glued on site. It is recommended that the pRaL® wall panel is fixed in the corner by keying it to a plank fitted to the wall on beforehand. The pRaL® unit can also be held in place by propping it from an opposite wall.



- o Complete the other pRaL® wall in the same manner as described above.



- o Sand all glued joints clean and polish overall to the desired gloss level.



- o Apply MS polymer seal horizontally between the horizontal bathroom unit and the vertical pRaL® wall as well as between the pRaL® wall and the ceiling in order to create a watertight seal. It is recommended to apply masking tape to the surfaces while applying the sealant in order to be sure not to stain the pRaL® surface.
- o Holes for taps require to be cut out beforehand and need to be a couple of mm larger than the tap tails. Also, do not forget to fill the gap here with MS polymer sealant.

15. Maintenance

- o Putting hot saucepans from the hob or the oven directly on to the pRaL® surface can cause damage, such as hairline cracks, scorching, blisters, etc. to it. We therefore recommend always using a mat. Fitting stainless steel rods in grooves cut into the pRaL® worktop may also be an answer.
- o Pouring hot water into a pRaL® sink should also be accompanied by running the cold tap.
- o Take care not to leave any traces of silicone behind on the pRaL® surface during fabrication. This might cause stains which can only be removed by re-sanding (and polishing) the surface.
- o It is inadvisable to use the pRaL® worktop as a chopping board. Use a wooden or suitable plastic chopping board, for instance, for this.
- o The surface will acquire a patina (minor scratches and dull patches) with the passage of time. The original surface finish can always be restored by polishing the pRaL® surface.
- o High-gloss surfaces are more difficult to maintain and scratches will be much more readily visible.
- o Darker and highly pigmented surfaces are more difficult to maintain compared to lighter colours and they also more prone to scratching.
- o For maintenance purposes a distinction is drawn between matt, semi-gloss (satin) and high-gloss surface finishes.
 - The majority of stains can be removed from the three finishes using a soft sponge and soapsuds.
 - Always dry off the surface with a soft, dry cloth in order to prevent limescale deposits.
 - Wine, coffee and tea can leave traces behind if they are not removed immediately. These stains can be mostly removed with vinegar. Matt surfaces can be cleaned with a mildly abrasive cleaner.
 - The surface will become less prone to staining as the level of gloss increases, but this in turn will make it more prone to scratching. A matt surface is exactly the reverse.
 - Tough stains, cigarette scorch marks and scratches can be removed by light sanding. Take good note of the level of surface gloss here. It will be easier with a matt finish than with high gloss (observe the build-up of sanding/polishing stages).
 - Sinks and sink bottoms always have a matt or semi-matt finish. We advise maintaining them using liquid household scouring cleaners applied on a soft sponge. Tough stains can be removed by leaving a water/bleaching powder (or bleach) solution to soak in for a couple of hours.
 - Limescale deposits can be removed with a descaling product (follow the manufacturer's instructions) or by light sanding. At the same time beware of local treatment that might stand out from the rest of the surface.
 - If in any doubt about a maintenance product it is best to try it out before attacking the entire surface with it.
 - Do not forget carefully to rinse it all over each time after each treatment.
 - If chemicals are spilled, the surface must be cleaned immediately and swilled off with abundant water.

Important

- o The advice and guidelines contained in this pRaL® processing manual are based on the current known material properties and processing techniques, and these may be changed at any time without prior notice.
- o Since Abet Laminati bears no responsibility for processing and fitting the pRaL® material, it cannot be held liable under any circumstances occurring for possible deficiencies resulting from processing and fitting the pRaL® material. Consequently, the advice and guidelines in this pRaL® processing manual are given subject to the protection of all rights in respect of Abet Laminati.
- o If when processing pRaL® material the processor has questions to which this pRaL® processing manual gives no answer, or the answer to which is not clear to the processor, then the processor should contact the relevant Abet Laminati office (see www.abet-laminati.it) for additional advice.

January 2009

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Note's

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