Interior Solid Surface Material

HI·MACS

# TECHNICAL DATA SHEET
# GENERAL SHEET FABRICATION

Ambitious designs need a material available in a wide range of colours.

Both the material and also its range of colours are crucial with superior quality designs. Elegant White, warm Toffee Brown, mystical Cima with a Volcanics structure, translucent pastel shades or sophisticated shimmering textures. Almost every conceivable shade is available in the HIMACS range. Irrespective of which shade you opt for, HIMACS is homogeneous through and through.

| COLOURS | | THICKNESS | STANDARD WIDTH | STANDARD LENGTH | AVAILABLE WIDTH | FLEXIBLE LENGTH |
|---|---|---|---|---|---|---|
| Solid | Solid S028 | 4.5mm | 930mm | 3000mm | 760mm | 3000 |
| | | 6mm | 760mm | 2.490mm | | 2.200mm ~3.680mm |
| | | | 910mm | 2.490mm | | |
| | | | 1,350mm | 3.680mm | | |
| | | | 1,520mm | 3.680mm | | |
| | | 9mm | 760mm | 3.680mm | | 2.200mm ~3.680mm |
| | | | 910mm | 3.680mm | | |
| | | | 1,350mm | 3.680mm | | |
| | | | 1,520mm | 3.680mm | | |
| | | 12mm | 760mm | 3.680mm | | 2.200mm ~3.680mm |
| | | | 910mm | 3.680mm | | |
| | | | 1,350mm | 3.680mm | | |
| | | | 1,520mm | 3.680mm | | |
| | | 20mm | 760mm | 3.000mm | N/A | 2.200mm ~3.680mm |
| | Solid (Except S028) | 6mm | 760mm | 2.490mm | 910mm,1350mm,1520mm | 2.200mm ~3.680mm |
| | | 9mm | 760mm | 3.680mm | 910mm,1350mm,1520mm | 2.200mm ~3.680mm |
| | | 12mm | 760mm | 3.680mm | 910mm,1350mm,1520mm | 2.200mm ~3.680mm |
| | | 20mm | 760mm | 3.000mm | N/A | 2.200mm ~3.680mm |
| | Ultra Thermofor | 12mm | 760mm | 3.680mm | 910mm,1350mm,1520mm | 2.200mm ~3.680mm |
| | | | 930mm | 3.680mm | | |
| | Intense Standard | 12mm | 760mm | 3.680mm | N/A | 2.200mm ~3.680mm |
| | Intense ULTRA | 12mm | 760mm | 3.680mm | 910mm,1350mm,1520mm | 2.200mm ~3.680mm |
| | S828 | 12mm | 760mm | 3.680mm | N/A | 2.200mm ~3.680mm |
| | FR S728 + S728M | 12mm | 760mm | 3.680mm | N/A | 2.200mm ~3.680mm |

| COLOURS | | THICKNESS | STANDARD WIDTH | STANDARD LENGTH | AVAILABLE WIDTH | FLEXIBLE LENGTH |
|---|---|---|---|---|---|---|
| Lucent | OPAL | 6mm | 760mm | 2.490mm | 910mm, 1520mm | 2.200mm ~3.680mm |
| | | | 1.350mm | 3.680mm | | |
| | | 9mm | 760mm | 3.680mm | | |
| | | | 1.350mm | 3.680mm | | |
| | | 12mm | 760mm | 3.680mm | | |
| | | | 1.350mm | 3.680mm | | |
| | Except OPAL (SApphire,) | 6mm | 760mm | 2.490mm | 910mm, 1350mm, 1520mm | 2.200mm ~3.680mm |
| | | 9mm | 760mm | 3.680mm | | |
| | | 12mm | 760mm | 3.680mm | | |
| Granite, Quartz, Sand & Pearl | Standard | 6mm | 760mm | 2.490mm | Wide sheet availability has to be discussed by color/case | 2.200mm ~3.680mm |
| | | 9mm | 760mm | 3.680mm | | 2.200mm ~3.680mm |
| | | 12mm | 760mm | 3.680mm | | 2.200mm ~3.680mm |
| | | 20mm | 760mm | 3.000mm | N/A | 2.200mm ~3.680mm |
| Lucia | Standard | 12mm | 760mm | 3.680mm | N/A | 2.200mm ~3.680mm |
| | | 20mm | 760mm | 3.000mm | N/A | 2.200mm ~3.680mm |
| Volcanics | Standard | 12mm | 760mm | 3.680mm | N/A | 2.200mm ~3.680mm |
| Aster | Standard | 12mm | 760mm | 3.680mm | N/A | 2.200mm ~3.680mm |
| Marmo | Standard | 12mm | 760mm | 3.680mm | N/A | 2.200mm ~3.680mm |
| Eden | Standard | 12mm | 760mm | 3.680mm | N/A | N/A |
| Strato | Standard | 12mm | 760mm | 3.680mm | N/A | 3.680mm |
| Terrazzo | Standard | 12mm | 760mm | 3.680mm | N/A | 3.680mm |

Some colours may easier to fabricate than others, depending on the intended application, and we would be pleased to advise you on the correct choice of colour

The technology of HIMACS fabrication is undelaying to joiners Know How and its fabrication technology. In addition with HIMACS typical material characteristics in recognition and respecting of regulations, design and quality the range of applications becomes dimensional.

There is a differentiation – according to the production and design effect of the HIMACS sheet color and grouped into color families:

- Solids
- Solids Velvet
- Solids Special Application use
- Sands
- Granite
- Lucent
- Marmo
- Aster (Galaxy)
- Pearls
- Quartz
- Volcanics
- Eden
- Lucia
- Concrete
- Intense Ultra Thermoforming
- Strato
- Terrazzo

## General Fabrication

The fabrication recommendations are based mainly on its specific color family. Each single color family has its specific characteristic and needs - here and there- special fabrication techniques are required to get best optical fabrication results.

## HIMACS Products Fabrication

The characteristics that give these HIMACS sheet materials their distinct appearance are the result of the manner in which the materials are manufactured. Conventional seaming methods for field seams, edge treatments, and backsplashes are not suitable for these products. Conventional methods that work well with solid colors and small particulate do not result in acceptable visual aesthetics when used with these products.

## Irregular Patterns (such as “MARMO”)

These products cannot be joined as an “L” or “U”-shape or joined end-to-end without sacrificing material. They will not produce an acceptable “stacked” edge or three-part coved backsplash. The two work-arounds are the “S-seam” and the “Partial Sheet”. Because of this, a fabricator should expect material yield to be as much as 50% less than with solid color or small particulate materials. See the “Irregular Patterns” section for more information.

## Translucence

Materials that allow light transmission can be backlit or otherwise illuminated to produce dramatic visual effects. But those same characteristics allow substructures to be visible. See the “Translucence” section for more information.

## Striped Material (such as “STRATO”)

Strato material exhibits a greater variation in color, shading, and pattern than is apparent in samples. Even 12-inch (300mm) square samples and full-sheet photographic images can’t fully capture these variations. If possible allow the customer to view the actual material together with seaming layout examples and sign a “document of understanding”. Otherwise the finished countertop may not be consistent with customer expectations

## HIMACS Sheets cut to size and workshop equipment

**The table circular saw**

This equipment is mainly used to cut the HIMACS panels to size. It is very popular in the joiner industry and be used for any straight cutting application if square or angled. High-quality saws pay off the benefit of accuracy and precise cuts and angles up to 45° degree.

**The vertical panel saw**

is a key consideration. High-quality panel saws require substantial investments, but offer the benefit of single-person operation with accurate results.

**Dust collection, ventilation and extraction system and/or tables**

HIMACS fabrication produces a nuisance dust. Dust collection systems provide a cleaner working environment and lead to an extended tool life. It also is necessary to keep up with OH&S compliance levels at high production capacities.

**Forklift**

This equipment is essential to the secure moving of HIMACS materials into the shop environment from the delivery truck without incurring damages and exposures to injury. It adds to the level of protection of HIMACS and creates a better work environment.

**Engineered work tables and benches**

The “stationing” of such tables will heighten efficiencies of production. These tables/stations provide flexible accessibility to electrical power and air connections for hand tools. It also ensures a calibrated work surface.

**Cantilevered storage racks**

These storage racks improve access to HIMACS materials by heightening efficiency and safety standards within the shop environment.

**CNC / V grooving machinery**

This machinery processes the materials efficiently and quickly on large jobs. It offers the consistent ability to manufacture components while maximizing material yields.

**Digital Template systems**

Digital Templating offers the ability to take a digital picture of the field conditions and calibrate it to perfect the accuracy of the dimensions of the HIMACS top. It is then downloaded to the waiting CNC where the fabrication process begins and the materials are cut. This is all accomplished without traditional templates and before the estimator returns from the field to the shop.

**HIMACS layout**

Before cutting the sheets you have ordered and received from your HIMACS distributor, calculate the number, lengths, widths and elevation to double check the amount of material you will need to finish the entire project. If you calculate too closely, you may create yield problems and dye lot concerns if more material must be ordered.
You must also remember to consider cutouts, backsplash materials and buildup strips. As you look at all of these factors consider the cutout sizes and locations, substructure requirements, seam locations, possible inlay issues and specialty fabrication, such as a cove backsplash or thermoformed surface requirement.

**Material review**

Place materials on the work benches. Inspect dye lots and run numbers.
Remove peel coat and inspect for colour variation, match and defects.
Review cuts and dry fit seams when applicable **before cutting!** Remember that this is a review and inspection process. Wet the edges between sheets to be seamed to help determine colour match.
Review all safety and shop procedures before cutting and machining the HIMACS sheet materials.

Think twice – before cutting ones!

## Cutting and staging overview

Avoid handling materials alone. Use best two people to move the sheet into position for cutting or use special lifting (vacuum) and workshop transportation systems.
Cut the HIMACS sheet materials for your job specifications. If you are using a table saw, make sure it has out feed supports. If using a vertical panel saw, remember to watch for errant materials after cutting.

Place cut materials on your workbench and create the 5 mm inside corner with the appropriate router and template. Remember that a 10 mm bit creates only a 5 mm radius.
Stage your components and assemblies on a flat, rigid plane surface. If using more than one bench to stage your project, make certain these benches are of the same height! Your supporting work tables should have supports approx. every 600 mm. This will ensure a flat and safe working area as you assemble your tops.

Save any extra materials or out falls for buildup strips, cutting boards and repair materials.

Remember to leave a good size piece of colour matched material at the jobsite in case of repair. A good spot to place this is under the sink cabinet. Pre-drill two holes in the material at your shop. During installation, place a screw into the drilled holes and position the piece to the side wall of the cabinet or chose any other convenient place.

## Seam locations and cutout positioning

Keep seams 50 mm from any inside or outside corners and 100 mm from any cutout for stove, sink or other consideration of cutout.
When having to layout and fabricate a countertop, remember to maintain the seam 50 mm from the inside corners.
A distance from hob cutout to backsplash should be 50mm.

## Cutout optimizing

When making a cutout, remember to make them larger than the recommendations provided by the manufac-turer. The recommendation is a 6 mm gap around the countertop cutout and a 3 mm around the sink cutout. Do not make them too large.

## Substructure

HIMACS needs to be supported. Depending on the application, the following materials for support can be recommended:

- Steel/stainless steel profiles
- Aluminum/aluminum profiles
- Moisture resistant wooden sheets of MDF, Plywood or particle board

For application as a kitchen counter top, a frame substructure is strongly recommended.

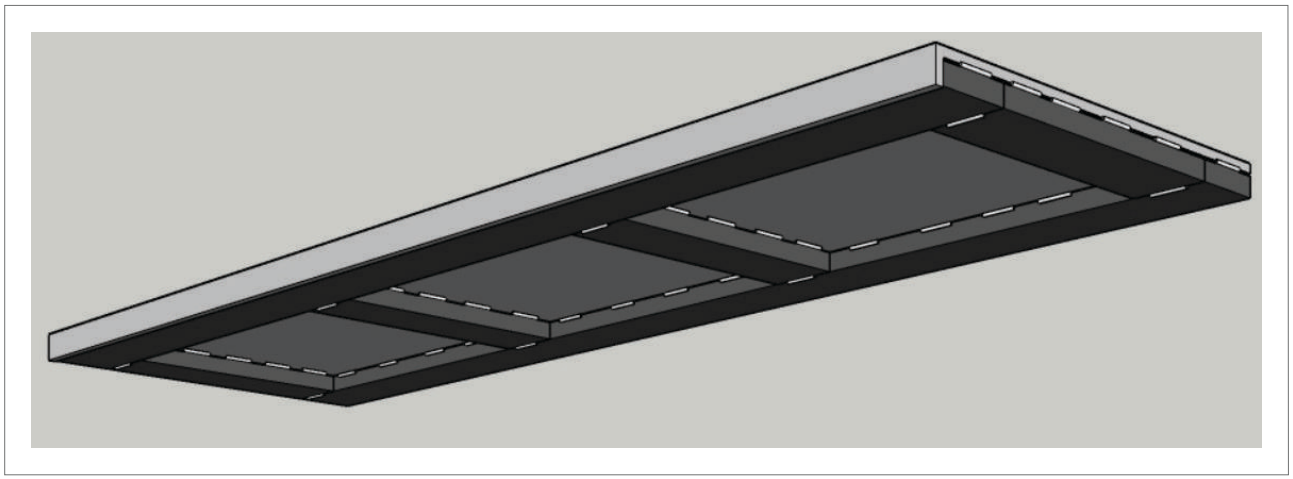


Fig.1.

A full underlayment can but should not be used.

Adjust all substructures with an permanent elastic silicone or with an permanent elastic PU adhesive to the back of the HIMACS sheet, preferably in dots with a maximum distance of approximately 100 mm. Wooden strips should have a width of ca. 80 mm. Rebate for reinforcement strips to be foreseen.

Non kitchen counter tops can be used and fabricated by a full underlayment construction
Ensure the top cannot become warped at any circumstances.

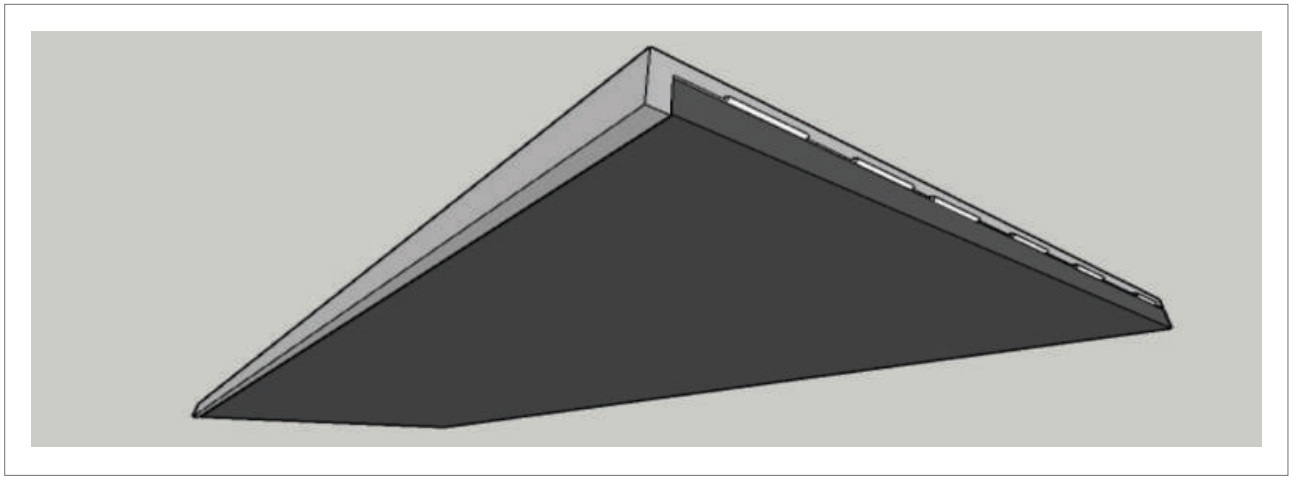


Fig.2.

## Prepping

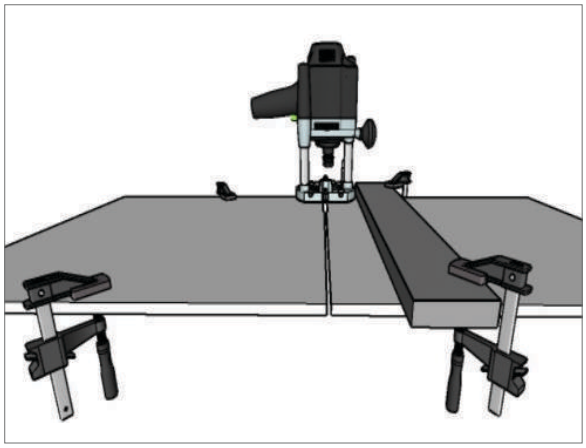
Though it is typically not necessary with acrylics to scuff-sand all surfaces to be bonded, it is a good practice and is recommended. It will increase the strength of the bond. When performing this procedure, use 60grit sandpaper. Remember, as a general requirement to clean the scuff-sanded areas and any joints or seams with denatured alcohol prior to final seam preparation and execution.

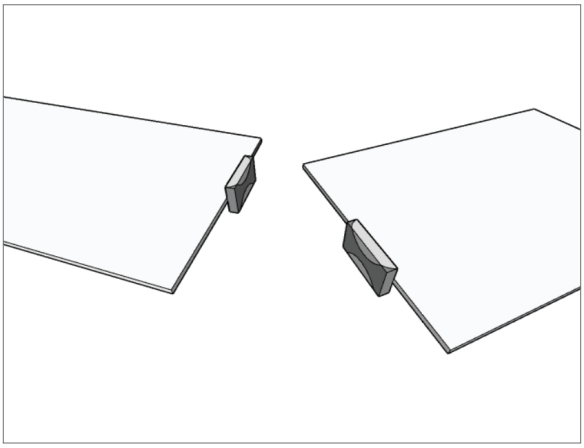
As a general rule, use clean, white, lint- free rags (cloth or paper) and avoid rags with any colour dyes. The dyes mixed with the denatured alcohol could contaminate the joints and seams.

## Seams

Traditionally, solid seams are the hardest and leave the least amount for error. It is very important when seaming solids that you thoroughly clean the seams and prepares a precise mirror cut.

Seaming with matrix colours, whether it be Sands, Pearls, Quartz or Granite series HIMACS, are more forgiv-ing, by virtue of the many colours of particulate.

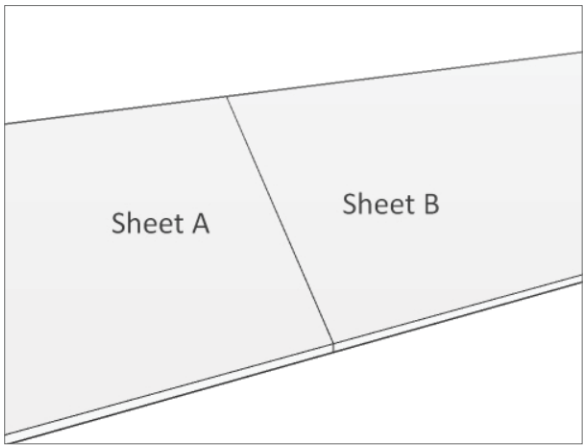


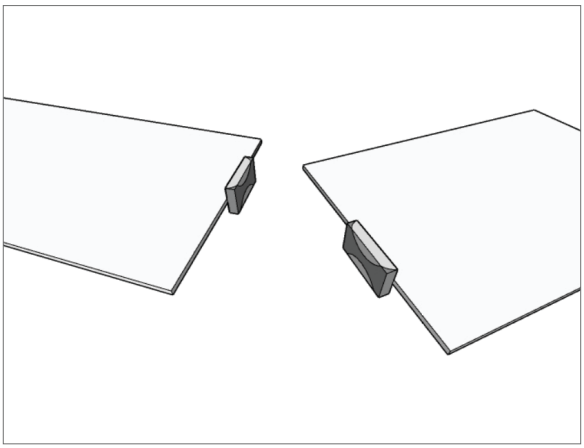


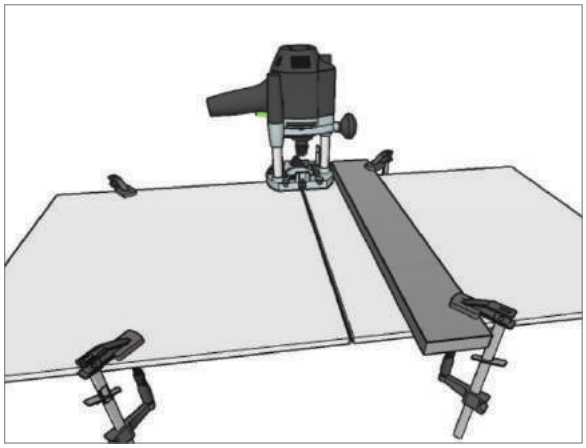
## Using the following procedures will ensure a great seam

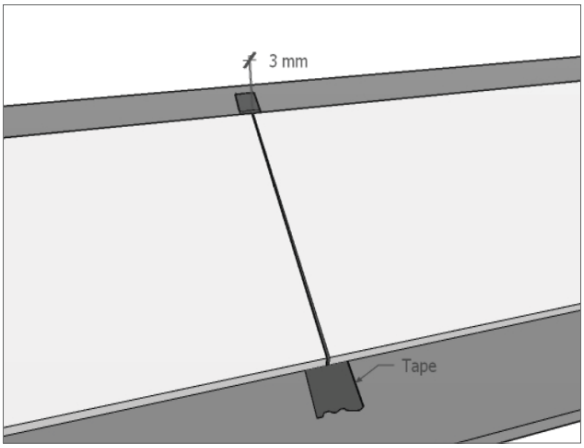
Industry standards suggest that two acceptable methods will ensure a great seam.
Mirror cut the two pieces to be seamed together and do so at the same time. This is performed by setting a straight edge in place on one of the pieces to be seamed and also clamping down the two pieces to be seamed. Maintain a gap approximately 6 mm greater than the shank of the bit. It will take approximately 3 mm off each of the pieces that will be seamed. A square base router will help the accuracy. With one controlled pass of the router, you will make these two “mirror” edges simultaneously. The two pieces will fit together exactly.
The other method is to do the exact same procedure, but use a wavy bit instead of a standard plunge bit. Using a wavy bit suggests a greater surface area for bonding.

You can also achieve extremely accurate cuts by using C.N.C., Vertical Panel Saws, or Auto “V” Groover.
If you scuff-sand the edges with a right angle block and 60 grit sand paper, you will ensure a greater bonding surface than if you do not.
Make sure to clean the joining edges with denatured alcohol and a clean white rag.
Apply a strip of box tape or packing tape to the underside of the area to be joined, half on each side of the two pieces. This will create a bridge. Leave about 3 mm between pieces before applying the tape.







## Clamping tips

- Remember clamping pressures. Do not use excessive pressure. If you do, you will create a dry seam. This is
- when you squeeze all the glue from the seam joint.
- Clamp pressures should be tight enough to allow a bead of adhesive to squeeze out.
- The adhesive will shrink slightly, so do not completely clean off the joint of excess adhesive.
- Look for glue voids and air pockets. Take care of this before the seam adhesive sets up. Inspect the seam to ensure a tight fit.
- Let the adhesive cure for a minimum of 40 minutes in normal conditions or until hard to your fingernail touch.
- Remove the excess adhesive by “Leveling” the seam with a router with a set of skis and a small leveling bit.
- Be careful when using a belt sander to perform this operation. Be aware that excessive heat will weaken the integrity or fail the seam all together.
- Finish sanding all surfaces to specified finish - best according to basic fabrication guidelines.

## Reinforcement typical standards

- Seam reinforcement materials should be comprised of 12 mm HIMACS materials.
- The reinforcement must be continuous along the entire seam. This 50mm wide reinforcement strip must be beveled to 45 degrees and sanded smooth to reduce the stress riser.
- Avoid stress risers. A stress riser is a sharp or rough cut or corner that weakens over time as the top expands and contracts. This weakening effect will eventually fail the top and a crack in the countertop will occur.
- Locate reinforced seams where full support is available. Reinforcements can sometimes get in the way of the overall support structure.
- Keep the nearest edge of the seam support a minimum of 50 mm from inside corners.

**Note:**
Do not place a seam over a dishwasher or washing machine or similar device. Do not place a seam through a sink.
Do not place a seam through a cook top area or any other heating device.

Attach scrap material or wooden blocks best with hot melt adhesive.

- Apply the adhesive.
- Use clamping device to tighten seam.
    - Do not over tighten; will cause “dry seam”.
- Remove clamps and blocks after adhesive has hardened.
    - Tip: Use denatured alcohol to spray onto the blocks with hot melt adhesive for better and easy remove.
- HIMACS requires a minimum 25 mm radius on all drop edge inside corners.
    - Diagram indicates recommended build-up.

## Edge build-up overview

HIMACS has its unique ability of providing the machining ability for fabricators to exercise their design creativity when creating edges. With the multitude of bits available to the fabricators and terrific adhesives, there are almost endless lists of edge considerations. The fabricator skill level will come into play when considering the level of sophisticated or complicated edge ideas.

The fabricator’s skill level also comes into play in making inconspicuous joints also paramount to the high quality of an edge simple or complicated.

Edge build-ups are typically 38 mm and occasionally 50 or 60 mm thick. Aprons for commercial work are a minimum of 75 mm with a typical being between 150 mm and 200 mm.

## Drop edges and build-downs

- Drop edges applied to sheets of HIMACS can create a multitude of design possibilities. One of the easiest
- ways to produce a drop edge is to simply stack layers of HIMACS on the underside of the sheet. Fig.3.

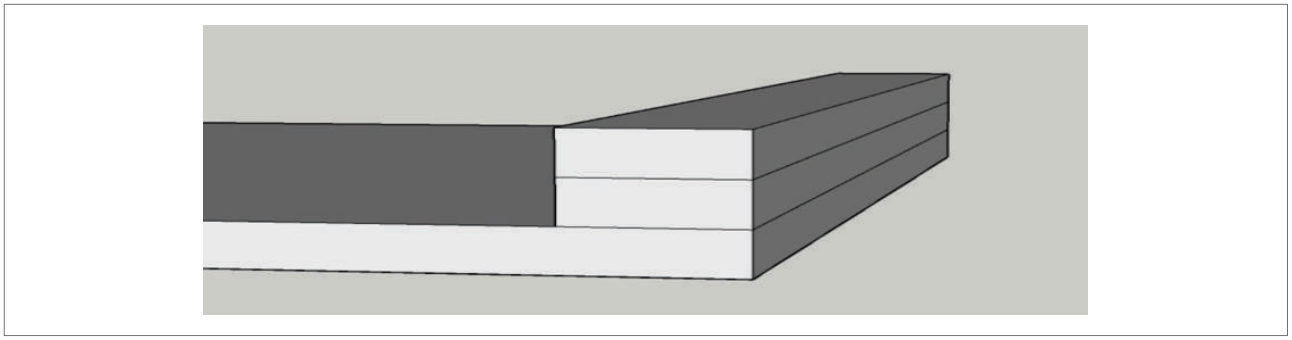


Fig.3

- Start by cutting strips which are slightly oversized and sand the underside with 120 grit paper. Clean with denatured alcohol and white cloth.
- Apply a sufficient amount of HIMACS Joint-Adhesive to each of the strips and smooth out using a wooden or plastic spatula.
- Attach 'A' style spring clamps every 80 / 85 mm and allow to cure (45 min/+20°C). Ensure that, once the clamps have been applied, a reasonable amount of adhesive is forced out from the joins. Fig.4.

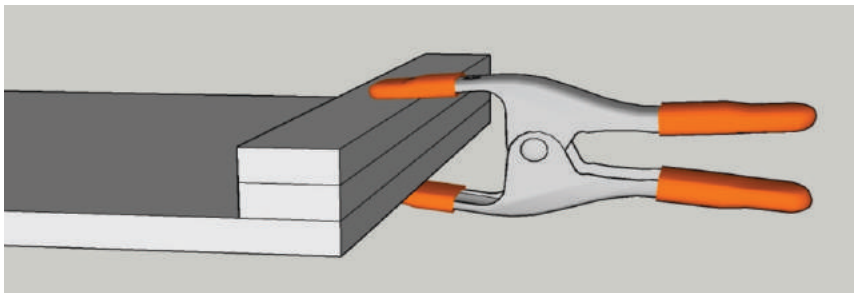


Fig.4

- Once fully cured, trim the edge square by using a table circular saw, then machine the required profile using a portable hand router or spindle moulder. Fig.5.

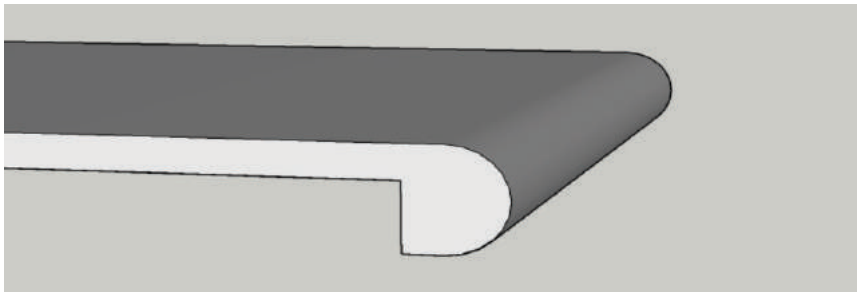


Fig.5

- Drop edges can sometimes be applied on edge, primarily for deeper build-downs. The best way to achieve this detail is to first rebate the underside of the sheet to a depth of approx. 2mm. Fig.6.

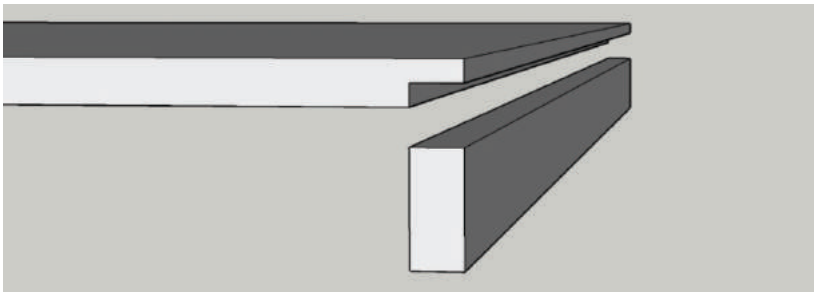


Fig.6

- The rebate serves two functions, firstly it increases the bond strength and secondly it minimizes the effect of uneven particle distribution.
- As you would normally do, sand both the internal edges of the rebate and the corresponding edges of the build-down with 150/180 grit paper, cleaned with denatured alcohol with a white cloth.
- Apply a sufficient amount of adhesive and clamp edge in position with screw clamps set at 80 / 85 mm apart. Fig.7.

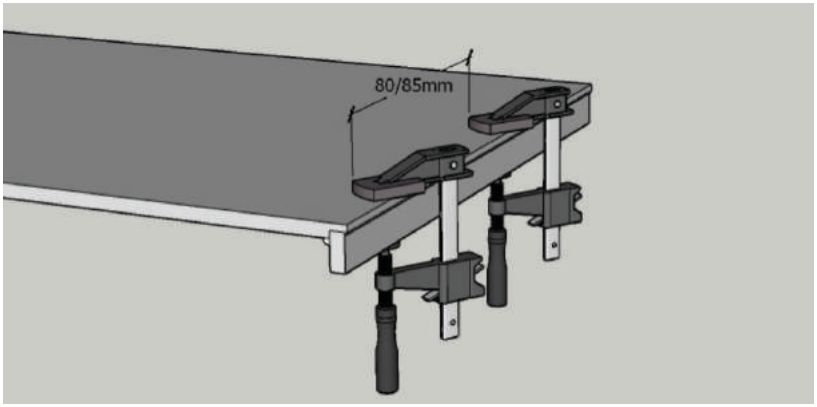



Fig.7

Ensure that beads of adhesive are formed at both the internal and external edge of the joint. Fig.7. Once fully cured trim the overhang using a portable hand router, use a straight cutter with Nylon bearing attachment.

- It is possible to create curved build-downs to shaped counters, simply by thermoforming the edges prior to bonding. Please refer to page 53 for thermoforming techniques (but more time intensive and profile limited).
- For internal/external corners, thermoforming will provide one solution, alternatively simply stack up and bond sheets of HIMACS at theses corners and machine using a portable hand router.
- When it comes to a 'waterfall' edge, the top sheet will need to be rebated while the edge will need grooving. Fig. 8.

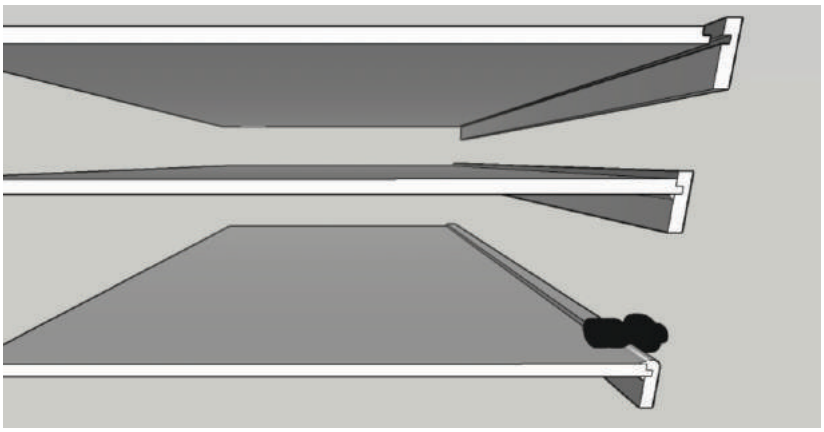


Fig.8

Fig.9

Fig.8 & 9

Ensure that the connection between the rebate and the grove is neither too tight nor too slack. Fig.8.
Clamp the section together using sash clamps and allow the adhesive to fully cure.
Machine the two edges using a purpose made router tool with a Nylon bearing, working from the top edge. Fig.9. (alternative: place profile to edge in advance due machining)

## Overhangs

**Overhang Support**

Sometimes a countertop design features an overhang that extends beyond the base cabinets.

**Overhangs up to 50mm**

No additional support required.

**Overhangs up to 150mm**

Overhangs between 50mm up to 150mm deep require a second layer of HIMACS material beneath the countertop. The second thickness must continue under the countertop and be anchored to the base cabinet(s).

**Overhangs more than 150mm**

Corbels should be used for widths over 150mm or when unusual loading conditions are present or can be expected. A proper fabricated edge treatment will provide additional strength for the overhang and will conceal the supporting material. If you may don't like shelves visible you may choose a metal frame construction for the whole counter to be fixed to the cabinet.

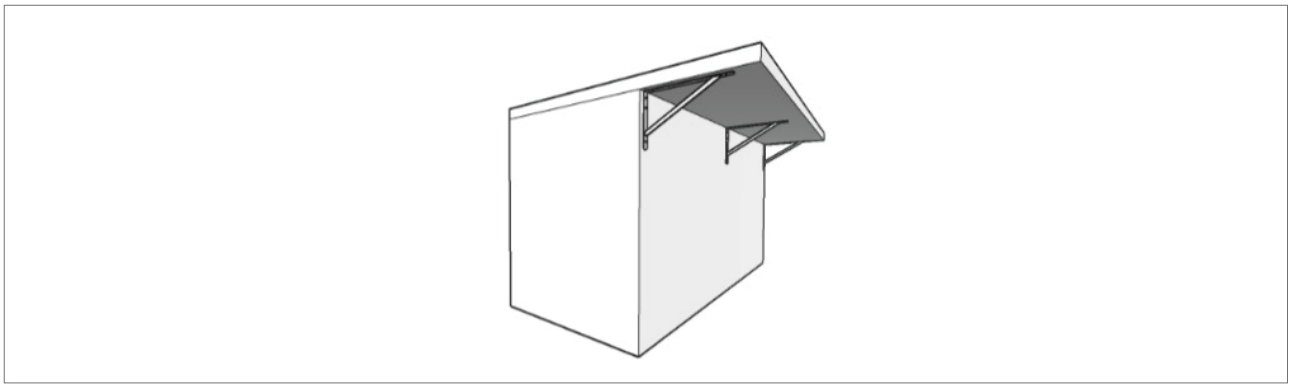


Fig.10

## Overhangs & typical expectations of HIMACS

To avoid failure in an overhang, remember to always allow maximum 1/3 of the width to overhang while two thirds of the width should be supported. If this rule cannot be followed, you must install corbel brackets on the overhang for necessary support.

When doing so, do not screw the brackets directly into the HIMACS material, rather, install a piece of hardwood in your perimeter support or lattice support and use screws or fastener that will not surpass the thickness of the wood. When using metal, use silicone between junction points. A full substrate on an overhang with a web support over the cabinets is an acceptable method of support too for overhangs.

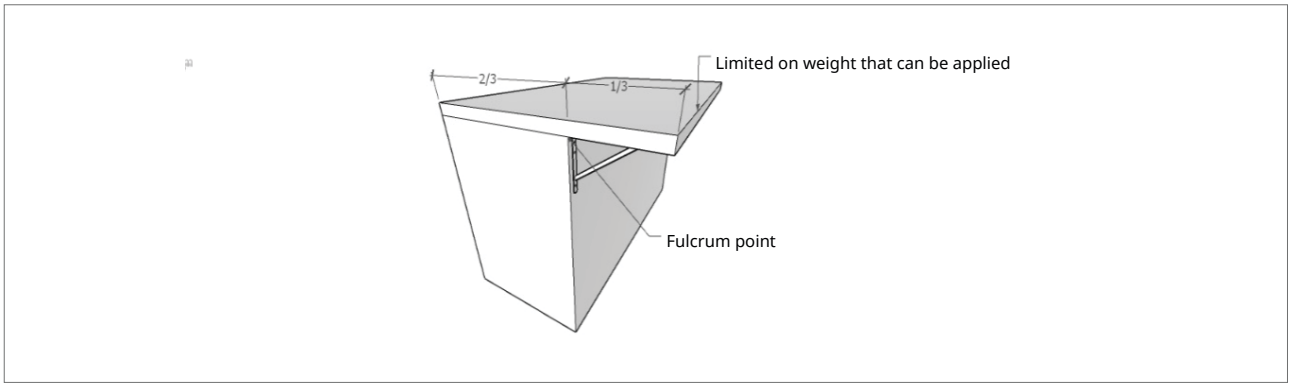



Fig.11

Choose the right method and fittings for your individual project needs to fulfil the necessary requirements.

## Backsplash

For installation of backsplash materials from 50 mm – 100 mm, follow the provisions:

- Cut the splash from the same materials as were used on the countertop production. Do not use left material from other sheet production.
- Prepare the strip by sanding and edge-profiling, if required before installing.
- Dry fit the splash materials to ensure all joints and edges are tight.
- Scribe the backsplash to the wall or countertop if necessary.
- Install the backsplash materials with 100% silicone adhesive. Place dabs of silicone every
- 100 mm – 150 mm on the back side of the backsplash materials that will come in contact with the wall. Prior to setting the splash into position, run a thin bead of clear or colour matched silicone on the back surface edge of the countertop where the splash will rest.
- Put the splash material in place and remove excess silicone squeezed from the joints and finish caulking operation.

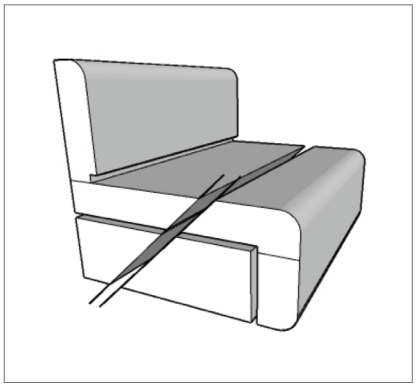


Fig.12

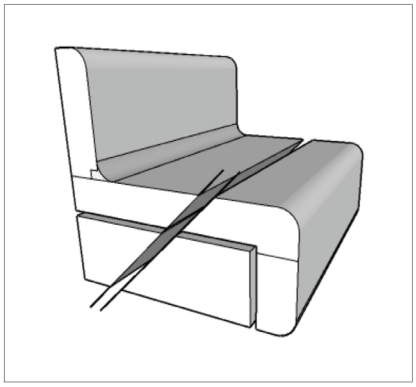


Fig.13

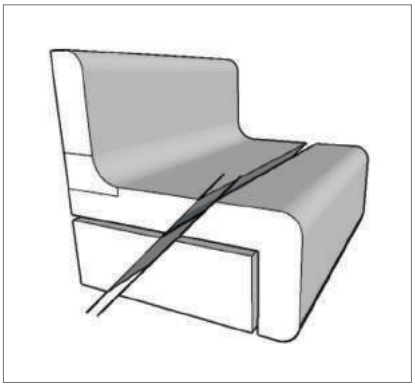


Fig.14

## Full height backsplash

- The same steps and procedures are used when installing full height backsplash materials with a few exceptions:
- If using full height splash in either 6 mm or 12 mm HIMACS materials,
- Remember to allow a 3 mm gap below the upper cabinets for expansion.
- Make cuts with only a router and maintain a 12 mm minimum radius on all inside-corners.
- Adhere to wall with silicone – never use panel adhesive which do not allow some movement afterwards.
- In areas of hobs advice a minimum distance of at least 80mm.
- Pots & pans used supposed never have an overhang of the hob, neither the flame of a gas hob supposed burning the surface of HIMACS.

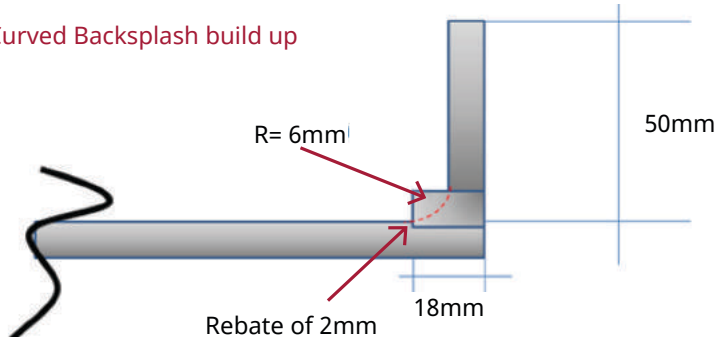
## Curved backsplash overview

Curve backsplashes are fabricated in the shop. Specialty routers, tools and procedures are necessary to successfully fabricate a curved backsplash. It should be noted, however, that standard solid surfacing routers and saws can help create a superior quality backsplash, providing the fabricator is skillful and patient. The most important thing to note is the time necessary to create a curved splash, which typically reflects in the cost to your customer. This cost varies depending on shop equipment, frequency and proficiency with cove operations and the time necessary for finish sanding.

- In order to make a curve backsplash, it is recommended to rabbit into the backside of the counter deck in 25 mm from the back edge of the counter deck. This notch should be approximately 3 mm at a minimum depth. This will create a pocket for a HIMACS 25 mm square cove strip to be placed into.

- Cut two 25 mm x 12 mm thick pieces of HIMACS and glue them to the counter deck in the notch (Rabbit) you have created. You will need to prep the materials with denatured alcohol and a clean white rag on the deck and strips. Place the adhesive thoroughly in the deck notch and place the first strip flat into the rabbit created. (Place the 25 mm strip in the 25 mm rabbit flat on the edge using the 12 mm thickness). Once the first strip is put in place, apply adhesive to the top of the first strip and place the second strip on top in a horizontal stack method as used in edge build-ups. Place the spring clamps into position using the clamping procedures outlined in this manual.
- After the adhesive has dried from the strips, it is time to cut the backsplash material you wish to incorporate into the top. This backsplash can be standard, full height or a custom height selected by the customer. Remember, the full height splash is much more difficult to control as you fabricate it in place and in the transportation and installation process.
- As you apply the desired backsplash strip, remember to thoroughly clean the edge you wish to apply adhesive to. Put the adhesive to the back face of the top strip you adhered earlier and place the strip on the glue line. Use bar or pipe clamps to hold the splash in place as the adhesive dries, and remember to use a square to adjust pressures so that the backsplash will remain straight and at a right angle from the countertop surface.
- Once this has dried, you will want to remove the excess material with a cove router. The depth and arc angle of the cut should be tangent to both the deck and backsplash.
- The balance of this operation is sanding the cove you have created. There are power sanders that have been developed, but some hand-sanding will be required for the best results and quality of finish.
- Use the same procedure and steps to create the inside corner cove on an “L” shaped return on the counter-top. Another method is to create an inside corner cove block that is
- Pre-fabricated. It can then be bonded to the inside corner, which is finished in the same manner.

Curved Backsplash build up



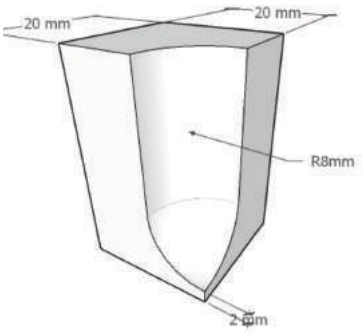

Preparation: Cutting list _ Cut to size

Counter top Down

turn / Apron

Backsplash upstand

Backsplash rebate strip for radius




Further details see at TDS Backsplashes & Upstands.

## Countertop cutouts

Countertops and heat generating appliance applications remain the greatest challenge to Solid Surfacing. The heat generated in various manufacturers of these appliances constantly challenge the performance limits of solid surfacing materials. Fabrication techniques have improved over time and a lot has been learned to avoid most failures in such conditions. It remains true that solid surfacing can take the heat, but must have an outlet for venting or dispersion in order to keep the temperature under critical performance limits.

> Note that deviations from these fabrication practices will result in voiding the product warranty!

- Only use a router to cut out the countertop.
- Make certain you ease the top and bottom of the cutout with a 1/8" (3 mm) round over.
- After rounding the cutout profile, remember to finish sand any chatter smooth to 150 Grit.
- Make sure to make the cutout as large as possible, being ever mindful that it must still have the ability to properly support the cook top.
- Create a ≥ 5mm radius at all inside corners.
- Apply a minimum of 1 layer of heat conductive foil tape (preferably two or three layers as illustrated below) to the edge of the cutout. Place these layers so that the first layer of tape rests on the entire flange of the countertop. You can carefully trim any excess tape after final installation.
- As you apply the second and third layer of tape, remember to fan them out like fins. This will increase the surface area for the heat to travel, and this increased surface area will also assist in faster dissipation of trapped heat. Thus, keeping the HIMACS at heat tolerances and void of failure possibilities.

## Fabrication recommendations to ensure a high performance level in cooktops or Bain Maries

Some manufacturers or specific models of countertops are notoriously known to fail in solid surfacing applications and have no prior success. If you have known a model or manufacturer as being successful, these steps can be considered as optional. If you do not know or have history using a specific model or manufacturer of countertop model or manufacturer, opt to use these techniques.

- Increase the inside corner radius to 32-38 mm. Keep the corner enlargements all symmetrical. As a part of this radius and inside corners, inset the inside corners with a router.

- This enlargement should be made 75 mm from the centerline of each corner radius point.
- Apply a thermal barrier tape under the aluminum conductive foil heat tape. Thermal barrier tape will insulate the countertop from heat caused by the countertop flange or firewall box. 3M makes such a tape. It is approximately 1 mm thick. If this is difficult to find, look for a heat tape substitute that contains ceramic materials.
- Provide air ventilation to the cabinet containing the cooktop by using a vent and fan system to help carry the heat away from the countertop material.
- Ensure positive convection currents for the fan to be installed so as to remove and not collect additional heat. It may also require cutting or venting the cabinet walls if the fire box walls are too close to the cabinet and preclude air flow.

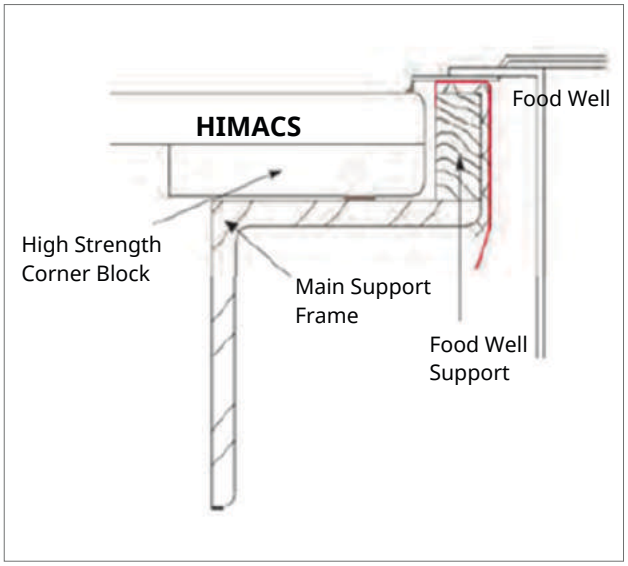



Fig.15

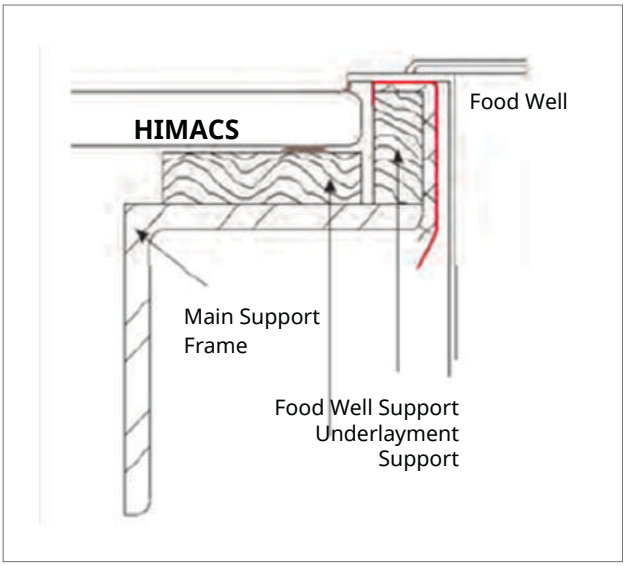



Fig.16

## Reinforcing and subassembly techniques to ensure high performance level in cooktops

In some regions a common method used in fabrication today is the "**Underdeck Corner Block**". The Underdeck Corner Block method is successful in dealing with the amount of heat generated by the cooktop.

## Underdeck corner block method

A corner block is placed at each corner of the radius cut cooktop cutout and should be installed just after the cut out is routed. These blocks are placed on the underside of the sheet and will be adhered or bonded to the cooktop.

Do not ease the cutout or finish sanding the chatter until these blocks have been installed.

- 4 blocks are prepared by using outfalls of HIMACS 12 mm sheet materials. These blocks should be a typically 150 mm squares.
- Once the blocks have been cut, make sure you bevel or chamfer the edge to 45 degrees and round the square corners to eliminate the chance of creating a stress riser. Scuff-sand and clean the surface area of the blocks and bottom of the sheet to be bonded.
- Place adhesive on the block thoroughly and position the block so that a 75 mm x 75 mm surface area of the block, extend from the routed cooktop cutout. Clamp in place until dry.
- Now trim the excess material from the blocks on the inside of the cooktop and any extensions or protrusions in the front or back edges of the deck.
- Ease the top and bottom of the cutout and support block materials with a router and finish sand the chatter to a 180 Grit finish.
- Apply the three layers of heat tape as previously described.

Underside of cooktop cutout with reinforcing blocks in place

Close-up of reinforcing block in place

View of reinforcing block after finishing

## Thermoforming

**Note:**
Any Thermoforming process has to be recorded and carefully prepared according to necessary condition needs and to be accepted in our 15-Year-Warranty Program.

## Thermoforming equipment

- Pre-Heating Oven
- Vacuum Table
- Hydraulic Press
    - Moulds
    - Safety glasses
    - Long shirt
    - Heat protection
    - cloth others


## Templating

Template to a custom shape required using plywood, MDF or professional equipment according to the complexity of job requirement, like high density foam.

## Thermoforming process per thickness of product

| | | |
|---|---|---|
| **Ri ≥ 16 mm** → **4.5mm** Solid | **Ri ≥ 50 mm** → **12mm** Solid, Sand, Pearls, Lucent, Sparkle | **Ri ≥ 200 mm** → **12mm** Volcanics, Aster, (Galaxy), Terrazzo |
| **Ri ≥ 20 mm** → **6mm** Solid | **Ri ≥ 85 mm** → **12mm** Granite, Quartz | |
| **Ri ≥ 40 mm** → **9mm** Solid, Sand, Pearls | **Ri ≥ 100 mm** → **12mm** Lucia, Eden, Marmo, Aurora; **20mm** Solid | **Ri ≥ 6 mm** → **12mm** Solid Ultra Thermoforming |

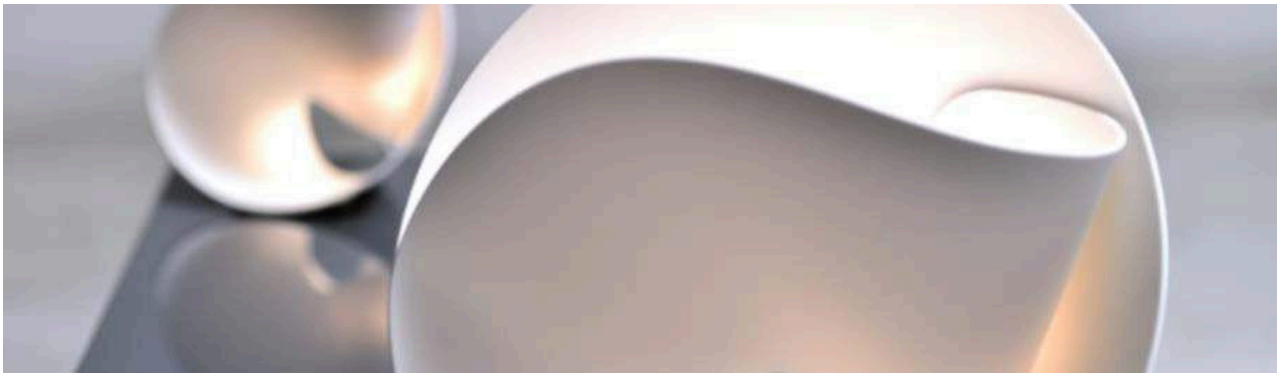
Ri = inside radius (smallest radius recommendation)

Information of smallest: possible radius is based on standard light colors which can be from some variation of result when using dark colors.

Depending on color family

- More or less / bigger or smaller radius:
- Due to darker or highly pigmented color: whitening can occur change parameter of thermoforming process or change the radius to a larger one to ensure satisfaction of the result.

**Note:**
Do not overtake the recommendations of smallest radii in above list of the product, whilst light colors will be more align with a positive result than darker colors or materials with large chips.



Tulip by Pierre Cabrera, ©Franck Foucha – Xavier Muyar

## Processing

- Peel off the protective film from HIMACS sheet, which is attached to the surface of the product.
- Be careful that the oven temperature does not exceed more than +195°C.
- Best temperature to be used: +155°C up to +165°C; using a Pre-Heating Oven with heating plates up and down.
- Heat up the workpiece for 10 ~ 20 minutes, or more if you need the product with minimum curve R.
  → Check exact heating time according to material thickness.
- Note with caution that a whitening effect can be generated on the surface of the product if the temperature is too high or the heating is prolonged as well as the mold is too tight...

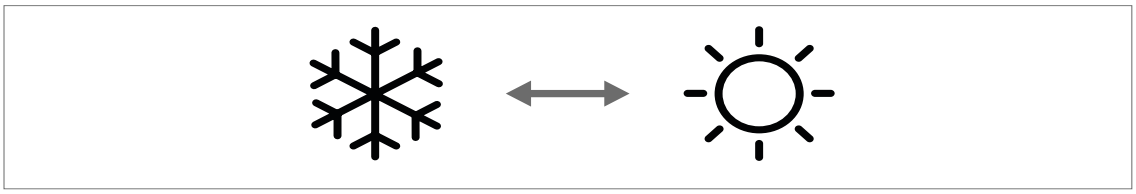
## Cooling

- Never take out the product from the template before the temperature reaches + 80°C. The shape of product is maintained at temperatures below + 80°C, even if the product is not supported by the template.
- When workpiece is taken out from molding – place it were air can surround and cool it down further to room temperature.
- Avoid trapped heat.

## Re-work

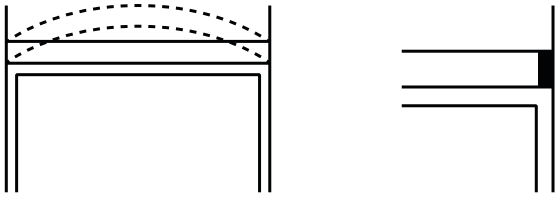
- After reaching room temperature start to re-work the workpiece and finish off according the fabrication guidelines.

## Thermal Expansion & Contraction



Sufficient space should be given to compensate for expansion or contraction at the time of installation since this product may expand or contract depending on the temperature.

Allow 1.5 mm per linear meter for expansion and contraction.



**Expansion coefficient HIMACS according to norm DIN 51045:**

**$\Delta t$ = ca. 48 x $10^{-6}$ /K**

**Formula without adding limitations**
**$\Delta = \alpha t \times \Delta t \times l$**

$\Delta$ = expansion
$\alpha t$ = thermal expansion coefficient
$\alpha\Delta t$ = temperature difference
$l$ = length

**Sample Calculation**

| | |
|---|---|
| $\Delta t$ = + 30°C | temperature difference |
| $\alpha t$ = 0,000048 K L | thermal expansion coefficient |
| = 100 cm | sheet length |

$\Delta$ = 0,000048 K x 30°C x 100cm
$\Delta$ = 0,00144 x 100
$\Delta$ = 0,144 cm
$\Delta$ = 1,44 mm

## Surface Finishing

HIMACS sheet materials are factory sanded prior to peel coat application. The result of this superior quality factory finish offer fabricators less final sanding time in the shop or on the jobsite.

Sanding is a very important part of the fabrication process. Finish considerations can make or break the aesthetic value of your surface. Be very sure to sell a finish that is right for the colour and lifestyle of the customer. Do not oversell the performance of a specific finish, especially in a darker colour selection and in a satin or gloss finish selection. Be forthright, in clearly expressing the performance of a finish option.

The sanding and finishing process can also be the most time consuming and frustrating experience to the fabricator in the process of fabrication. HIMACS would like to simplify the process as you take your countertop finish from a standard matte to satin to high gloss finish.

Additionally, it can be confusing to the fabricator because of the multitude of sanding equipment, systems and sand paper companies available to the fabricator.
As you decide the best equipment and sanding papers to incorporate into your fabrication process, remember to purchase good quality sanding equipment and sandpapers.

- Make sure to remove excess adhesives with a surfacing router equipped with a system of skis.
- Avoid use of a belt sander as it generates a great deal of heat and can fail a seam.
- Furthermore, the belt sanding equipment is very aggressive and can remove material quickly.
- That being said you can create more problems for your countertop fabrication if more material is removed than is supposed to be. You want to maintain control in the sanding process. It is the final step of showcasing your work.
- An important step in the process of sanding is to thoroughly clean the top between each step or grit changes. You can do so with a spray bottle of water or preferably denatured alcohol and a clean white rag. Cleaning off sanding dust between steps allow for a more consistent and high quality finish.
- Apply equal pressure and overlapping coverage in both directions of the top. For example, left to right and front to back. Complete one direction before starting the other.
- Change or clean your sandpaper as you sand as it will get loaded and become less efficient.
- As you get to a more detailed finish the sandpapers will load more quickly. If care is not taken to keep the sandpaper loading to a minimum, it will impair your ability to achieve a high quality, consistent finish. In a gloss situation, you may never achieve it.

## Finish Possibilities

| | SURFACE FINISH/SANDING LEVEL |
|---|---|
| 1 | Matt Finish |
| 2 | Semi-Gloss Finish |
| 3 | High-Gloss Finish |

**Matte Finish**

- To achieve a matte finish, you can either use a “grit” or a “micron” sanding paper system. Remember the numbering system or grades of papers between grit and micron systems are opposite to one another.
- First, use a 120 Grit or 100 micron abrasive. Once this step has been completed, remember to clean the top and switch papers to a 180 or 220 Grit or 60 Micron paper.
- Finally, clean the top once again and surface the top with a Scotch Brite™ pad.
- If you are working with a dark or black colour, you may have to add an additional third step in sanding. This will require a 320-400 Grit or 30 micron paper. If this is done, you will then want to clean the top and then surface the top with a Ultra Fine Scotch Brite™ pad.

**Semi-Gloss Finish**

- If you wish to achieve a satin finish follow the same steps expressed to achieve a Matte Finish on a dark colour.
- Use a 120 Grit/100 Micron
- Switch to 180-220 Grit/60 Micron.
- Change to use 320-400 Grit/30 Micron paper and finish off with an Ultra Fine Scotch Brite ™ pad or by using the Superpad S/G from Joest-Abrasives.

Remember to clean off the top between each single sanding step

**Gloss Finish / High Gloss Finish**

Gloss prior High Gloss finish is not recommended for any application of use and is not protected neither covered under our warranty.

- Follow the steps to the Satin Finish specification, but do not use the pad yet. As you reach the 320-400 Grit/30 Micron step, you will need to add a few additional steps.
- Sand the top using 600-900 Grit/15 Micron paper. Thoroughly clean the top. Remember to check the loading of your paper during the process and replace it frequently as necessary to maintain a consistent finish.

## Sanding & Polishing procedures

Remember the polisher will build a lot of heat as you buff the surface with the polishing compounds. Maintain moderate consistent pressure to prevent overheating of the top and burnishing of the gloss finish.

| | | | Standard recommendation | | | |
|---|---|---|---|---|---|---|
| **FINISH-LEVEL** | **MATT-FINISH** | | **SEMI-GLOSS-FINISH** | | **HIGH-GLOSS-FINISH** | |
| **HIMACS colour family** | **for all colours** | | **for all colours** | | **for all colours** | |
| **Sanding steps** | **micron-sandpaper** | **grid-sandpaper** | **micron-sandpaper** | **grid-sandpaper** | **micron-sandpaper** | **grid-sandpaper** |
| Step 1 | 100/80 µ | 150/180 | 100/80 µ | 150/180 | 100/80 µ | 150/180 |
| | take dust away | | take dust away | | take dust away | |
| Step 2 | 60 µ | 220 | 60 µ | 220 | 60 µ | 220 |
| | take dust away | | take dust away | | take dust away | |
| Step 3 | "useit® Superpad S/G Scotch Brite™ Maroon 7447 | 280 | 40/30 µ | 280/320 | 30 µ | 280/320 |
| | take dust away | | take dust away | | take dust away | |
| Step 4 | industrial paper towel | "useit® Superpad S/G Scotch Brite™ Maroon 7447 | "useit® Superpad S/G Scotch Brite™ Maroon 7447 | 380/400 | 15 µ | 380/400 |
| | take dust away | | take dust away | | take dust away | |
| Step 5 | | industrial paper towel | industrial paper towel | "useit® Superpad S/G Scotch Brite™ Maroon 7447 | 9 µ | 600/800 |
| | | | | take dust away | take dust away | |
| Step 6 | | | | industrial paper towel | Finesse-it™ Finish-component | 1200 |
| | | | | | take dust away | |
| Step 7 | | | | | | 1500 |
| | | | | | | 1800 |
| | | | | | | 2500 |

## Technical Specification Data Sheet: Comparison Overview

| SPECIFICATION | | Unit | 3mm | 6mm | 9mm | Old 12mm | 12mm | 19mm | Test method |
|---|---|---|---|---|---|---|---|---|---|
| | Kürzel | Einheit | S028 | S028 | S028 | S06 | S728 | S028 | Norm |
| Density | P | g/cm³ | 1,72 | 1,70 | 1,72 | 1,75 | 1,72 | 1,73 | DIN EN ISO 1183 |
| | | kg/m³ | 1720 | 1700 | 1720 | 1750 | 1720 | 1730 | |
| Flexural E-modulus | Ef | Mpa | 7800 | 7900 | 8800 | 8900 | 10200 | 10000 | DIN EN ISO 178 |
| Flexural strength | σ fm | Mpa | 48,4 | 69,6 | 74,7 | 70,1 | 74,7 | 70,4 | DIN EN ISO 12372 |
| Ultimate elongation | εfm | % | 0,89 | 0,84 | 0,83 | 1,01 | 0,70 | 0,81 | DIN EN ISO 178 |
| Tensil Strength | σ fm | Mpa | 23,1(%0,98) | 52,9(%0,97) | 54,5(%1,07) | 32,7 | 52,8(%1,13) | 51,3(%1,69) | DIN EN ISO 527 |
| Thermal expansion coefficiant | α | mm/mk | | | | 0,048 | | | DIN EN 12664 |
| | α | mm/°C | 42,1x10$^{-6}$ | 41,3x10$^{-6}$ | 41,3x10$^{-6}$ | 30x10$^{-6}$ | 41,3x10$^{-6}$ | 42x10$^{-6}$ | DIN EN 14581 |
| Thermal conductivity | λ 10try | W/mK | 0,671 | 0,881 | 0,884 | 0,656 | 0,976 | 0,871 | DIN EN 12664 |
| Resistance to thermal insulation | R | m²K/W | 0,0046 | 0,0063 | 0,01 | 0,038 | 0,0119 | 0,022 | DIN EN 12664 |
| Electrostatic | | >1x10$^{9}$ | 205x10$^{9}$ | 254x10$^{9}$ | 308x10$^{9}$ | | 389x10$^{9}$ | 513x10$^{9}$ | DIN IEC 1340-4-1, 04-`92 |
| Contact resistance | Ω | >1x10$^{12}$ | 0,205x10$^{9}$ | 0,254x10$^{9}$ | 0,308x10$^{9}$ | isolating | 0,389x10$^{9}$ | 0,513x10$^{9}$ | EN 61340-5-1 |
| Wasserdampfdurchlässigkeit efficient of diffusion resistance | μ | μ | 81346 | 44805 | 23022 | 18607 | 17750 | 8060 | DIN EN ISO 12572 |
| Water obsorbtion | | | | | | | | | |
| Increase of weight Increase | sp. G | % | 0,4 | 0,2 | 0,1 | <0,1 | 0,1 | 0,1 | DIN EN 438-12 |
| of thickness | d | % | 2,5 | 0,2 | 0,2 | <0,1 | 0,2 | 0,3 | |
| Measure variation at humidity change | | | | | | | | | |
| Length | | % | | | | -0,03 | | | DIN EN ISO 318_5-`98 |
| Thickness | | % | | | | 0,06 | | | |
| Mass | | % | | | | 0,05 | | | |
| Slippery resistance | R | | | | | >0,32-0,9 | | | GMG 100 (±R9) |
| Angle of acceptance 10° to 19° | | | | | | R10 | | | DIN 51130 |
| Scratch fastness | | | | | | 4D | | | DIN 68861_4,11-`81 |

## Product Availability

| SIZE | GRADE |
|---|---|
| 4.5 x 930 x 3000 mm (40 sheets/pallet) | Solid |
| 6 x 760 x 2490 mm (30 sheets/pallet) | Lucent |
| | Granite |
| | Quartz |
| | Sand & Pearl |
| | Solid |
| 6 x 910 x 2490 mm (30 sheets/pallet) | Solid |
| 9 x 760 x 3680 mm (20 sheets/pallet) | Granite |
| | Quartz |
| | Sand & Pearl |
| | Solid |
| 9 x 910 x 3680 mm (20 sheets/pallet) | Solid |
| 9 x 910 x 3680 mm (20 sheets/pallet) | Aster (Galaxy) |
| | Marmo |
| | Lucent |
| | Lucia |
| | Granite |
| | Quartz |
| | Sand & Pearl |
| | Solid |
| | Sparkle |
| 12 x 910 x 3680 mm (15 sheets/pallet) | Solid |
| 12 x 1350 x 3680 mm (12 sheets/pallet) | Solid |
| 20 x 760 x 3000 mm (10 sheets/pallet) | Available in all colours except for Eden, Marmo Collection and M551 Chic Concrete, M552 Shadow Concrete and M553 Ebony Concrete from Concrete Collection. |
| 20 x 760 x 3680 mm (10 sheets/pallet) | Solid |

### Standard Format

| SHEET THICKNESS IN MM | SHEET WIDTH IN MM | SHEET LENGTH IN MM |
|---|---|---|
| 4.5 | 930 | 3000 * |
| 6 | 760 | 2490 |
| 6 | 910 | 2490 * |
| 6 | 1350 | 3680* |
| 9 | 760 | 3680 |
| 9 | 910 | 3680 * |
| 9 | 1350 | 3680 * |
| 12 | 760 | 3680 |
| 12 | 910 | 3680 * |
| 12 | 1350 | 3680 * |
| 12 | 1520 | 3680 * |
| 20 | 760 | 3000 * |

### Special Format

| SHEET THICKNESS IN MM | SHEET WIDTH IN MM | SHEET LENGTH IN MM |
|---|---|---|
| 4.5 | 930 | 3000 * |
| 6 | 910 | 2490 ** |
| 6 | 1520 | 3680 * |
| 9 | 910 | 3680 ** |
| 9 | 1520 | 3680 * |
| 12 | 910 | 3680 ** |
| 20 | 760 | 3000 *** |
| 20 | 760 | 3680 **** |

### Ultra-Thermoforming Format *****

| SHEET THICKNESS IN MM | SHEET WIDTH IN MM | SHEET LENGTH IN MM |
|---|---|---|
| 12 | 760 | 3680 |
| 12 | 910 | 3680 |
| 12 | 930 | 3680 |

▶ Further Information on HIMACS - 3mm sheet material: Technical Bulletin 13

* Only available in S028 Alpine White.
** Only available in S006 Arctic White.
*** Available in all colours except for Eden, Marmo Collection and M551 Chic Concrete, M552 Shadow Concrete and M553 Ebony Concrete from Concrete Collection.
**** Only available in Solid Colours
***** Ultra-Thermoforming is only available in S928 Alpine White

Special format available on special request, minimum quantities apply.

## Custom Colour of HIMACS

| NAME | THICKNESS (MM) | DIMENSIONS (MM) | COLOUR AVAILABILITY | 20`CONTAINER | | 40`CONTAINER | | SHEETS / PAL |
|---|---|---|---|---|---|---|---|---|
| | | | | PAL | SHEETS | PAL | SHEETS | |
| Wide Sheets | 12 | 1,520 x 3,680 | S028 Alpine White | | | 10 | 190 | 19 |
| | 12 | 1,520 x 3,680 | S028 Alpine White | | | 12 | 216 | 18 |
| | 12 | 910 x 3,680 | S028 Alpine White<br>S006 Arctic White | 12 | 180 | 24 | 360 | 15 |
| | 9 | 1,350 x 3,680 | S028 Alpine White | | | 15 | 300 | 20 |
| | 9 | 910 x 3,680 | S028 Alpine White<br>S006 Arctic White | 12 | 240 | 24 | 480 | 20 |
| | 6 | 1,350 x 3,680 | S028 Alpine White | | | 20 | 420 | 21 |
| | 6 | 910 x 2,490 | S028 Alpine White<br>S006 Arctic White | 12 | 360 | 24 | 720 | 30 |
| | 4 | 1,350 x 3,000 | S028 Alpine White | | | 40 | 720 | 18 |
| | 3 | 930 x 3,000 | S028 Alpine White | 12 | 480 | 24 | 960 | 40 |
| HIMACS Ultra-Thermoforming | 12 | 760 x 3,680 | S928 Alpine White | 12 | 180 | 24 | 360 | 15 |
| HIMACS FR | 12 | 760 x 3,680 | S728 Alpine White | 12 | 180 | 24 | 360 | 15 |
| 20 mm | 20 | 760 x 3,000 | S028 Alpine White<br>Any Solid Colour | 12 | 120 | 24 | 240 | 10 |
| Eden ** | 12 | 760 x 3,680 | Any Eden Colour | 12 | 180 | 24 | 360 | 15 |

* HIMACS FR: All colours are the same as regular product colour (i.e. S728 Alpine White = S028 Alpine White). Production in Korea. ** Eden colour range: Production in USA. Delivery time: minimum 8 weeks.

## Troubleshooting

### Repairs

One of the main advantages of HIMACS, is that the surfaces can be repaired in the event of an accident. Depending on the type of damage, a number of solutions can be used.

### Scratches

For scratches, it may well be possible to sand them out with Scotch Brite pads, abrasive creams or even abrasive papers.

### Small indentations

With small indentation marks it is possible to drill out the affected area and fill the hole with HIMACS colour matched adhesive. Be sure to over fill the hole and try to eliminate any air pockets prior to curing. Once cured the adhesive can be sanded down in the normal way, however, the repaired area will need to be blended in with the existing work surface.

### Larger areas of damage

For larger areas of damage, particularly with the Granites and Sands, a plug repair is a possible alternative solution.

### Major damage

For major damage, regarding cracks or burn marks, a 12 mm triangular piece of HIMACS (same thickness / same production as installed / not applicable to any heat source) will need to be fitted. And clamp it to the surface around the damaged area. Machine out the section using a portable hand router. Using the same template cut another section from an offcut of colour matched HIMACS piece or better if the piece is from the same sheet to minimize any colour difference. Bond the triangular spare piece with
HIMACS adhesive and reinforce the underside.

### Broken seams

To repair a broken seam, first machine a ‘V’ groove down the entire length of the crack. Cut a square section of matching HIMACS so that when turned through 90°, it fits the groove.
Apply HIMACS adhesive into groove and push the square section home until sufficient adhesive is forced upwards. Once fully cured sand down the new section as normal. Ensure that the seam has reinforcement beneath prior to completion.
Always leave sink or bowl cutout at the item of your customer for any unexpected repair or trouble solving
(original piece for repair).

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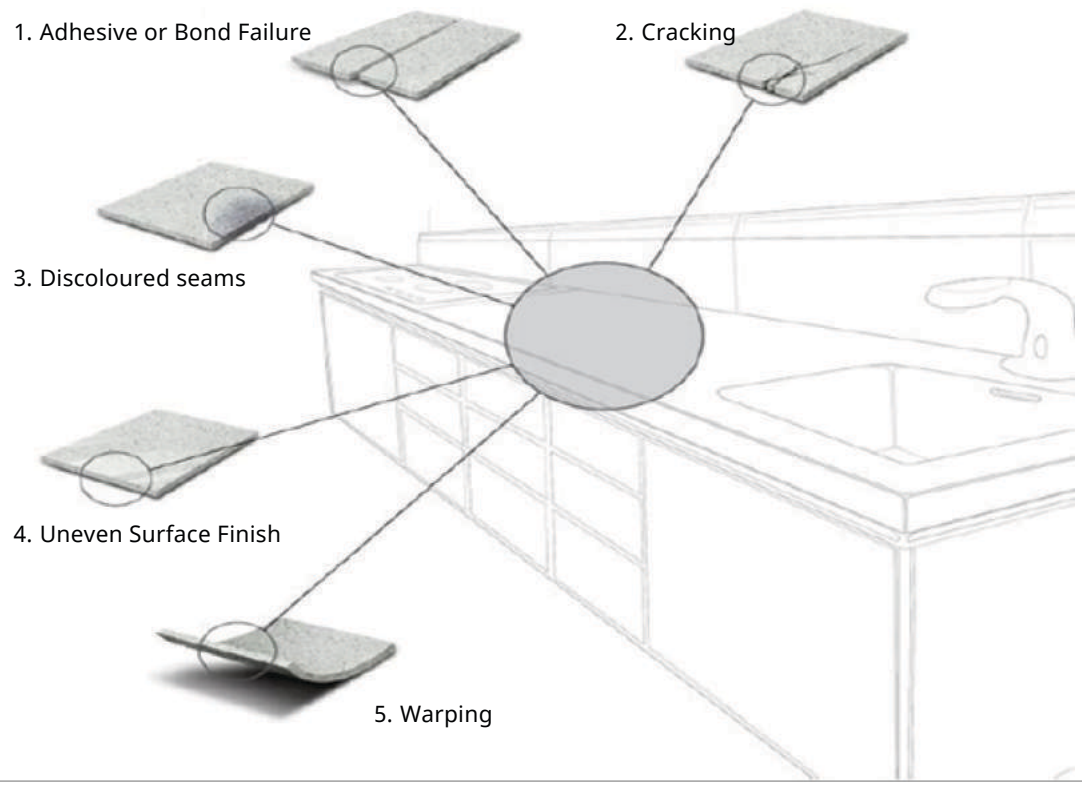
**Troubleshooting**




**Adhesive or bond failure**

- Failure to scuff, sand or clean joint before bonding.
- Improper support of deck or overhang seams.
- Improper mixing of seam kit

**Cracking**
HMACS countertop fabricated with stress riser.

- Failure to radius inside corner at least 12 mm
- Failure to install tops on level plane surface.
- Failure to use heat tape at countertop cutout.
- Failure to reinforce countertops, cutouts and seams.
- Failure to allow a 1 mm gap every 1 meter for expansion.
- Failure to use silicone adhesive on dissimilar materials.
- Failure to cover all bonding surfaces with adhesive.

**Discoloured seams**

- Failure to use clean; white, lint free rags.
- Failure to clean joints with denatured alcohol before adhering.

**Uneven surface finish**

- Use of a belt sander on countertop surface.
- Failure to use appropriate grit abrasive on sand paper
- Sanding on one spot too long.
- Failure to control x & y motion of sander equally.

**Warping**

- Failure to fabricate and install countertop on level, plane surface.
- Failure to store received materials properly as prescribed.
- Failure to add 1 mm gap for expansion every 1 meter
- Failure to use heat tape on countertop cutouts.

For further guidelines of fabrication see specific descriptions of sheet and shape fabrication and installation recommendation in other sections according to application and subject.

# LX Hausys Europe GmbH

**European Headquarters:**
**LX Hausys Europe GmbH**
**Lyoner Str. 15 60528**
**Frankfurt am Main, Germany**

BECAUSE QUALITY WINS