Interior Solid Surface Material

HI·MACS

TECHNICAL DATA SHEET
THERMOFORMING

Tulip by Pierre Cabrera
©Franck Foucha – Xavier Muyar

1. Thermoforming

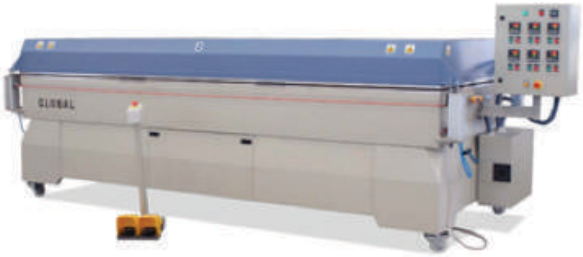
The material property of HIMACS allows with specific controlled heat to thermoform HIMACS sheets into 2- or 3-dimensional forms, like shapes or other rounded applications.
During this fabrication process many different parameters will have an influence to the results of the finished products.

The technology of thermoforming is one of the most sophisticated fabrication techniques of HIMACS.

Thermoforming allows designers' and architects' dreams to come true. The LGCE-team would like to share some basic thermoforming knowledge to allow everybody working with HIMACS products to join us on the road of customers', architects', designers' and specifiers satisfaction. – The future begins now!

Everything starts with the right tools for the right job.

Therefore we would like to announce that we have a special partnership with Global Machines/ Nabuurs Development to offer you the widest and most complete range of tools and equipment needed for your thermoforming job. Please visit the website: www.globalvacuumpresses.com



To ensure that the job will take place successfully you have to understand the HIMACS material's performance and its thermoforming process with all the positive and negative issues that may possibly occur during the fabrication process. Although the information given in this Technical Information is to the best of our knowledge at the present time,

LX Hausys Europe GmbH does not protect any material defects or mistaken results of Thermoforming under its Warranty of the Quality Club Program.

Therefore, please check the material quality before starting with the project and keep record of following items:

- Sheet-no.
- Temperature accuracy
- Environmental conditions (ambient temperature etc.)

For your own safety: ensure to handle the project with all due care whilst the material is very hot. Protect any parts of your own body and take necessary care of your colleagues working with you to avoid any serious injury.

Based on its molecular structure HIMACS belongs to the group of Thermoplastics and can therefore, by preheating, be changed into a thermo-elastic material.

Definition:
Thermoforming means a deformation of thermoplastic material under the influence of heat with moulds under suction, pneumatic pressure or vacuum.

(Meyers Lexikon, Bd. 3 , Mannheim 1970)

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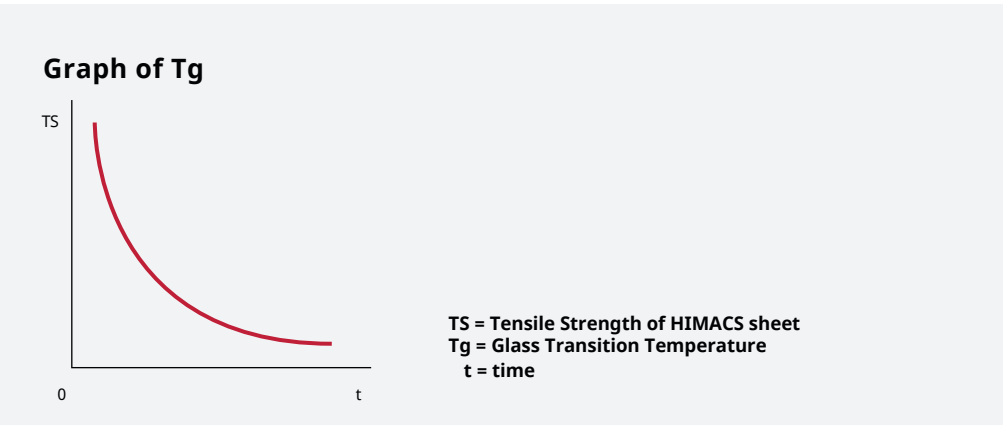
It is important to reach the “glass transition” temperature (Tg) of the HIMACS;
This means it is best to get the ideal softness of its material performance.
The ideal point is, where the material has the best softness for optimum thermoforming performance for most thermoforming applications.



Heating temperature for HIMACS

approx. + 155 ° C up to + 175 ° C

Danger heating point: + 204 ° C

The correct temperature depends on many different factors and needs to be

- established,
- analyzed and
- tested

before starting the job.

Criteria which influence the thermoforming possibilities

- Colour
- Colour family
- Batch of product
- Design: large/small radius
- Pre-Heating devise: Air circulation heat or contact
- heat Accuracy of temperature
- Environment

Thermoforming Analysis

Positives and negatives of thermoforming

POSITIVES
High production output When large quantities are fabricated
2D thermoforming
3D thermoforming
Special effects like : pressing of motifs expl : logos into the surface

NEGATIVES
Higher energy costs Depending on available heating system Availablility of photo-voitac-system
Small volume Relative highly fabrication costs

The only limitation in thermoforming is the size of the oven used for the heating process. Although all HIMACS sheet products can be thermoformed, not all HIMACS products will produce satisfactory or visually pleasing results. The best results will be achieved with solid colour or small-particulate material.

SOME PRODUCTS, WHEN THERMOFORMED, MAY NOT PRODUCE ACCEPTABLE RESULTS	
Sheet material with large particulate	Particulate may be distorted on the radius due to ''stretching''
Sheet material with veining or stripes	Veins or stripes on the radius may spread or lighten charging their appearance
Sheet material with ''motion''	As above, like vein or stripe material the new shape will negatively affect the appearnce
Any dark colour and/or a tight radius	The darker the colour and/or the tighter the radius, the more likely the result will show ''whitening''on the thermoforming area

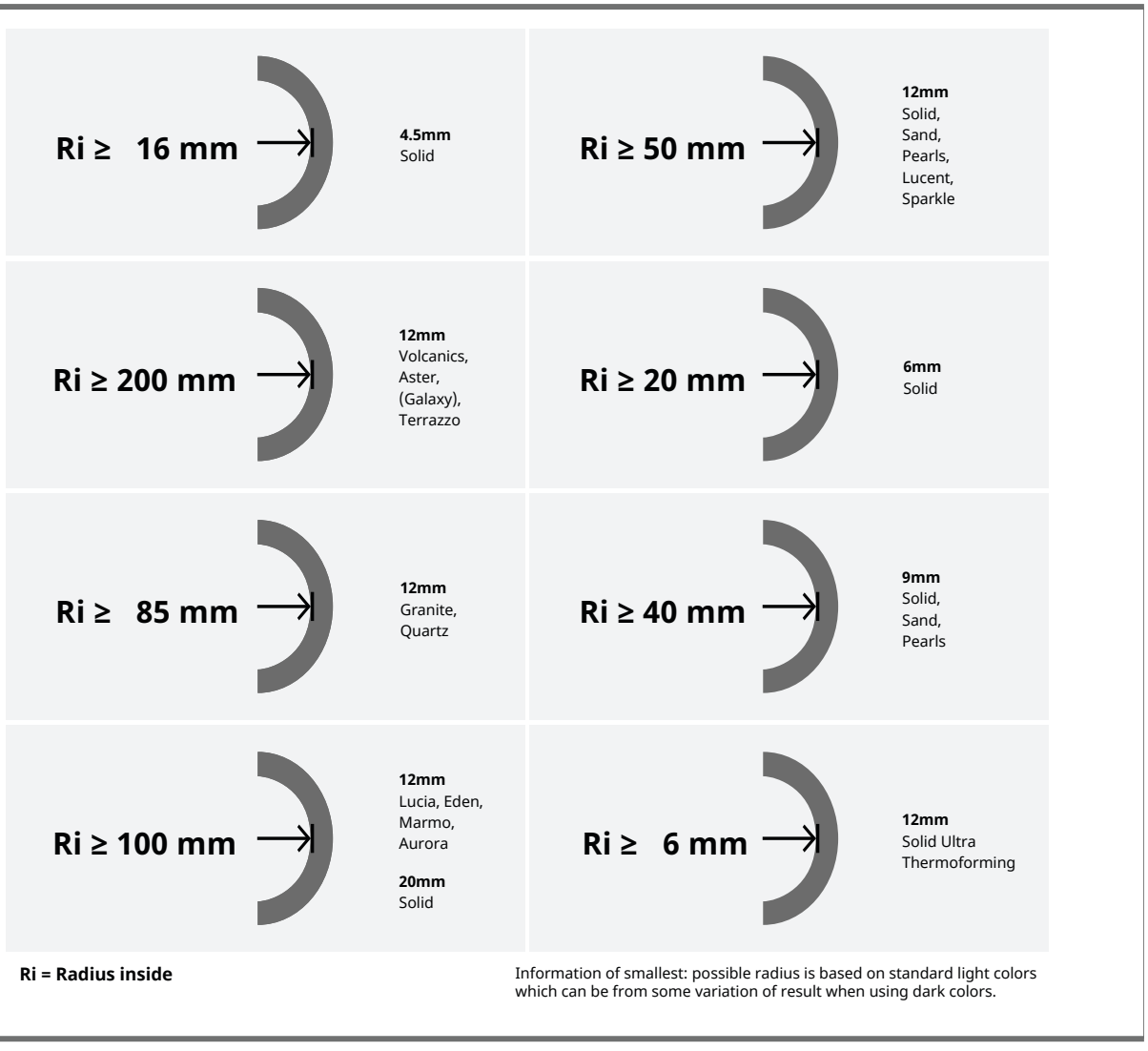
Regardless of the oven size, all thermoforming must be completed before any joints (adhesive or silicone sealant) are created. Adhesive joints cannot be thermoformed.

HIMACS sheet material can shrink about 5% to 7% during the thermoforming process. Material to be thermoformed should be oversized by at least 25mm and up to 7% of overall dimensions to allow for this shrinkage.

Remove the protective film before placing the HIMACS material in the thermoforming oven.

Achievable recommended minimal radii:

Be aware that choosing a smallest possible radius may cause some whitening by heavy pigmented or dark colors (see remarks above). If so, choose a larger radius to avoid this whitening effect. Check before all parameters are correct. Make a test piece (prototype) according to the design before starting the fabrication and assembling process and get customer approval.



Ri = Radius inside

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

2. Fabrication Process

2.1 Work-piece preparation

Before pre-heating the work-piece:

- Quality control
- Check if there is no damage on the work piece or other defects.
- Rebate all edges or put a radius (min. R= 1,5 mm) on all edges.
- The smaller the chosen radius – the more the edge should be rebated or a larger radius should be used.
- Make cut-outs in the work-piece after the thermoforming process only.
- If your work-piece has an engraved motif or logo – handle with care.

Do not heat up a seamed sheet due to higher visibility of the adhesive after thermoforming process. The edges will become deformed and widen the seam.

The smaller the radius chosen, the more critical the area of the seam will be.
It is best to trim off after thermoforming process and bond two pieces when it has reached room temperature again.
Before heating the HIMACS sheets pull off the protective film on the surface side.

2.2 Keep record

- Temperature of work-piece
- Temperature of device / accuracy check
- Heating time
- Environmental conditions (winter/summer time/place in workshop/next to door/windy position/etc.)
- sheet production-no etc. (for later reference if needed)
- cooling position / environmental influences / air flow & air circulations

Be aware that there may appear to be a colour difference when working with dark or highly pigmented colours. Eventually check project result with your customer and keep record.

2.3 After thermoforming process

- Let the work-piece cool down evenly and continuously from all sides.
- Do not make a “shock cooling”.
- Allow the work-piece to shrink in the mould without stress.
- When the work-piece has reached a min. of + 82°C the work-piece can be taken out of the mould
- Ensure even further cooling until room temperature is reached.
- Trim off the edges when necessary and bond the work-pieces as needed.
- Finish off as under normal standards or as decided by specifier and recommended in the “sanding” section of the fabrication manual.

According to the design: the work-piece can be thermoformed best with a:

- positive and negative mould (male and female)
- vacuum machine or
- pneumatic press or
- high pressure mould system ...

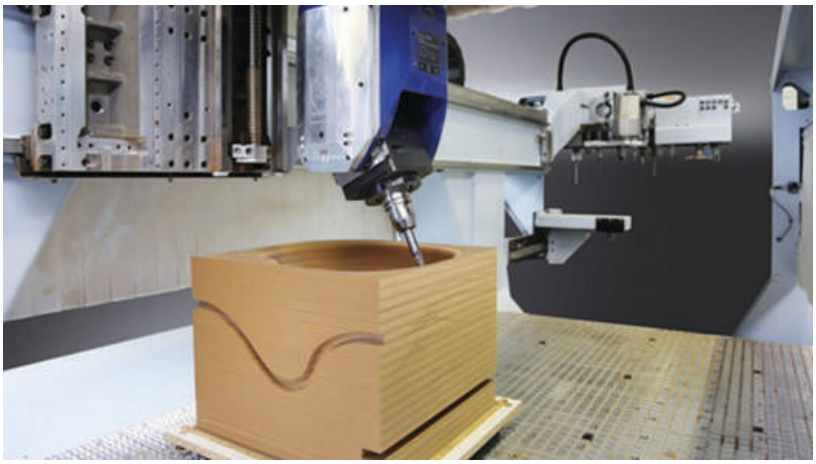
Also with reference to the production it needs to be decided which kind of mould will be the best option to reach the best and most efficient result for the project.

- Quantity
- Quality
- Time &
- Frequency

are the first important items to meet.

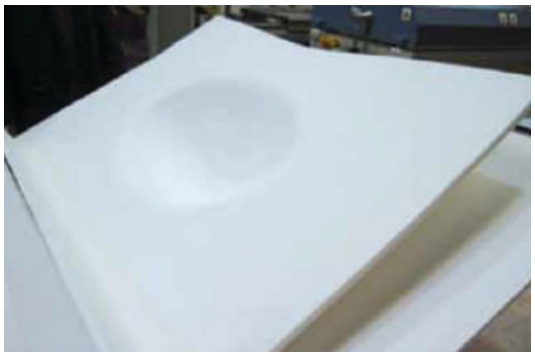
MDF-mould

Thermoformed HIMACS piece



Mould preparation with HOMAG CNC

Global press & alu cooled mould



Thermoformed HIMACS work piece

GlobalPress & high density foam

For more information:
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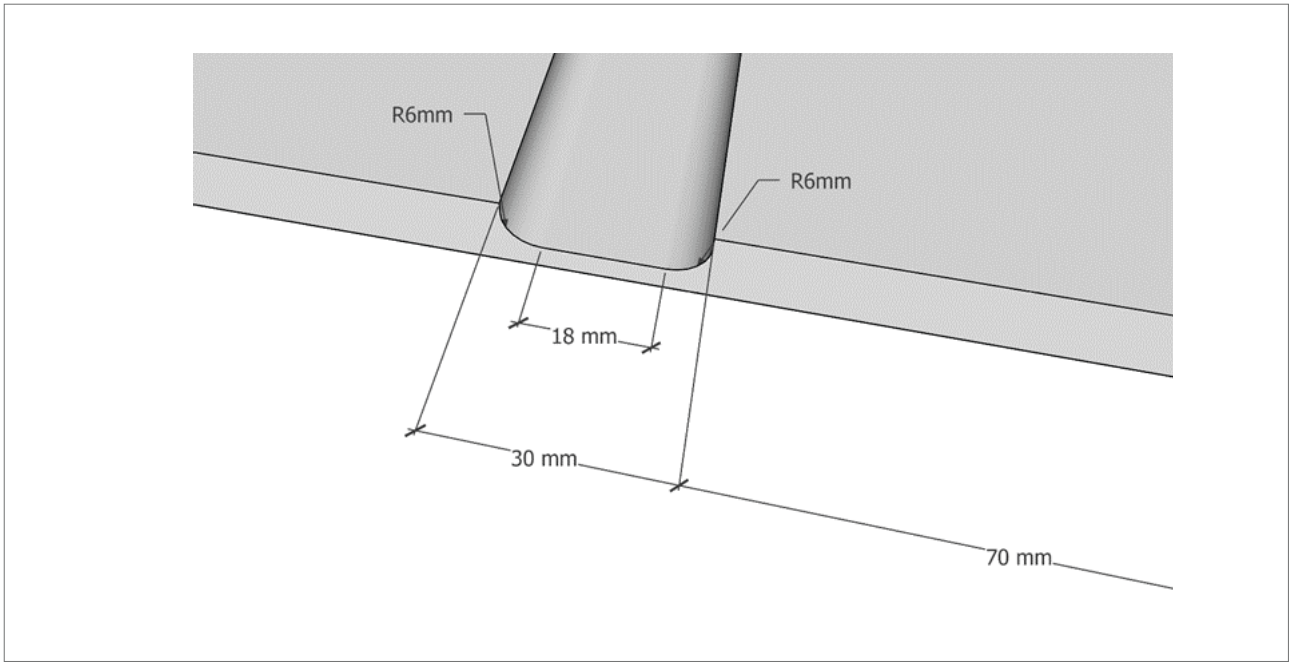
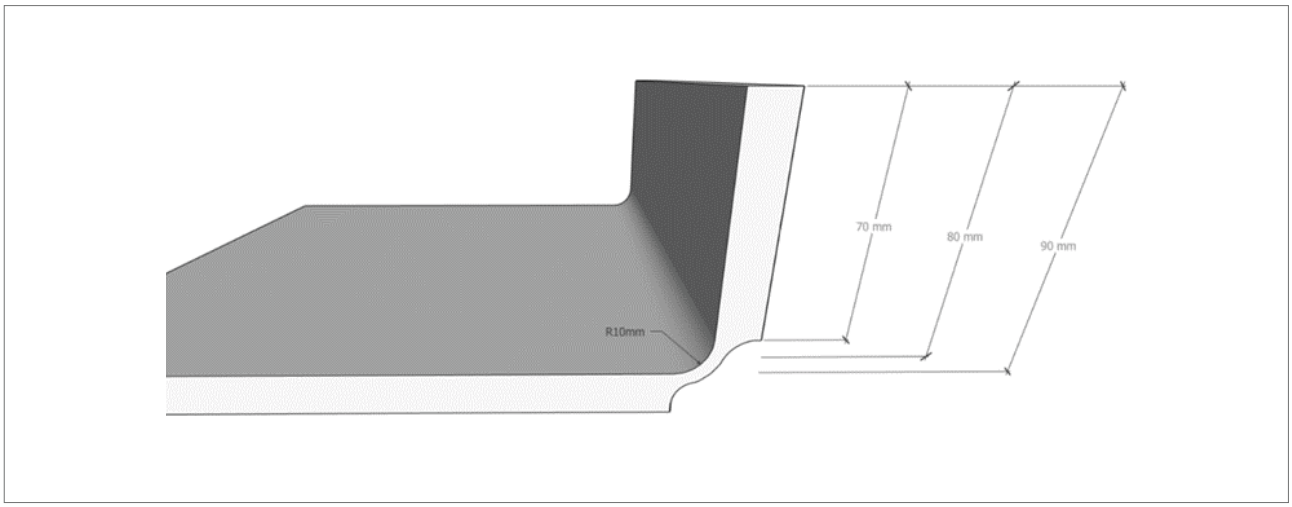
Fax: +(34) 961 526 001
global@nabuurs.com
www.globalvacuumpresses.com

2.4 Thermoformed Curved Backsplash

For simple, but attractive curved backsplash there is an opportunity of hygienic building instead of traditional build-up curved backsplash.
At 12mm HIMACS material under standard condition a 50mm radius using for curved backsplash has no estatic look of design values. When the curve is smaller, like a radius of 20/25mm the design becomes valuable and be able to be created by thermoforming process.
Inside- and outside corners are limited and are not recommended to this method, but possible to use with an 45° degree-cut.





To avoid any warping of the curved backsplash during thermoforming process:

- Support the radius with a filling piece according the radius you have to create: here 10mm
- Ensure your backsplash stays up at 90° without any warping in length and height.
- Re-sand after thermoforming process
- Put an radius on the above front edge and brake all edges to a radius of R=1,5mm.
- Never ever leave sharp corners or sharp edges anywhere.
- Break the edges or put a small radius on.

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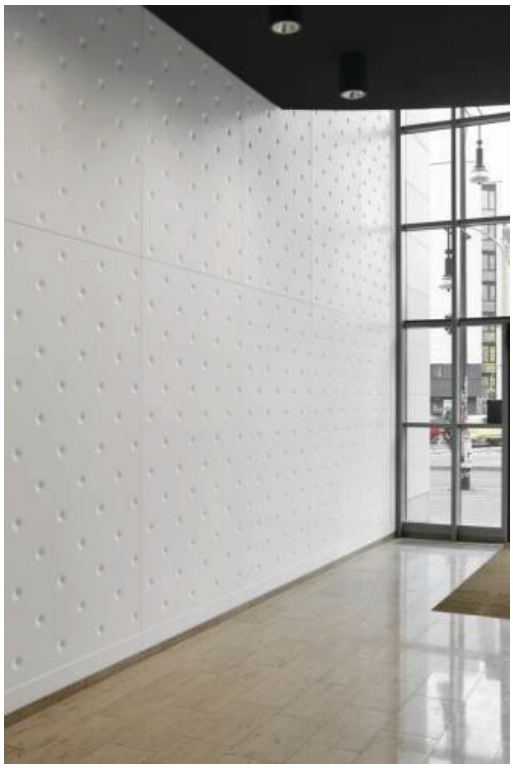
Photos ©Uwe Röder

Wall Cladding 3D with backlight Train station Schwäbisch-Gmünd,



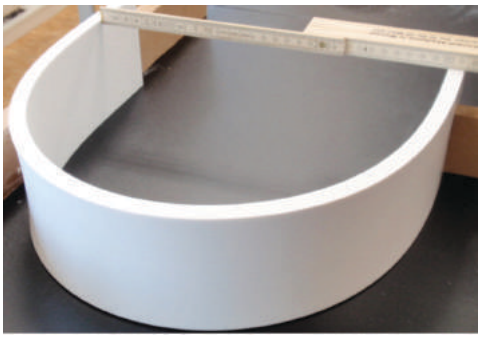
Photos ©Volker Mai and Andreas Mikutt

Wall Cladding Design of bubbles with air- and sound absorption holes Schönhauser Tor, Interior Wall Cladding; Berlin, Germany

3. Special Products

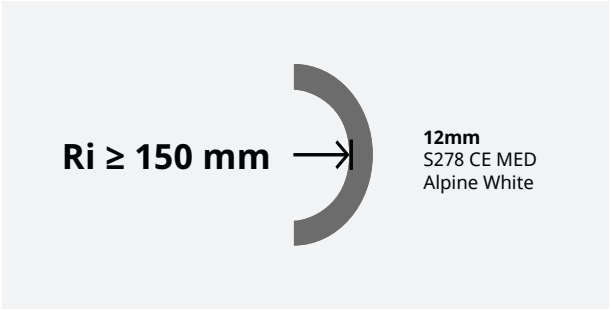
3.1 HIMACS S728 CE MED Alpine White

Due to a different formulation HIMACS S728 CE MED Alpine White cannot be bended as much as HIMACS standard product, like S028 Alpine White. S728 has very good fire classification values, but in terms of thermoforming we only can reach a smallest Radius of
Ri = 150mm / or Ø 300mm



S728 Ri = 150mm

S728 Ø = 300mm



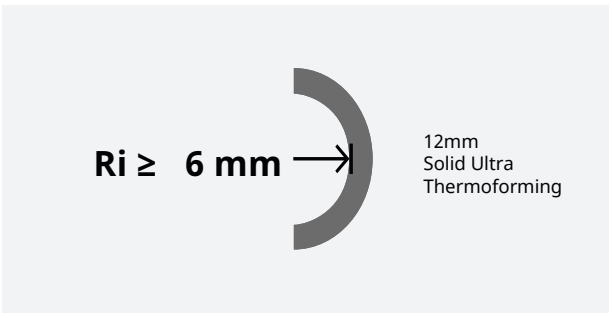
3.2 HIMACS S828 Alpine White

Due to a different formulation HIMACS S828 Alpine White cannot be bended as much as HIMACS standard product, like S028 Alpine White. S828 has good UV resistance values, and will reach same min Radius as HIMACS Standard products:
Ri = 50mm / or Ø 100mm

3.3 HIMACS S928U Alpine White Ultra thermoforming:

Due to a different formulation HIMACS S928U Alpine White Ultra thermoforming can be bended much more as the HIMACS standard product, like S028 Alpine White. S928U has very good thermoforming values, and can reach a smallest Radius of
Ri = 6mm / or Ø 12mm

S928 Alpine White

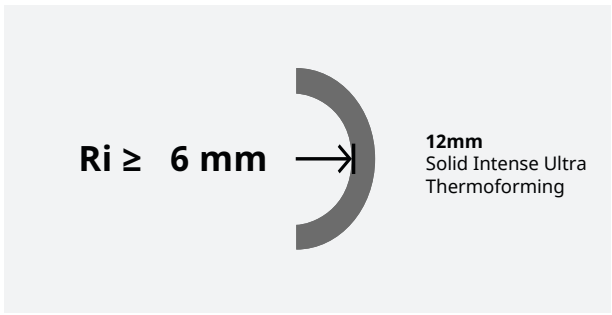


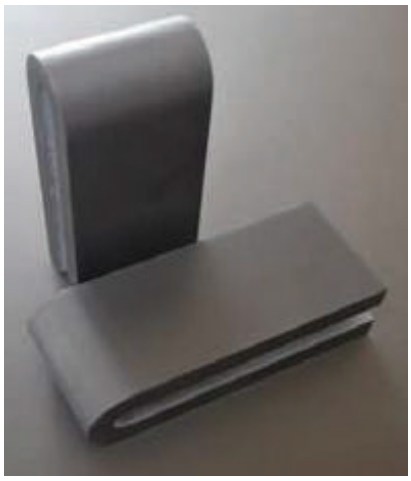
3.4 HIMACS Intense Ultra Thermoforming
S922U Intense Ultra Black ;
S923U Intense Ultra Grey & S922U Intense Ultra Dark Grey

Due to a different formulation

- HIMACS S922U Intense Ultra Black,
- HIMACS S923U Intense Ultra Grey and
- HIMACS S924U Intense Ultra Dark Grey

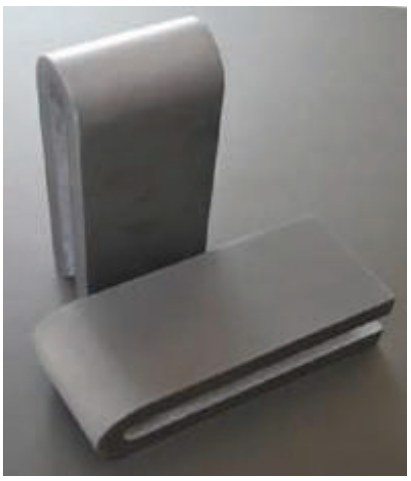
can be bended much more as the HIMACS standard product, like S028 Alpine White. S922U / S923U and S924U have high intensive pigmentations and have very good thermoforming values. Those can reach a smallest Radius of
Ri = 6mm / or Ø 12mm:





S922U Intense Ultra Black

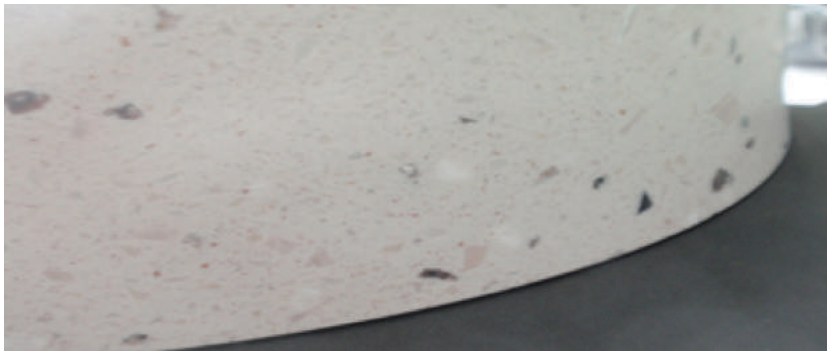
S923U Intense Ultra Grey



S924U Intense Ultra Dark Grey

3.5 HIMACS Terrazzo

Due to a different formulation HIMACS Terrazzo, like Q001 Classico and Q002 Grigio cannot be bended as much as HIMACS standard product, like S028 Alpine White. We only can reach a smallest Radius of
Ri = 200mm / or Ø 400mm:



Hint:
Be aware that the chips used in Terrazzo easily can break. Handle the thermoforming process with care and do not over-tighten the pressure when it's placed in a bending shape.

Warranty Terms

LX Hausys covers within the Warranty Program such products only, where all parameters (like e.g.: smooth and stable mould materials and mould conditions, range and proof of temperature as well as heating time, cooling time and cooling temperature of the mould, “Tg” of the sheet material, smallest minimum radius (Ri = inside radius) is not undertaken, etc.) **are recorded and approved.**

Note:
Any Non-recorded and a non-approved processes will not be applicable to the LX Hausys Europe Warranty Program.

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