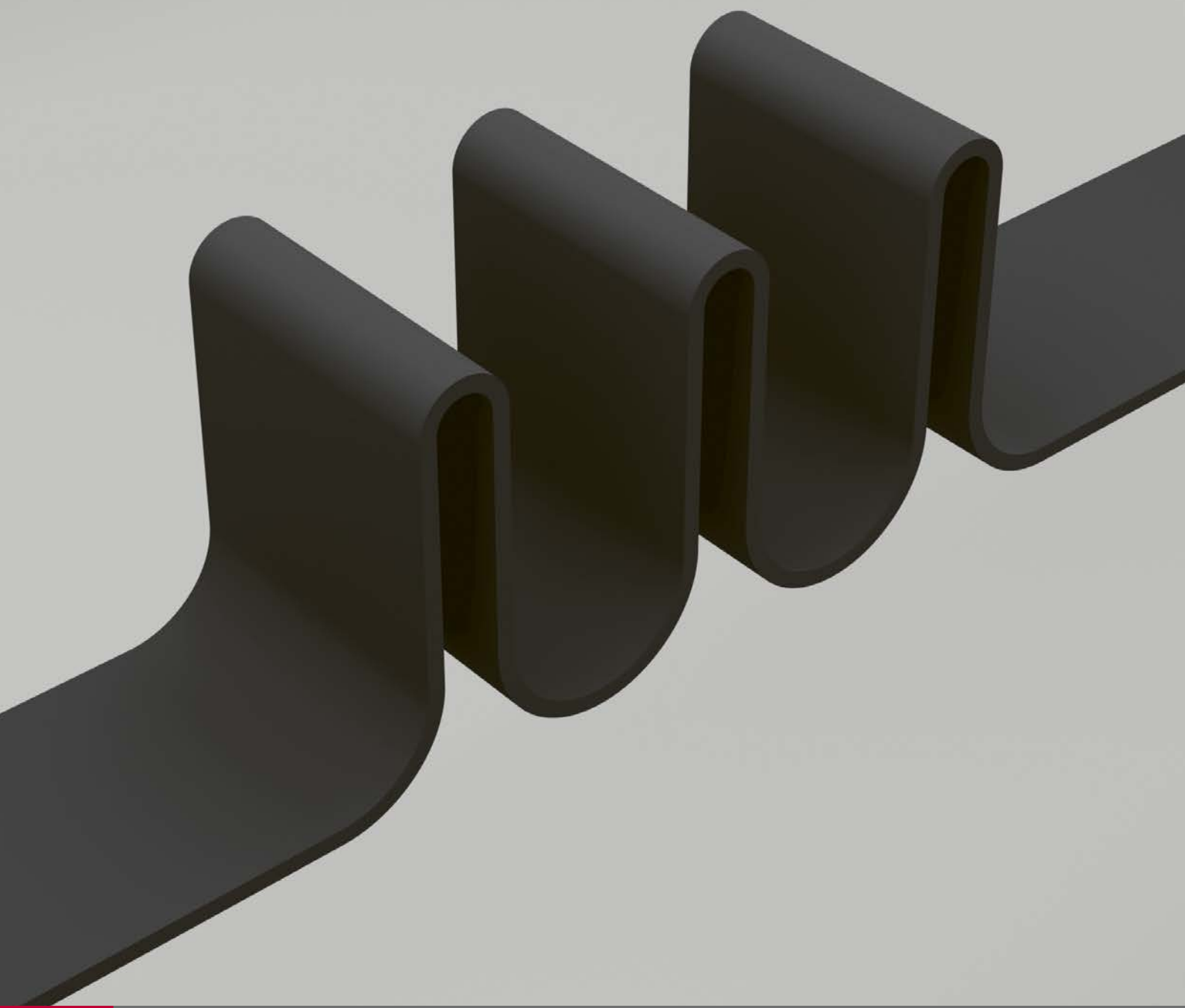


Interior Solid Surface Material

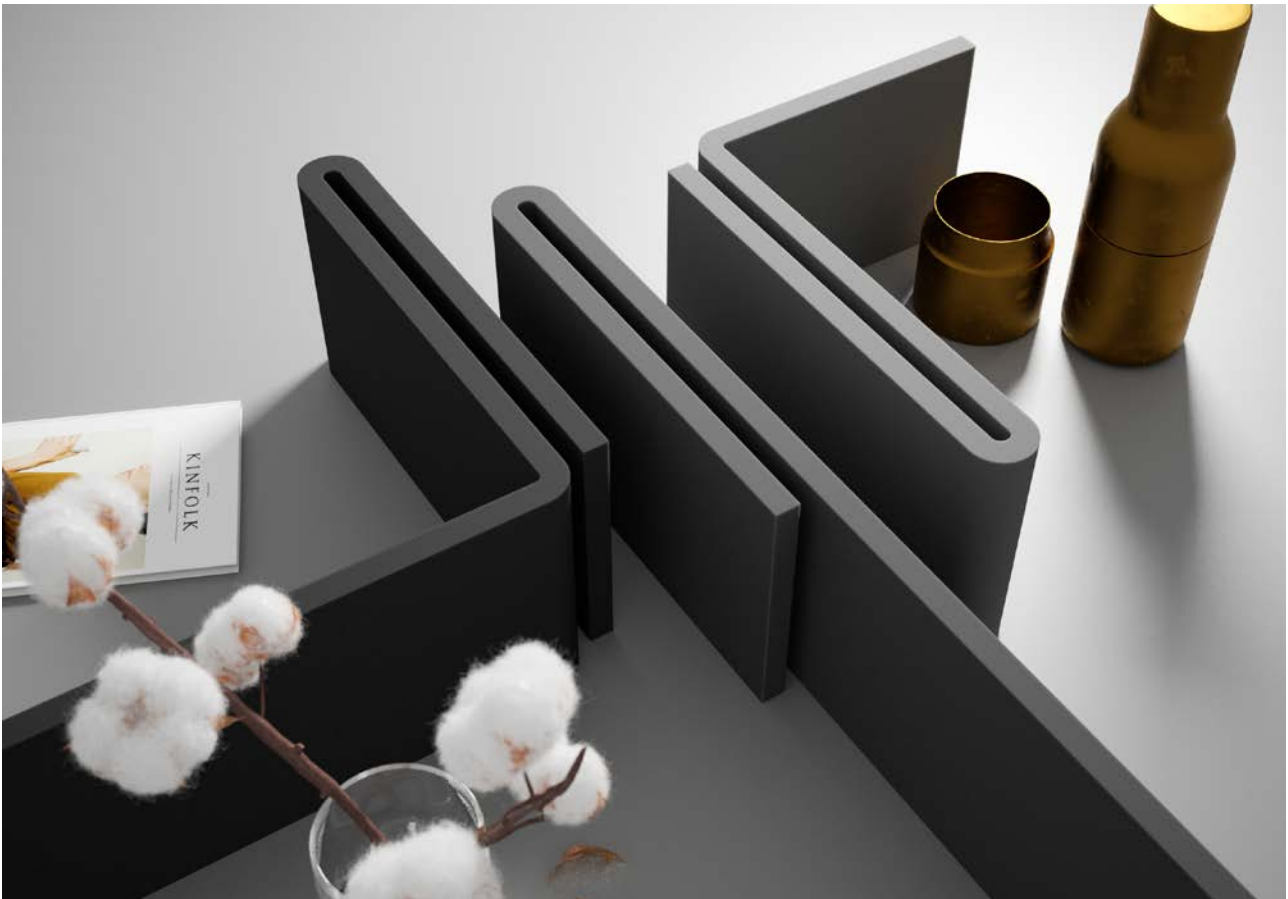
HI-MACS[®]
Natural Acrylic Stone[™]

I TDS – TECHNICAL DATA SHEET

**HI-MACS[®] INTENSE ULTRA &
HI-MACS[®] ULTRA-THERMOFORMING**



■ HI-MACS® Intense Ultra. Work with Power.



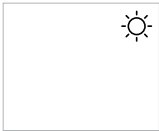
Following the launch of HI-MACS® Ultra-Thermoforming in its colour Alpine White, the company is now introducing **HI-MACS® Intense Ultra**, a revolution for the Solid Surface market which opens new possibilities for surface design.

The product range combines the characteristics from two disparate worlds: Intense Colour Technology and Ultra-Thermoforming. Dark colours become more “intense”, darker and also more resistant, with less visible scratches. The new formulation allows for colour consistency during and after fabrication, maintaining the dark colour when worked, producing less sanding dust and leaving fewer sanding marks on the surface and edges.



1. Products

1.1 Sheet Colours



Ultra-Thermoforming
Alpine White
S928 [12 mm]



HI-MACS® Intense Ultra
Black
S922U [12 mm]



HI-MACS® Intense Ultra
Dark Grey
S924U [12 mm]



HI-MACS® Intense Ultra
Grey
S923U [12 mm]

1.2 Product Specification

GROUP	SHEET COLOUR CODE	COLOUR NAME	SHEET THICKNESS	SHEET SIZE (WIDTH X LENGTH)	M² PER SHEET	WEIGHT PER SHEET	WEIGHT PER M²	SHEETS PER PALLET
Ultra Thermoforming	S928	Alpine White	12 mm	760 mm x 3680 mm	2.7968	55.38 kg	19.80 kg	15
Intense Ultra	S922U	Intense Ultra Black	12 mm	760 mm x 3680 mm	2.7968	55.38 kg	19.80 kg	15
	S923U	Intense Ultra Grey	12 mm	760 mm x 3680 mm	2.7968	55.38 kg	19.80 kg	15
	S924U	Intense Ultra Dark Grey	12 mm	760 mm x 3680 mm	2.7968	55.38 kg	19.80 kg	15

1.3 Sheets & Adhesive Colour Codes

GROUP	SHEET		ADHESIVE		
	COLOUR CODE	COLOUR NAME	COLOUR CODE	COLOUR NAME	PACKAGING UNIT
Ultra Thermoforming	S928	Alpine White	H16	Alpine White	45 ml/ 250 ml
Intense Ultra 2019	S922U	Intense Ultra Black	H134	Intense Black	45 ml/ 250 ml
	S923U	Intense Ultra Grey	H54	Concrete Grey	45 ml/ 250 ml
	S924U	Intense Ultra Dark Grey	H135	Intense Dark Grey	45 ml/ 250 ml

1.4 LRV

SHEET COLOUR CODE	SHEET COLOUR NAME	COLOUR FAMILY	SHEET LRV VALUE
S928	Alpine White	Solid	85.12
S922U	Intense Ultra Black	Solid	
S923U	Intense Ultra Grey	Solid	
S924U	Intense Ultra Dark Grey	Solid	

1.5 Sheets Colour Codes RAL – Pantone

COLOUR CODE	COLOUR NAME	RAL DESIGN	RAL CLASSIC	PANTONE
S928	Alpine White	Solid	9003	11-4201 TPX
S922U	Intense Ultra Black	Solid	9005	19-4007 TPX
S923U	Intense Ultra Grey	Solid	7016	19-4104 TPX
S924U	Intense Ultra Dark Grey	Solid	9017	19-0303 TPX

2. Fabrication

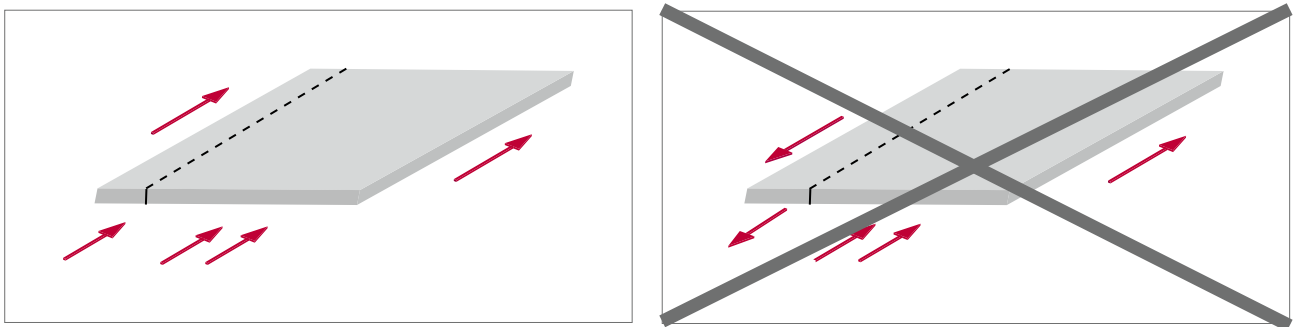
2.1 Quality check cutting

When fabricating the new HI-MACS® Ultra-Thermoforming, there is almost no difference to the general standard HI-MACS® products with regards to fabrication and installing.

Always handle the material with care to avoid any additional uncontrolled scratches from the top or the back of the sheet.

When cutting HI-MACS® material always use a new and sharp saw blade or trim off with CNC router accordingly to size required. Ensure cut is perfectly straight for later bonding.

Check on sheet direction to have the same production flow when assembled:



2.2 Bonding

The bonding/jointing process of the standard fabrication of the HI-MACS® Ultra-Thermoforming, can be done as recommended for all other available sheet colours.

Follow the Standard bonding procedures:
Fabrication Manual 2019, 72 & 73.



2.2.1 Bonding Sheet to Sheet

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 HI-MACS® Sands, Pearl, Quartz or granite ranges, are more forgiving, due to the variety of coloured particles.

With HI-MACS® Intense Ultra handle the seaming carefully and straight to avoid any unexpected whitening from the result of a poorly saw blade or irregular cut.

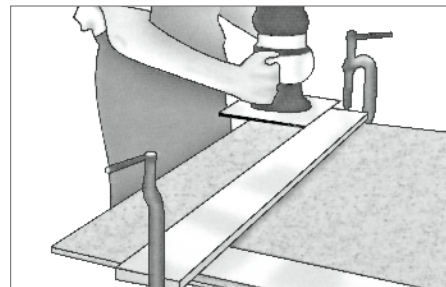
Make the edges smooth and clean before bonding.

Improved colour at cutting surface



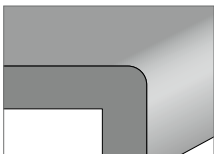
S022
Black

S922
Intense
Ultra Black

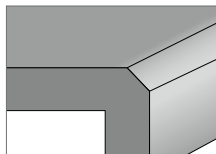


2.2.2 Bonding Edges / Down Turns

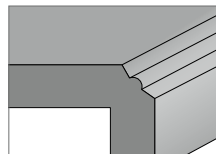
Follow the standard fabrication process as outlined in our Fabrication Manual according the chosen design



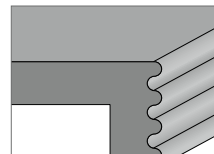
Standard with radius



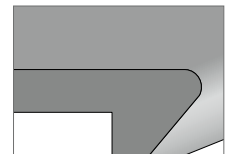
Standard with bevel



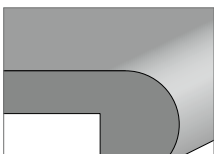
Standard with profile



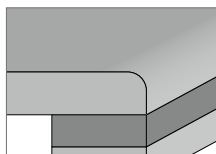
Standard with wave



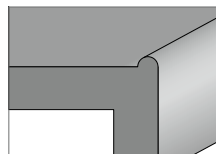
profil Standard with back bevel



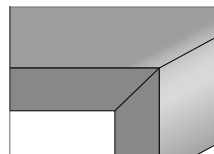
Bull-nose



Sandwich



Waterfall edge



Standard v-grooved

The Ultra-Thermoforming sheets have the material performance allowance of tighten radii, whilst round curves is not an difficult issue anymore



S928 Ultra-Thermoforming
Alpine White



S922U Intense Ultra Black



S923U Intense Ultra Grey



S924U Intense Ultra Dark Grey

2.3 Sanding (finishing)

- The reference is as recommended with our standard products:
- For further details: **See TDS-no.4 Sanding.**

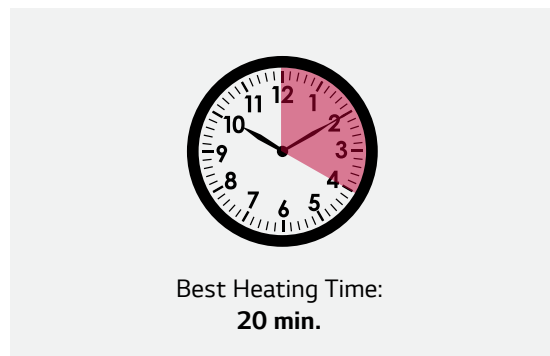
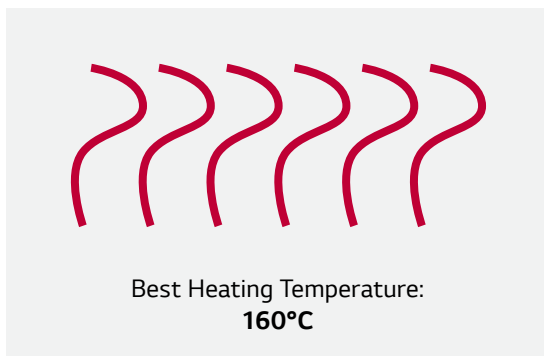


		Standard recommendation					
FINISH-LEVEL	MATT-FINISH		SEMI-GLOSS-FINISH		HIGH-GLOSS-FINISH		
HI-MACS® colour family	for all colours		for all colours		for all colours		
Sanding steps	micron-sandpaper	grid-sandpaper	micron-sandpaper	grid-sandpaper	micron-sandpaper	grid-sandpaper	
Step 1	100/80 µ	150/180 µ	100/80 µ	150/180 µ	100/80 µ	150/180 µ	
	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		take dust away		
Step 7						1500	
						1800	
						2500	

2.4 Thermoforming

To prepare the workpieces, follow the standard thermoforming process

For the Thermoforming process we recommend using a pre-heating oven with double sided heating plates.



- Thermoforming comparison test:
Standard HI-MACS® S028 Alpine White vs
HI-MACS® Ultra-Thermoforming S928 Alpine White.
- The Glass-Transition-Temperature is reached by ca. +111°C.
- Please note the temperature is supposed to be the same across whole sheet.

Product and Mould Development History

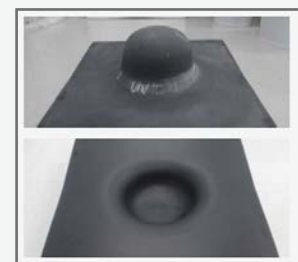
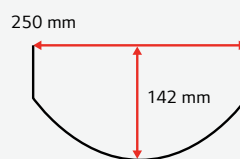
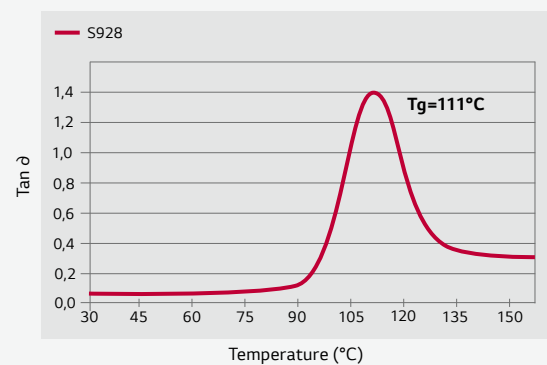
New mould production for evaluation of sink ball formability

	BEFORE	AFTER
Mould Shape		
Mould Depth	Depth: 110 mm	Depth: 142 mm
Remark		30 % enhanced conditions

History of thermoforming test: Pilot Test sample with improved properties 142 mm depth: Passed

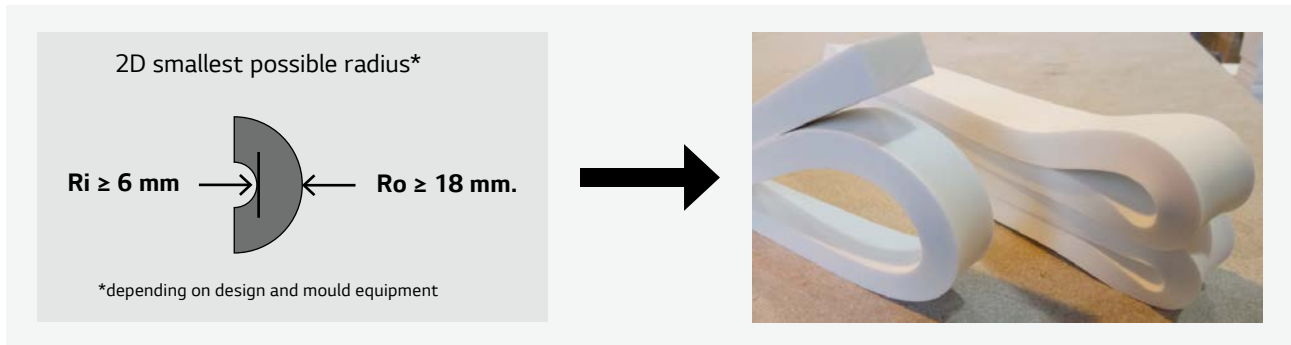


S928 Tan δ



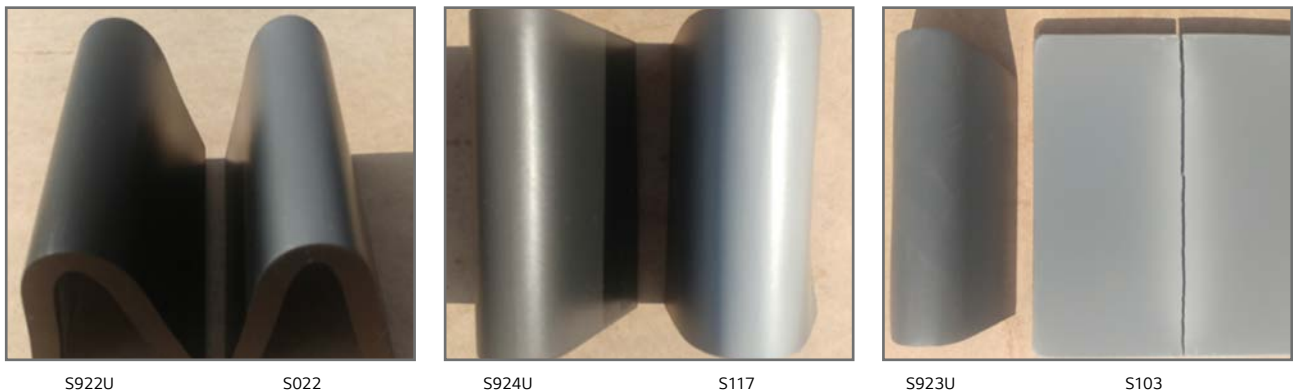
- Concerning the 3D thermoforming of HI-MACS® Ultra-Thermoforming, the allowable R value depends on the type of mould.
- The smallest interior radius to bend is approximate $R_i \geq 6 \text{ mm}$ and exterior radius of $R_o \geq 18 \text{ mm}$.

- Picture below shows bending to the extreme:



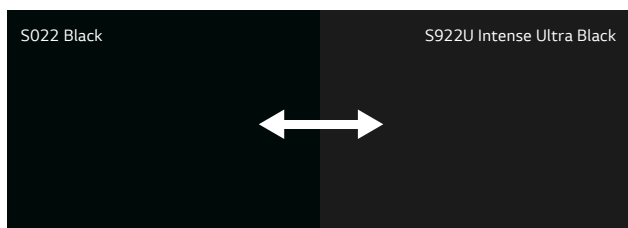
2.5 Comparison Tests

Thermoforming to the limits. Here three (3) samples to compare.



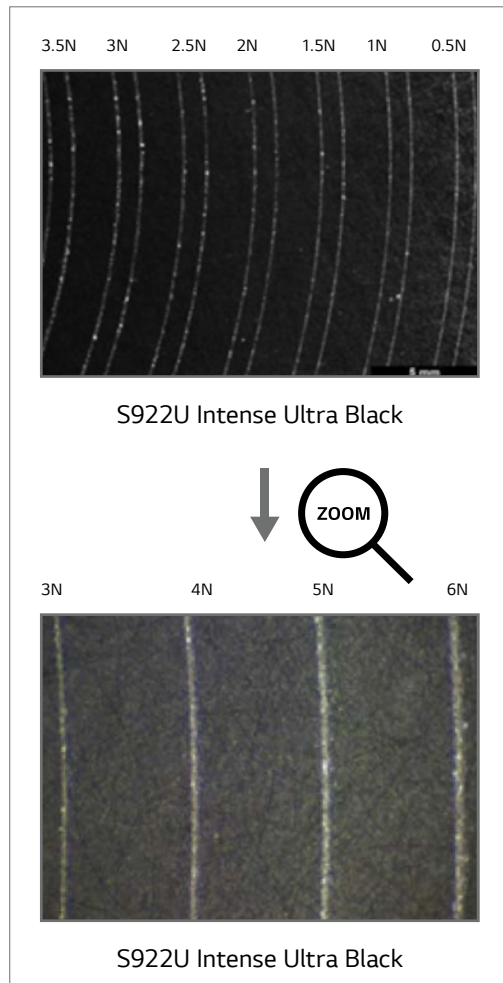
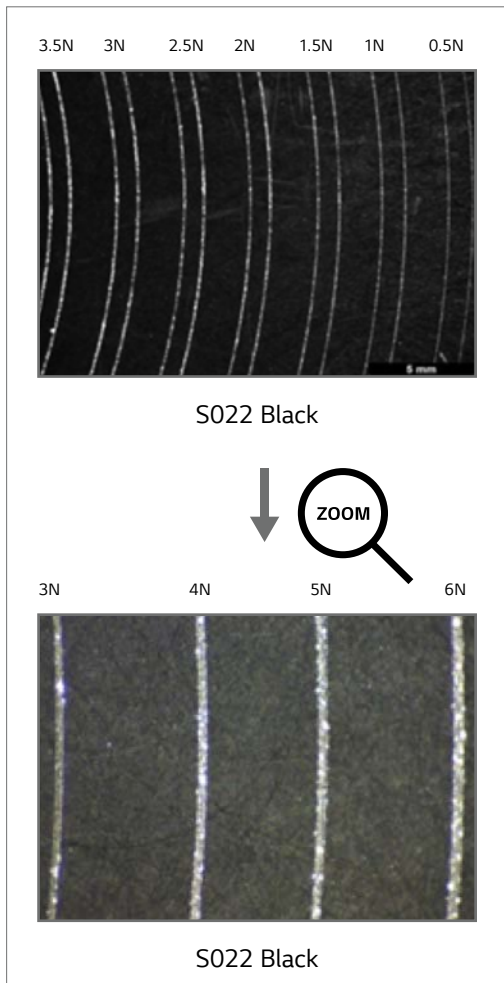
2.5.1 Comparison Tests

Intense Ultra Thermoforming Sheets do show a much less dust concentration as with Standard or many alternate products. It shows a more worker friendly fabrication environment.

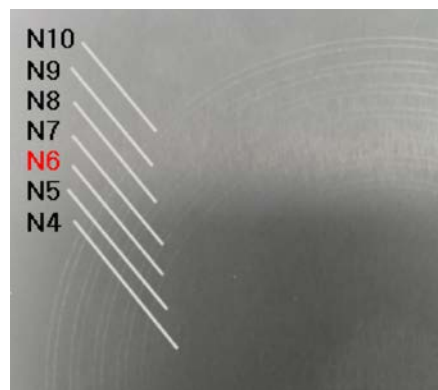


2.6 Scratch Comparison Tests

Improved Scratch Concealment



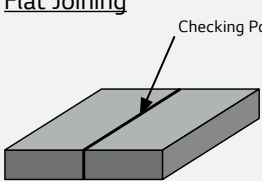

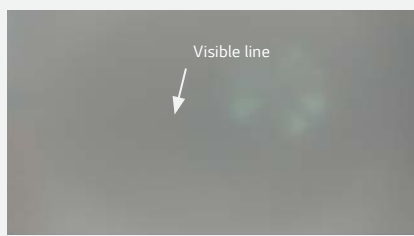
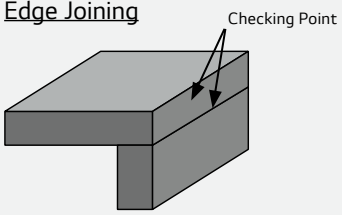


Up to level "N6" the sheet will be announced as more scratch resistance whilst above "N6" Level scratches will become more visible due to insensitivity of scratch pressure.



2.7 Seamline Comparison Test & Analyses

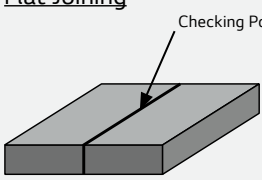

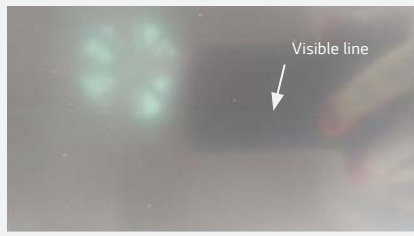
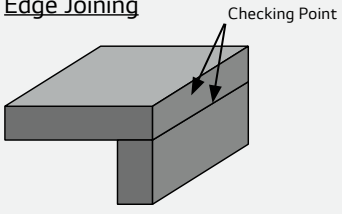
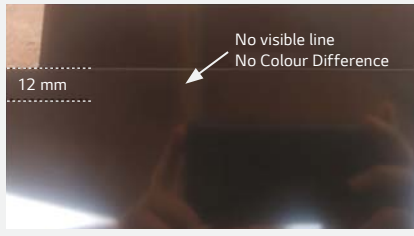
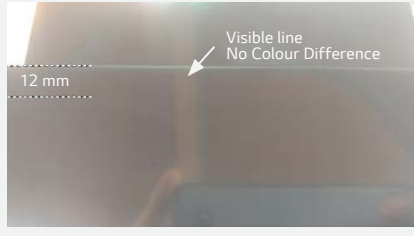
Intense Ultra Thermoforming Sheets also show a better Glue-Line capability for seams as the adhesive could be adjusted in a proper matter.

S924U vs. S117

	S924U	S117
<p>Flat Joining</p> 		
<p>Edge Joining</p> 		

- S924U: Small Colour difference was appeared at the section of the edge joining.

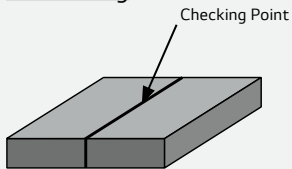
S922U vs. S022

	S922U	S022
<p>Flat Joining</p> 		
<p>Edge Joining</p> 		

- S922U: All good, No issue

S923U vs. S103

Flat Joining



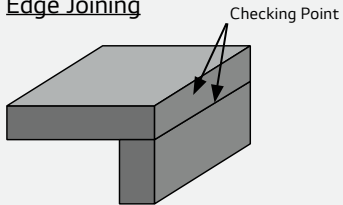
S923U



S103

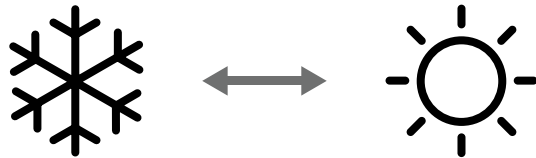


Edge Joining



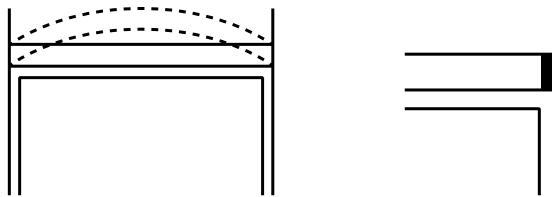
- S923U: Small Colour difference appeared at the section of the edge joining.

3. Thermal Expansion



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 HI-MACS[®] according to norm DIN EN 14851:

$$\Delta t = \text{ca. } 38 \times 10^{-6} / K$$

■ 4. Quality Check

- Check any fabricated item on quality aspects before leaving the workshop.
- Any mistakes can be repaired in the workshop at the time of fabrication.
Repairs needed at a later date will be more costly and time consuming.

Important:

Remember that the 15 Year Limited Installed Warranty does not cover any failures due to fabrication or installation mistakes.

5. Technical Specification Data

5.1 Technical Specification Data of Ultra Thermoforming Sheets

S928 ULTRA-THERMOFORMING ALPINE WHITE				
TEST ITEM	UNIT	SAMPLE	RESULT	TEST METHOD
Density and Specific Gravity ((23/23) °C)	–	–	1.72	ASTM D792-13 (Method A)
Rockwell Hardness (HRM)	–	–	82	ASTM D785-08 (2015) (Procedure A)
Barcol Hardness	–	–	63	ASTM D2583-13a
Tensile Strength	MPa	–	43.2	ASTM D638-14 (*)
Tensile Modulus of Elasticity	GPa	–	9.79	ASTM D638-14 (*)
Flexural Strength	MPa	–	67.9	ASTM D790-15e2 (**)
Flexural Modulus of Elasticity	GPa	–	9.30	ASTM D790-15e2 (**)
Izod Impact Strength	J/m	–	24	ASTM D256-10e1 (Method A)
Water Absorption (24 h Immersion)	%	–	0.02	ASTM D570-98 (2010) e1
Appearance (Discolouration) after Heat Resistance [(170 ±2)°C 1 h]	–	–	No Defects	Client Provided Test Method
Hot Water Resistance	–	–	No Defects	Client Provided Test Method (***)
Deflection Temperature Under Load (1.82 MPa)	°C	–	101	ASTM D648-16 (Method B)
Thermal Expansion	1/°C	–	3.8x10 ⁻⁵	KS M 3015: 2003
Pencil Hardness (Mitsubishi pencil)	–	–	9H	KS M ISO 15184: 2013

* Speed of Testing: 5.2 mm/min, Support Span: 190 mm, Number of Specimen: 4ea

** Specimen: Type I, Speed of Testing: 5 mm/min (Modulus: 1 mm/min)

*** Changing appearance after pour boiled water on the specimen surface.

5.2 Technical Specification Data for Intense Ultra

S922U INTENSE ULTRA BLACK				
TEST ITEM	UNIT	SAMPLE	RESULT	TEST METHOD
Density and Specific Gravity ((23/23) °C)	-	-	1.708	ASTM D792-13 (Method A)
Rockwell Hardness (HRM)	-	-	85	ASTM D785-08 (2015) (Procedure A)
Barcol Hardness	-	-	62	ASTM D2583-13a
Tensile Strength	MPa	-	46.2	ASTM D638-14 (*)
Tensile Modulus of Elasticity	GPa	-	10.2	ASTM D638-14 (*)
Flexural Strength	MPa	-	73.4	ASTM D790-17 (**)
Flexural Modulus of Elasticity	GPa	-	9.50	ASTM D790-17 (**)
Izod Impact Strength	J/m	-	20	ASTM D570-98 (2018)
Water Absorption (24 h Immersion)	%	-	0.02	ASTM D570-98 (2018)
Appearance (Crack) after Heat Resistance [(170 ±2) °C x 1 h]	-	-	No Defects	Client Provided Test Method
Appearance (Crack) after Hot Water Resistance	-	-	No Defects	Client Provided Test Method (***)
Temperature Under Flexural Load (1.82 MPa)	°C	-	99	ASTM D648-18 (Method B)
Thermal Expansion	1/°C	-	3.6 X 10 ⁻⁵	KS M 3015: 2003
Pencil Hardness (Mitsu bishi pencil)	-	-	8H	KS M ISO 15184: 2013

S923U INTENSE ULTRA GREY				
TEST ITEM	UNIT	SAMPLE	RESULT	TEST METHOD
Density and Specific Gravity ((23/23) °C)	-	-	1.722	ASTM D792-13 (Method A)
Rockwell Hardness (HRM)	-	-	86	ASTM D785-08 (2015) (Procedure A)
Barcol Hardness	-	-	62	ASTM D2583-13a
Tensile Strength	MPa	-	51.3	ASTM D638-14 (*)
Tensile Modulus of Elasticity	GPa	-	9.43	ASTM D638-14 (*)
Flexural Strength	MPa	-	71.7	ASTM D790-17 (**)
Flexural Modulus of Elasticity	GPa	-	10.0	ASTM D790-17 (**)
Izod Impact Strength	J/m	-	19	ASTM D570-98 (2018)
Water Absorption (24 h Immersion)	%	-	0.02	ASTM D570-98 (2018)
Appearance (Crack) after Heat Resistance [(170 ±2) °C x 1 h]	-	-	No Defects	Client Provided Test Method
Appearance (Crack) after Hot Water Resistance	-	-	No Defects	Client Provided Test Method (***)
Temperature Under Flexural Load (1.82 MPa)	°C	-	97	ASTM D648-18 (Method B)
Thermal Expansion	1/°C	-	4.1 X 10 ⁻⁵	KS M 3015: 2003
Pencil Hardness (Mitsu bishi pencil)	-	-	8H	KS M ISO 15184: 2013

* Speed of Testing: 5.2 mm/min, Support Span: 190 mm, Number of Specimen: 4ea

** Specimen: Type I, Speed of Testing: 5 mm/min (Modulus: 1 mm/min)

*** Changing appearance after pour boiled water on the specimen surface.

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