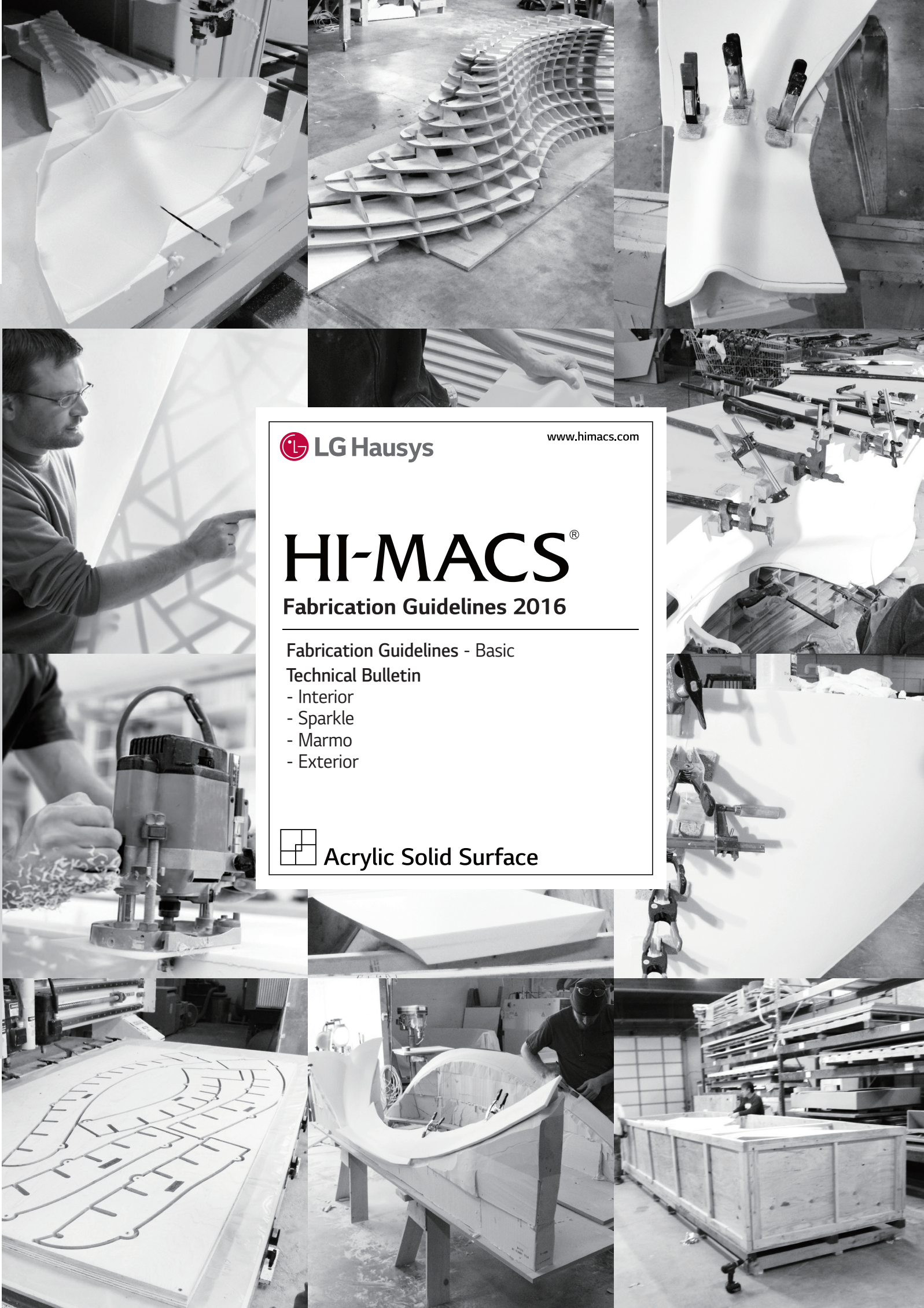

LG Hausys

www.himacs.com

HI-MACS®

Fabrication Guidelines 2016

Fabrication Guidelines - Basic
Technical Bulletin
- Interior
- Sparkle
- Marmo
- Exterior

Acrylic Solid Surface

HI-MACS® by LG Hausys

Foreword

This manual has been created to provide clear, simple and authoritative instructions with regards to the techniques to be used for the successful fabrication of HI-MACS Acrylic Solid Surface. The intention of this manual is to provide the most effective and time efficient methods. It is important that you take into account that the techniques listed in this manual have been designed to optimize the performance of HI-MACS according to its chemical formulation and exclusive performance. It is impossible to cover all the existing fabrication techniques in this manual. However, we have described and explained the basic elements of fabrication which comply to our LG Hausys warranty program. The fabrication guidelines manual does not intend to replace any testing you may need to conduct to determine the suitability of our products for your particular purposes and needs. LG Hausys assumes no intent nor responsibility for the end-use of the instructions and techniques mentioned in the fabrication guidelines manual on other products.

How to use this manual

The Fabrication Guidelines manual is organized into sections, each section covering a major element of HI-MACS fabrication. Within each section you will find defined divisions covering each aspect of the mentioned subject. For easy reference, a comprehensive index is included at the beginning of the fabrication guidelines manual.

Technical bulletins

Technical bulletins may be published from time to time by LG Hausys. At the end of the Fabrication Guidelines manual, you will find some empty sections where those technical bulletins can be inserted.

Introduction

LG Hausys, as part of LG Group, a leading global company, has the vision to exceed customer expectations through advanced technology and innovative solutions.

HI-MACS® is one of those products.

Creating a safe working environment is the most important goal in the markets where HI-MACS® is distributed and manufactured. At LG Hausys, we share this aim. Many different tools are used to manufacture, fabricate and install HI-MACS®. Following these simple safety rules will help to prevent any accident.

As a HI-MACS® Fabricator, we would ask and strongly recommend that you apply these safety rules as well as fabrication and installation guidelines.

HI-MACS® is the ideal choice for a wide range of applications including sink units, shower trays and shower walls, furniture, kitchen work surfaces, shop fitting in commercial and residential environments – let your imagination run wild!

HI-MACS® has a natural look and feel that evokes quality, strength and durability valued by consumers, architects and designers alike. Offering endless freedom, it can be sculpted into unique shapes and features from the simple to the sophisticated.

HI-MACS® - Creativity unlimited!

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Section 01.

Safety Rules

When handling HI-MACS®

Safety Rules

When Handling HI-MACS®

1.1 **For your own safety, read the HI-MACS® Fabrication Guidelines manual before operating the different tools.**

1.2 **Earth tools.** If a tool is equipped with a three-prong plug, it should be plugged into a three-hole electrical socket. If an adapter is used to accommodate a two-prong socket, the adapter lug must be connected to a true earth ground.
Never remove the third prong.

1.3 **Remove adjusting keys and wrenches.** Form the habit of checking to see that keys and adjusting wrenches are removed from the tool before turning to "on".

1.4 **Keep work area neat and clean.**

1.5 **Damp environment.** No tools should be used in wet and damp environments or exposed to rain. Keep your working area clean, dry and well ventilated, with adequate lighting.

1.6 **Visitors and children.** Keep all visitors and children at a safe distanc from the work area. Make the workshop childproof by removing starter keys, putting master switches and padlocks out of reach.

1.7 **Wear proper clothing.** No loose clothing, gloves, neckties, scarves, rings, bracelets or other jewellery that can get caught in moving parts should be worn. We recommend that you wear safety and non-slip footwear. Wear a protective hair covering to contain long hair as well as noise protectors.

1.8 **Use visors, goggles.** Standard glasses are not recommended as they do not have impact resistant lenses.

1.9 **Use a face or dusk mask if the cutting operation is dusty.**

1.10 **Secure work.** Use clamps or vices to hold work.
It is safer than using your hands when operating a tool.

Safety Rules

When Handling HI-MACS®

1.11 **Keep your proper footing and balance.** Do not overreach!

1.12 **Use the right tools and do not force tools.** Each tool has been designed to work at a specific speed. The job will be safer and better done.

1.13 **Tool maintenance.** Maintain tools in top condition: sharp and cleanfor the best and safest performance.

1.14 **Tool disconnection.** Disconnect tools before changing accessories such as blades, bits, cutters or before servicing.

1.15 **Accessories.** Use all recommended accessories. Hazards may be caused by the use of improper accessories.

1.16 **Switch.** Make sure the switch is in the off position before plugging in.

1.17 **Unattended tools.** Never leave tools running unattended – turn them off until they come to a complete stop.

1.18 **Alcohol, medication, drugs.** Do not use any tools under the influence of alcohol, medication or drugs.

1.19 **HI-MACS® sheets** should be carried by two persons, one at each end of the sheet. Do not flex the sheets. Wear heavy duty gloves and if appropriate, use lifting straps.

1.20 **Boxed products.** Do not stack them too high. Stack them in a way that is easy and safe to reach.

1.21 **Alcohol, adhesives, other toxic or flammable products.** Keep them in a safe, dry and well ventilated area.

Section 02.

Products

HI-MACS® Adhesive colors

Products

HI-MACS® Adhesive colors (1/2)

SOLID

HI-MACS		ADHESIVE	
S001	Satin White	H01	S/White
S002	Almond	H04	Peanut
S005	Grey	H03	Grey
S006	Arctic White	H02	A/White
S009	Cream	H121	Creemy
S022	Black	H45	V/Black
S025	Fiery Red	H18	Red
S026	Banana	H17	Banana
S027	Orange	H19	Orange
S028	Alpine White	H16	Al/White
S029	Ivory White	H32	Ivory
S033	Nordic White		
S034	Diamond White	H113	Diamond White
S100	Coffee Brown	H37	Mocha
S102	Babylon Beige	H52	Babylon Beige
S103	Concrete Grey	H53	Concrete Grey
S104	Toffee Brown	H54	Toffe Brown
S106	Lemon Squash	H104	Lemon Squash
S107	Mazarin Blue	H102	Mazarine Blue
S108	Marta Grey	H107	Mata Grey
S109	Steel Grey	H101	Steel Grey
S111	Dark Night	T09	Dark Night
S115	Deep Indigo	T08	Deep Indigo
S116	Festival Pink	H106	Festival Pink
S117	Midnight Grey	H109	Miud Grey
S201	Nougat Cream	H20 H04 (EU)	Cream Peanut (Eu)
S203	Sky Blue	H30	Dawn Misty
S212	Light Green	H56	Light Green
S302	Opal	T02	Opal
S303	Sapphire	T03	Sarrhire
S304	Ruby	T04	Ruby
S305	Emerald	T05	Emerald

LUCIA

HI-MACS		ADHESIVE	
W001	Ice Queen	H16	Al/White
W003	Shadow Queen	H58	Pebble Pearl
W004	Star Queen	H42	Merapi
W002	Cloud	H16	Al/White
W005	Pistachio	H20	Cream
W006	Macadamia	H34	I/Crystal
W007	Lentil	H20	Cream
W008	Acorn	H20	Cream
W009	Marron	H52	B/Beige
W010	Red Quinoa	H39	Latte

GRANITE

HI-MACS		ADHESIVE	
P001	Perna White	H21	P/White
P004	Perna Black	H07	Black
G001	Desert Sand	H04	Peanut
G002	Grey Sand	H03	Grey
G004	White Quartz	H36	Silver
G005	White Granite	H44	Mikeno
G007	Platinum Granite	H03	Grey
G008	Almond Pearl	H04	Peanut
G009	Black Sand	H42	Merapi
G010	Black Pearl	H07	Black
G015	Midnight Pearl	H10	Blue
G017	Grey Granite	H03	Grey
G019	Natural Quartz	H04	Peanut
G023	Natural Granite	H03	Grey
G030	Ivory Quartz	H04	Peanut
G031	Black Granite	H07	Black
G034	Arctic Granite	H36	Silver
G038	Sea Oat Quartz	H44	Mikeno
G042	Venetian Sand	H26	Sand Brown
G047	Black Bird	H07	Black
G048	Beach Sand	H04	Peanut
G050	Tapioca Pearl	H36	Silver
G053	Stardust Granite	H07	Black
G058	Moonscape Quartz	H04	Peanut
G063	Allspice Quartz	H14	Sephia
G065	Tundra Quartz	H02	Arctic White
G074	Mocha Granite	H37	Mocha
G100	Peanut Butter	H04	Peanut
G101	Crystal Beige	H01	S/White
G102	Grey Crystal	H03	Grey
G103	Grey Onix	H65	Grey Onyx
G105	Brown Pearl	H35	Dark
G106	Riviera Sand	H20	Cream
G107	Pebble Pearl	H58	P/Pearl
G108	Lunar Sand	H36	Silver
G109	Beige Island	H34	Ivory Crystal
G110	Corona	H36	Silver
G111	Macchiato	H20	Cream
G112	Caramel	H20	Cream
G113	Iceberg	H36	Silver
G114	Clay	H62	Clay
G117	Cappuccino	H52	Babylon Beige
G259	Persian Cream	H36	Silver
G260	Persian Sand	H26	Sand Brown
G235	Candy White	H24	Candy White
G130	Vanilla Sugar	H02	A/White
G131	Oatmeal	H116	Oatmeal
G132	Walnut	H117	Walnut
G133	Cinnamon	H119	Cinnamon
G134	Wholegrain	H118	Wholegrain
P101	Kreemy Grey	H112	Kreemy Grey
P100	Key Lime	H110	Key Lime
P103	Kandy Pink	T14	Kandy Pink
P104	Kanada Violet	H10	Blue
P105	Kopp	H37	Mocha
P106	Koal	H42	Merapi
P102	Kold Silver	H111	Kold Silver

Products

HI-MACS® Adhesive colors (2/2)

VOLCANICS

HI-MACS		ADHESIVE	
VE01	Tambora	H20	Cream
VW01	Gemini	H36	Silver
VA01	Santa Ana	H03	Grey
VE04	Maroa	H20	Cream
VE02	Mikeno	H44	Mikeno
VB02	Cima	H45	V/Black
VA22	Frosty	H03	Grey
VB21	Taos	H48	Taos
VE26	Shasta	H52	Babylon Beige
VG21	Maui	H49	Maui
VL21	Santorini	H10	Blue
VN24	Kohala	H67	Jupiter
VR21	Stellar	H47	Steller

ASTER(GALAXY)

HI-MACS		ADHESIVE	
T001	Black Hole	H35	Dark
T002	Uranus	H60	Uranus
T004	Saturn	H37	Mocha
T008	Jupiter	H67	Jupiter
T010	Nebula	H02	A/White
T011	Venus	H01	S/White
T016	Mars	H34	Ivory Crystal
T017	Andromeda	H16	Al/White
T018	Carina	H02	A/White
T019	New Moon	H01	S/White
T020	Hercules	H22	P/Grey
T024	Spica	H36	Silver
T025	Capella	H04	Peanut
T026	Rigel	H60	Uranus

MARMO

HI-MACS		ADHESIVE	
M103	Bologna	H34	Ivory Crystal
M104	Roma	H22	P/Grey
M105	Verona	H61	Verona
M201	Terni	H68	Terni
M203	Lucca	H50	Kohala
M205	Parma	H39	Latte
M206	Monza	H07	Black
M207	Pisa	H46	Hekla
M301	Siena	H50	Kohala
M302	Pompei	H35	Dark
M303	Capri	H62	Clay
M304	Bari	H39	Latte
M305	Modena	H52	Babylon Beige
M309	Savona	H116	Oatmeal
M306	Breeze White	H02	A/White
M307	Mist	H01	S/White
M401	Veladero	H52	Babylon Beige
M402	Goldstrike	H115	Coloseum
M403	Cortez	H35	Dark
M322	Pantheon	H114	Pantheon
M323	Colosseum	H115	Coloseum
M351	Milan	H02	A/White
M352	Vernazza	H34	Ivory Crystal
M411	Messina		
M412	Foggia		

Section 03.

Product Specifications

Sheet Specifications

Specification Data Sheets

Chemical Resistance

Product Specifications

Sheet Specification

Sheet thickness in mm	Sheet width in mm				Sheet length in mm		
3			930			3000*	
6	760				2490		
6		910			2490*		
9	760						3680
9		910					3680*
12	760						3680
12		910					3680*
12				1350			3680*
19	760						3680*

* only available in S28 Alpine White

Weight /m²	Thickness	Solids/ Lucents	Unit	Textured colours*	Unit
	3 mm	5,25	kg		
	6 mm	10,50	kg	9,9	kg
	9 mm	15,64	kg	14,85	kg
	12 mm	21	kg	19,80	kg
	19 mm	33,25	kg		

* Pearls, Sands, Quartz, Granite, Volcanics, Marmo, Galaxy, Sparkle, Eden

Weight/Sheet	Thickness	Width / Length	m²/Sheet	kg/ Sheet
Solid	3mm	930 / 3000	2,7900	14,65
	6 mm	760 / 2490	1,8924	19,87
	6 mm	910 / 2480	2,2660	23,79
	9 mm	760 / 3680	2,7968	43,75
	9 mm	910 / 3680	3,3488	52,37
	12 mm	760 / 3680	2,7968	58,74
	12 mm	910 / 3680	3,3488	72,43
	12 mm	1350 / 3680	4,9680	104,34
	19 mm	760 / 3680	2,7968	93,00
Pearl, Sand, Quartz, Granite	6 mm	760 / 2490	1,8924	18,73
	9 mm	760 / 3680	2,7968	41,53
	12 mm	760 / 3680	2,7968	55,38
Volcanics	12 mm	760 / 3680	2,7968	56,60
Lucent	6 mm	760 / 2490	1,8924	19,87
	12 mm	760 / 3680	2,7968	58,74
Marmo, Galaxy	12 mm	760 / 3680	2,7968	55,38
Eden	12 mm	760 / 3680	2,7968	55,38
Sparkle	12 mm	760 / 3680	2,7968	55,38

Product Specifications

Specification Data Sheets (1/2)

Specification	Unit	Result		Test methods
		Solids	Granite	
Flexural-E-modulus	MPa	8900	7730	DIN EN ISO 178
Flexural strength	MPa	70.1	64.3	ASTM D638
Breaking elongation	%	1	1.1	DIN EN ISO 178
Tensile strength	MPa	69.5	56.3	DIN EN ISO 527
Density	g/cm^3 kg/m^3	1.75 1750	1.65 1650	ISO 1183 ISO 1183
Ball indentation hardness	N/mm^2	257	239	DIN EN ISO 2039-1
Mohs hardness		2 to 3	2 to 3	EN 101
Pencil hardness		>9H	>9H	ISO 15184
Water absorption weight strength/thickness		 <0,1% <0,1%	 <0,1% <0,1%	DIN EN 438 Part 12
Impact resistance impactor drop ball test (fall height)	 N mm	 ≥ 25 ≥ 1500	 ≥ 25 ≥ 1500	 E DIN EN 438, 02/02 Part 2/20 E DIN EN 438, 02/02 Part 2/21
Slip resistance		>0,32 – 0,9		GMG100 (replaces R9)
Slip resistance		angle of acceptance of more than 10° to 19° = R10		DIN 51130
Climate change resistance	°C	≥ 0,05	≥ 0,05	AMK
Dry heat (pan base)	°C	≥ 100 (7C)		DIN 68 861, Part 7, 04-'85
Damp heat (pan base)	°C	≥ 100 (7C)		DIN 68 861, Part 8, 04-'85
Temperature change resistance	°C	no change		UNI 9429
Resistance to cigarette burns		6C	6B	DIN 68 861, Part 6, 11-'82
Scratch resistance		4D	4B	DIN 68 861, Part 4, 11-'81
Electrostatics conductivity resistance	$>1x10^{12}\ \Omega$	insulating non-conductive		DIN IEC 1340-4-1, 04-'92 EN 61340-5-1
Thermal conductivity	W/mK	0.636	0.55	DIN EN 12664
Thermal resistance	m^2K/W	0.038	0.045	DIN EN 12664
Thermal expansion co-efficient	mm/mK m/m/°C	0.048 30.0×10^{-6}	0.055	DIN EN 14581
Water vapor transmission properties – diffusion resistance factor	μ	18607	16150	DIN EN ISO 12572

Product Specifications

Specification Data Sheets (2/2)

Specification	Unit	Result		Test methods
		Solids	Granite	
Dimensional change by change in relative humidity length thickness mass	 % % %	 -0.03 0.06 0.05	 -0.02 0.03 0.05	DIN EN 318, edit. 5, 1998
Resistance to boiling water increase in weight increase in thickness	 % %	 <0,1 <0,1	 >0,1 <0,1	E DIN EN 438, 02/02 Part 2/12
Light fastness (Xenon)	scale 0 – 10	better than 6	better than 6	DIN 53 387, 04-'89
Food tolerance		suitable for all colours		LMBG § 31
Hygiene		suitable	suitable	LGA Hygiene Certificate
Fire protection classification Flame-retardant properties MPA/NRW HI-MACS® MPA/NRW (BAM) 12 mm (BAM) 9 mm + back-up (Bodycote/Warrington) 12 mm		B1 non-dripping material B1 for all colours* B1 for all colours* B-s1 , d0 for all HI-MACS® colours* complies with BS 476 class 0		DIN 4102-1 DIN 5510 DIN 4102-1 BS EN ISO 11925-2 : 2002 BS EN 13823: 2002
* not currently applicable to Marmo, Galaxy, Volcanics, Lucent, Eden, and Sparkle				

Product Specifications

Chemical Resistance

According to DIN 68861 & DIN 68930 Tab.1

Test material	Application time	Evaluation of G02 changes	Evaluation of S02 changes
Acetic acid (vinegar)	16 hrs	no change	no change
Citric acid (lemon)	16 hrs	no change	no change
Sodium carbonate	16 hrs	no change	no change
Ammonium hydroxide	16 hrs	no change	no change
Ethyl alcohol	16 hrs	no change	no change
White wine, red wine	16 hrs	no change	no change
Beer	16 hrs	not tested	not tested
Cola drinks	16 hrs	no change	no change
Instant coffee	16 hrs	no change	no change
Black tea	16 hrs	no change	no change
Blackcurrant juice	16 hrs	no change	no change
Cream	16 hrs	no change	no change
Water	16 hrs	no change	no change
Petrol	16 hrs	no change	no change
Acetone	16 hrs	3	3
Ethyl butyl acetate	16 hrs	3	3
Butter	16 hrs	no change	no change
Olive oil	16 hrs	no change	no change
Mustard	16 hrs	no change	no change
Salt	16 hrs	no change	no change
Onion	16 hrs	no change	no change
Lipstick	16 hrs	no change	no change
Common household disinfectant	16 hrs	no change	no change
Black ballpoint	16 hrs	2	2-3
Stamping ink	16 hrs	1	1
Household cleaner	16 hrs	no change	no change
Cleaning agent	16 hrs	no change	no change
Wear resistance group to DIN 68861		1B	1B
Evaluation according to DIN 68930 Tab. 1 Other work surfaces: wear resistance group: "1C"		Requirement met +	according to DIN 68861 & DIN 68930

* 1A = Excellent; 1F = very bad 0 = no visible result; 5 = damaged

Section 04.

Health & Safety

Material Safety Data Sheet / Sheet

HI-MACS® Joint Adhesive Kit - Component A

HI-MACS® Joint Adhesive Kit - Component B

Health & Safety

Material Safety Data Sheet

4.1 LG Hausys, LTD.
Solid Surface Material Division

One IFC Building 18F
10 Gookjegeumyoong-Ro, Yeongdeunngpo-Gu,
Seoul 150-876, Korea
Tel.: 82 (0)2 6930-0825

4.2 Composition and Information on Ingredients

	Product no.	% by weight	TLV/PE	LC50/LD50
Alumina Trihydrate	21645-51-2	52-62	15mg/m3 OSHA PEL 10mg/m3 ACGIH TLV	not available
MMA – Methyl Methacrylate	80-62-6	30-50	not available	not available
Copolymer colourants	not available	1-5	not available	not available

4.3 Section 03 Hazard Identification Overview

With solid sheets of all colours, dust caused by machining may cause irritation to the skin, eyes and respiratory system. Routes of Entry: inhalation (dust during machining), eyes, skin contact

Potential ACUTE Health effects	The product will not easily enter the human body. The product is supplied as a solid sheet. As such, there would not be any health hazards with it however, if any cutting, sanding or routing takes place, dust may be generated that may cause mechanical irritation to the eyes and respiratory tract.
Eyes :	Dust generated during fabrication may irritate the eyes.
Skin :	Any sharp edge will cut or abrade the skin. Dust generated by fabrication may cause skin sensitization . High concentrations of methacrylate have been shown to cause allergic reactions.
Respiratory Tract:	Dust generated during fabrication may cause irritation to the respiratory tract, characterized by sneezing and coughing. May cause headache in case of long term exposure.

Health & Safety

Material Safety Data Sheet

Potential CHRONIC health effects	Non-hazardous to skin (non-corrosive and non-permeating) or by ingestion.
Carcinogenic effects:	None
Mutagenic effects:	No substance present
Teratogenic effects:	None. Is NOT toxic to the blood, kidneys, lungs, nervous system, reproductive system, liver, mucous members.
Symptoms of over-exposure:	None
Medical problems	None

4.4 First Aid Measures

Eye Contact	Upon contact with dust particles, flush eyes immediately with large amounts of water for a minimum of 15 minutes. Seek medical attention.
Skin Contact	Not expected to be a problem. May cause skin sensitisation. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. If irritation persists, seek medical attention.
Inhalation	Repeated or prolonged inhalation of dust may lead to chronic respiratory irritation. Allow the victim to rest in a well ventilated area. Oxygen may be administered if breathing is difficult. Seek medical attention
Ingestion	Not applicable
Notes to Physician	No additional information

Health & Safety

Material Safety Data Sheet

4.5 Fire and Explosion Data

Flammability of the Product	Non-flammable
Flash Points	Not available L.E.L. & U.E.L.-not available.
Self-combustion Temperature	Not available
Combustible Products	Some metallic oxides.
Fire Risks in the Presence of Various Substances (Flammability)	Substances (Flammability) Non-flammable in the presence of shocks, heat, oxidizing materials, reducing materials com- bustible materials, organic materials, metals, acids, alkalis, moisture
Explosion Risk with Different Substances	Not considered an explosion-risk product
Fire Fighting Media and Instructions Small Fire :	Use DRY chemicals,COO, water spray or
Large Fire :	Use water spray, fog, or foam, DO NOT use water jet.
Special Remarks on Fire Hazards	No additional remarks
Special Remarks on Explosion	No additional remarks

4.6 Accidental Release Measures

Small Spill	Use appropriate toolsto transfer the dropped solid into a convenient waste disposal contai - ner. No additional information.
Lage Spill	No additional information

Health & Safety

Material Safety Data Sheet

4.7 Handling and Storage

Precautions	Do not breathe in the dust. If work creates dust, ventilate the area to keep exposure to airborne contaminates below the exposure limit.
Storage	No specific storage is required. Be sure that it is not necessary to strain to reach materials, and that shelves are not overloaded.

4.8 Physical and Chemical Properties

Engineering Controls	If work (machining, routing, sanding) creates dust, ventilate the area to keep exposure to airborne contaminants below the exposure limit.
Personal Protection	Safety glasses. Gloves to protect against cuts and abrasions are highly recommended. Wear appropriate breathing apparatus if ventilation is inadequate (NIOSH approved).
Exposure Control	Not available.

4.9 Exposure Controls/Personal Protection

Odour/Odourless	Taste not available	Colour varies	Not available
Physical state and appearance	Solid	Volatility	Not available
Molecular Weight	applicaple	Odour Threshold	Not available
PH (1% soln/water)	applicaple	Evaporation rate	Not available
Boiling Point	Not available	Viscosity	Not available
Melting Point	Not available	Water Oil Dist.Coeff	Insoluble in water and oil
Specific Gravity	0.04 (water = 1) based on informa - tion available	Solubility in water	Insoluble in water
Vapor Pressure	Not available	Solubility in solvents	Insoluble in methanol, diethyl ether, n-octanol acetone

Health & Safety

Material Safety Data Sheet

4.10 Stability and Reactivity Data

Stability	The product is stable.
Conditions of Instability	No additional remarks
Chemical Instability/ Materials to Avoid	Not considered to be reactiveaccording to our database.
Corrosivity	Not considered to be corrosive for metals and glass according to our database..
Special Remarks/ Conditions of Reactivity	No additional remarks
Special Remarks on Corrosivity	No additional remarks
Hazardous Decomposition	Not available
Hazardous Polymerisation	Yes

4.11 Toxicological Information

Mechanical Controls	This product has not been tested for its effects on animals. See Section 11 for ingredient information.
Personal Protection	The substance is not toxicto the blood, kidneys, lungs, nervous system, reproductive system, liver, mucous membranes. No additional information.
Exposure Limits	

4.12 Ecological Information

Ecotoxicity	Not available
BODS and COD	Not available
Toxicity of the Biodegradable Products	Not available
Special Remarks on the Biodegradable Products	No additional remarks

Health & Safety

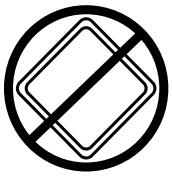
Material Safety Data Sheet

4.13 Disposal

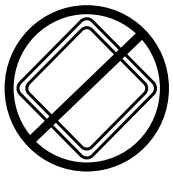
Waste Disposal	Use appropriate tools to put the solid in a convenient waste disposal container.

4.14 Transport Information

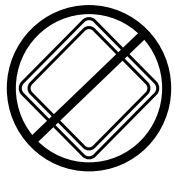
DOT/TDG Classification	Not a DOT controlled material (United States)
DOT/TDG Proper Shipping Name	Not regulated.
DOT/Identification Number TDGPIN	Not applicable.
Packing group	No reportable quantity of hazardous substance (RQ).



DOT (Pictogram)



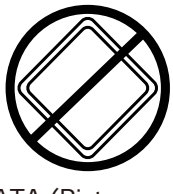
TOG (Pictogram)



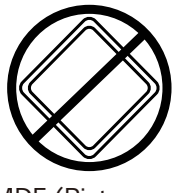
ADR (Europe, Pictogram)

Special Provision For Tranport

IATA (Air Transport)		IMDC (OceanTransport)	
Proper Shipping Name	Not regulated	Proper Shipping Name	Not regulated
Hazard Class	Not controlled under IATA	Hazard Class	Not controlled under IDMG
Identification Number	Not applicable	Identification Number	Not applicable
Packing Group	None	Packing Group	Not applicable



IATA (Pictogram)



IMDF (Pictogram)

4.15 Other Regulatory Information and Pictograms

Federal Regulations	TSCA (Toxic Substance Control Act): All components of this product are listed on the TSCA Inventory.
	Resource Conservation & Recovery Act (RCRA)
	(40 CFR 261) Regulated; not Available
	CERCI. A Reportable Quantity (RQ) amount; none (lbs)
	This product may contain one or more of the following chemicals subject to the reporting requirements of SECTION313 of TITLE III of the SUPERFUND AMENDMENT ANDREAUTHORISATION ACT of 1986 (SARA) and 40 CFR Part 372
	Cas Number, Chemical Name: NONE

Other Classifications

WHMIS STATEMENT	This product has been classified according to the hazard criteria ofthe CPR and the MSDS contains all the information required by the CPR
WHMIS (Canada) (Pictogram)	 Not controlled under WHMIS (Canada)
DSCL (ECC) (Europe) (Pictogram)	 Not controlled under USCL (Europe)
Japan	Not available
Australia	Not available
Additional Information	No additional remarks
HMIS (U.S.A.)	Health Hazard : 1 Reactivity : 0 Fire Hazard : 0 Personal Protection: A
National Fire Protection Association (USA)	 Hazard Rating : 4 = Extreme, 3 = High, 2= Moderate, 1 = Slight, 0 = Minimal (Insignificant)
Protective Clothing (Pictogram)	

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Material Safety Data Sheet

4.16 Other Information

References	SAX, N.I Dangerous Properties of Industrial Materials, Toronto, Van Nostrand Reinold, 60 cd. 1984 Industrial Hygiene and Toxicology. Manufacturer's Material Safety Data Sheet.
Glossaire	
AGC :	American Conference of Governmental Industrial Hygienists
ASTM :	American Society for Testing and Materials
BODS :	Biological Oxygen Demand in 5 days
CAS :	Chemical Abstract Services
CEPA :	Canadian Environmental Protection Act
CERCLA :	Comprehensive Environmental Response, Compensation and Liability Act
CFR :	Code of Federal Regulations
DOT :	Department of Transportation
DIN :	Deutsche Institut für Normung
DSL :	Domestic Substance List (Canada)
HCS :	Hazardous Communication System
HMTS :	Hazardous Material Information System
IARC :	International Agency for Research on Cancer
ISO :	ISO International Organisation for Standardisatio
DL50/CL50 :	Lethal Dose/Concentration kill 50%
DLLo/LCLo :	Lowest Published Lethal Dose/Concentration
NFPA :	National Fire Prevention Association
NIOSH :	National Institute for Occupational Safety & Health
NTP :	National Toxicology Program
OSHA :	Occupational Safety & Health Administration
PEL :	Permissible Exposure Limit (15 minutes)
RCRA :	RESOURCE Conservation and Recovery Act
STEL :	Short Term Exposure Limit (15 minutes)
TDG :	Transportation of Dangerous Goods (Canada)
TLV :	Threshold Limit Value
TWA :	Time Weighted Average
TSCA :	Toxic Substances Control Act
WHMIS :	Workplace Hazardous Material Information System
Consideration	No additional Remark
Revision	Annual update.
Comments	Telephone number changes.
Notice to reader	The data contained in the MSDS and recommendations presented herein are based upon information considered to be accurate, as of this date. However, LG Hausys makes no guarantee or warranty, either expressed or implied, of the completeness of this data and recommendations, and assumes no liability in connection with any use of this informa tion.

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HI-MACS® Joint Adhesive Kit - Component A [Safety Data Sheet]

SECTION 1:
IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier: HI-MACS® JOINT ADHESIVE KIT - COMPONENT A

1.2 Relevant identified uses of the substance or mixture and uses advised against:

· Relevant identified uses: Adhesive.
· Uses advised against: Do not use in medical applications involving permanent implantation in the human body.

1.3 Details of the supplier of the safety data sheet:

LG Hausys Ltd.

E-mail address for a competent person responsible for the safety data sheet:

Mr. Hyoungkeun Choi
winlife98@lghausys.com

SECTION 2:
HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture:

2.1.1 Classification according to Regulation (EC) No 1272/2008:

Flammable liquid:	Flam. Liq. 2, H225
Skin corrosion/irritation:	Skin Irrit. 2, H315
Serious eye damage/eye irritation:	Eye Irrit. 2, H319
Skin sensitization:	Skin Sens. 1, H317
Specific target organ toxicity – single exposure: (respiratory tract irritation)	STOT SE 3, H335

2.1.2 Classification according to Directive 1999/45/EC:

Highly flammable:	F; R11
Irritant:	Xi; R36/37/38
Sensitising:	R43

2.1.3 Additional information:

For full text of R-phrases and hazard statements: see SECTION 16.

2.2 Label elements:

· **Labelling according to Regulation (EC) No 1272/2008:**

· **Hazard pictograms:**

· **Signal word:** Danger

· **Hazard statements:**

- H225 Highly flammable liquid and vapour.
- H315 Causes skin irritation.
- H317 May cause an allergic skin reaction.
- H319 Causes serious eye irritation.
- H335 May cause respiratory irritation.

· **Precautionary statements:**

- P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
- P261 Avoid breathing vapours.
- P280 Wear protective gloves/protective clothing/eye protection/face protection.
- P333+P313 If skin irritation or rash occurs: Get medical advice/attention.
- P363 Wash contaminated clothing before reuse.
- P337+P313 If eye irritation persists: Get medical advice/attention.
- P403+P233+P235 Store in a well-ventilated place. Keep container tightly closed. Keep cool.
- P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

· **Hazardous ingredients for labelling:** Methyl methacrylate.

2.3 Other hazards: There is no additional information.

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HI-MACS® Joint Adhesive Kit - Component A [Safety Data Sheet]

SECTION 3:
COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances: Not relevant.

3.2 Mixtures: Description of the mixture: Synthetic resin(s) and filler(s).
The mixture contains these substances:

Substance name	EC/CAS No.	Classification				Conc. (%)
		67/548/EEC	CLP			
			Hazard Class and Category Code(s)	Hazard statement	Pictogram/ Signal word	
Methyl methacrylate[1,D]	201-297-1 / 80-62-6	Highly flammable F; R11 Irritant Xi; R36[2]/37/38 Sensitising R43	Flam. Liq. 2 Skin Irrit. 2 Eye Irrit. 2[2] Skin Sens. 1 STOT SE 3	H225 H315 H319[2] H317 H335	GHS02 GHS07 Dgr	28.7
Titanium dioxide [1]	236-675-5/ 13463-67-7	–	–	–	–	<1.2
Carbon black [1]	215-609-9/ 1333-86-4	–	–	–	–	<1.2

1 Substance with workplace exposure limits.
2 Classification according to manufacturer.
Note D: Certain substances which are susceptible to spontaneous polymerisation or decomposition are generally placed on the market in a stabilised form. It is in this form that they are listed in Part 3. However, such substances are sometimes placed on the market in a non-stabilised form. In this case, the supplier must state on the label the name of the substance followed by the words 'non-stabilised'. For full text of H-statements and R-phrases: see SECTION 16.

SECTION 4:
FIRST AID MEASURES

4.1 Description of first aid measures:

General advice

Do not leave affected person unattended. Remove victim out of the danger area. Keep affected person warm, still and covered. Take off immediately all contaminated clothing. In all cases of doubt, or when symptoms persist, seek medical advice. In case of unconsciousness place person in the recovery position. Never give anything by mouth.

Following inhalation

If breathing is irregular or stopped, immediately seek medical assistance and start first aid actions. In case of respiratory tract irritation, consult a physician. Provide fresh air.

Following skin contact
Wash with plenty of soap and water.

Following eye contact
Remove contact lenses, if present and easy to do. Continue rinsing. Irrigate copiously with clean, fresh water for at least 10 minutes, holding the eyelids apart.

Following ingestion
Rinse mouth with water (only if the person is conscious). Ingest activated charcoal. Do NOT induce vomiting. Call a physician immediately.

4.2 Most important symptoms and effects, both acute and delayed:
Symptoms and effects are not known to date.

4.3 Indication of any immediate medical attention and special treatment needed: None.

SECTION 5:
FIREFIGHTING MEASURES

5.1 Extinguishing media:

Suitable extinguishing media: water spray, alcohol resistant foam, dry chemical, carbon dioxide (CO2).

Unsuitable extinguishing media: water jet.

5.2 Special hazards arising from the substance or mixture: In case of insufficient ventilation and/or in use, may form flammable/explosive vapour-air mixture. Solvent vapours are heavier than air and may spread along floors. Places which are not ventilated, e.g. unventilated below ground level areas such as trenches, conduits and shafts, are particularly prone to the presence of flammable substances or mixtures.

Hazardous combustion products: nitrogen oxides (NOx), carbon monoxide (CO), carbon dioxide (CO2).

5.3 Advice for firefighters: In case of fire and/or explosion do not breathe fumes. Co-ordinate firefighting measures to the fire surroundings. Do not allow firefighting water to enter drains or water courses. Collect contaminated firefighting

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HI-MACS® Joint Adhesive Kit - Component A [Safety Data Sheet]

SECTION 6:
ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures:

For non-emergency personnel: Ensure adequate ventilation. Use personal protective equipment. Remove all sources of ignition. Remove persons to safety. For emergency responders: Wear breathing apparatus if exposed to vapours.

6.2 Environmental precautions:

Keep away from drains, surface and ground water. Retain contaminated washing water and dispose it.

6.3 Methods and material for containment and cleaning up:

Wipe up with absorbent material (e.g. cloth, fleece). Collect spillage (sawdust, diatomite, sand, universal binder). Place in appropriate containers for disposal. Ventilate affected area.

6.4 Reference to other sections:

Hazardous combustion products: see section 5.
Personal protective equipment: see section 8.
Incompatible materials: see section 10.
Disposal considerations: see section 13.

SECTION 7:
HANDLING AND STORAGE

7.1 Precautions for safe handling:

Use local and general ventilation. Keep away from sources of ignition – No smoking. Take precautionary measures against static discharge. Use only in well-ventilated areas. Due to danger of explosion, prevent leakage of vapours into cellars, flues and ditches. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting equipment. Use only non-sparking tools. Places which are not ventilated, e.g. unventilated below ground level areas such as trenches, conduits and shafts, are particularly prone to the presence of flammable substances or mixtures. Vapours are heavier than air, spread along floors and form explosive mixtures with air. Vapours may form explosive mixtures with air. Wash hands after use. Do not to eat, drink and smoke in work areas. Remove contaminated clothing and protective equipment before entering eating areas. Never keep food or drink in the vicinity of chemicals. Never place chemicals in containers that are normally used for food or drink. Keep away from food, drink and animal feedingstuffs.

7.2 Conditions for safe storage, including any incompatibilities:

Keep container tightly closed and in a well-ventilated place. Use local and general ventilation. Keep cool. Protect from sunlight. Keep away from sources of ignition - No smoking. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. Take precautionary measures against static discharge. Ground/bond container and receiving equipment.

7.3 Specific end use(s): No data available.

SECTION 8:
EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters:

Occupational exposure limit values listed in EH40/2005 Workplace exposure limits:

Substance	CAS Number	Workplace exposure limit				Comments
		Long-term exposure limit (8-hr TWA reference period)		Short-term exposure limit (15-minute reference period)		
		ppm	mg/m ^{3}	ppm	mg/m ^{3}	
Methyl methacrylate	80-62-6	50	208	100	416	–
Titanium dioxide total inhalable respirable	13463-67-7	–	10	–	–	–
Carbon black [1]	1333-86-4	–	3.5	–	7	–

8.2 Exposure controls:

8.2.1 Appropriate engineering controls: General ventilation.

8.2.2 Individual protection measures, such as personal protective equipment:

8.2.2.1 Eye/face protection: Wear eye/face protection.

8.2.2.2 Skin protection:

Hand protection: Wear suitable gloves. Chemical protection gloves are suitable, which are tested according to EN 374. Check leak-tightness/ impermeability prior to use. In the case of wanting to use the gloves again, clean them before taking off and air them well. For special purposes, it is recommended to check the resistance to chemicals of the protective gloves mentioned above together with the supplier of these gloves.

Other: Take recovery periods for skin regeneration.
Preventive skin protection (barrier creams/ointments) is recommended. Wash hands thoroughly after handling.

8.2.2.3 Respiratory protection: In case of inadequate ventilation wear respiratory protection.

8.2.2.4 Thermal hazards: No data available.

8.2.3 Environmental exposure controls: Use appropriate container to avoid environmental contamination. Keep away from drains, surface and ground water.

SECTION 9:
PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties:

Appearance	liquid colour: various
Odour	acrylic
Odour threshold	no data available
pH	not applicable
Melting point/freezing point	no data available
Initial boiling point and boiling range	no data available
Flash point	10°C (closed cup)
Evaporation rate	no data available
Flammability (solid, gas)	not applicable
Upper/lower flammability or explosive limits	2.1 vol. % (lower) 12.5 vol. % (upper)
Vapour pressure (20°C)	39 hps
Vapour density	no data available
Relative density	1.20 - 1.24 kg/l
Solubility(ies)	partially miscible in water
Partition coefficient: n-octanol/water	no data available
Auto-ignition temperature	430°C
Decomposition temperature	no data available
Viscosity	no data available
Explosive properties	no data available
Oxidising properties	no data available

9.2 Other information: No data available.

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HI-MACS® Joint Adhesive Kit - Component A [Safety Data Sheet]

SECTION 10
STABILITY AND REACTIVITY

10.1 Reactivity: Concerning incompatibility: see below "Conditions to avoid" and "Incompatible materials".
The mixture contains reactive substance(s): risk of ignition.

10.2 Chemical stability: No decomposition if stored and applied as directed.

10.3 Possibility of hazardous reactions: No data available.

10.4 Conditions to avoid: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. UV radiation/ sunlight.

10.5 Incompatible materials: Oxidisers - reducing agents.

10.6 Hazardous decomposition products: Methyl methacrylate monomer.

SECTION 11
TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects:
Test data are not available for the complete mixture.

Substances:
Methyl methacrylate
Acute toxicity: LD50, oral: 7872 mg/kg (RTECS, 47796)

Mixtures:
Acute toxicity: Based on available data, the classification criteria are not met.
Skin corrosion/irritation: Causes skin irritation.
Serious eye damage/irritation: Causes serious eye irritation.
Respiratory or skin sensitisation: May cause an allergic skin reaction.
Germ cell mutagenicity: Based on available data, the classification criteria are not met.
Carcinogenicity: Based on available data, the classification criteria are not met.
Reproductive toxicity: Based on available data, the classification criteria are not met.
Specific target organ toxicity (STOT) - single exposure: May cause respiratory irritation.
Specific target organ roxicity (STOT) - repeated exposure: Based on available data, the classification criteria are not met.
Aspiration hazard: Based on available data, the classification criteria are not met.
Other information: Repeated and prolonged exposure to solvents may cause brain and nervous system damage.

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HI-MACS® Joint Adhesive Kit - Component A [Safety Data Sheet]

SECTION 12
ECOLOGICAL INFORMATION

12.1 Toxicity: Mixture is not classified as hazardous to the aquatic environment.

12.2 Persistence and degradability: No data available.

12.3 Bioaccumulative potential: No data available.

12.4 Mobility in soil: No data available.

12.5 Results of PBT and vPvB assessment: No data available.

12.6 Other adverse effects: No data available.

SECTION 13
DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods:

Dispose off in accordance with local and national regulations. Do not empty into drains. Avoid release to the environment. Handle contaminated packages in the same way as the substance itself.

SECTION 14
TRANSPORT INFORMATION

14.1 UN number: No data available.

14.2 UN proper shipping name: No data available.

14.3 Transport hazard class(es): No data available.

14.4 Packing group: No data available.

14.5 Environmental hazards: No data available.

14.6 Special precautions for user: No data available.

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code: No data available.

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HI-MACS® Joint Adhesive Kit - Component A [Safety Data Sheet]

SECTION 15
REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture: The substances in the mixture are not subject to the authorisation under Title VII nor restrictions under Title VIII of Regulation (EC) No. 1907/2006.

15.2 Chemical safety assessment: Chemical safety assessment for substances in this mixture is not available.

SECTION 16
OTHER INFORMATION

List of relevant hazard statements:
- H225 Highly flammable liquid and vapour.
- H315 Causes skin irritation.
- H317 May cause an allergic skin reaction.
- H319 Causes serious eye irritation.
- H335 May cause respiratory irritation.
- R11 Highly flammable.
- R36/37/38 Irritating to eyes, respiratory system and skin.
- R43 May cause sensitisation by skin contact.

Instructions for the training:
Product handling instruction shall be included into the educational system about the safety work (initial training, training at the workplace, repeated training) according to specific conditions at the workplace.

Recommended restrictions on use (i.e. non-statutory recommendations by supplier):
Mixture should not be used for any other purpose than for which is appointed (point 1.2). Because of the fact that specific conditions of use of substance are out of supplier's control, it is responsibility of the user to adjust the prescribed warnings to local laws and regulations. Safety information describes the product in terms of safety and it cannot be considered as technical information about product.

Sources of key data used to compile the Safety Data Sheet:
SDS was elaborated according to requirements set in Annex II of Regulation (EC) No 1907/2006 of the European Parliament and of the Council. SDS was prepared using data from the producer. This information is based upon the present state of our knowledge. This SDS has been compiled and is solely intended for this product.

Classification procedure:
Physical and chemical properties: The classification is based on tested mixture. Health hazards/environmental hazards: The method for classification of the mixture is based on ingredients of the mixture (additivity formula).

Purpose of SDS:
Purpose of this SDS is to provide relevant information for users of product to ensure proper handling and control of risks/hazards.

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HI-MACS® Joint Adhesive Kit - Component A [Safety Data Sheet]

Abbreviations and acronyms

· CLP	Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures
· EH40/2005	EH40/2005 Workplace exposure limits, Table 1: List of approved workplace exposure limits
· Eye Irrit.	eye irritation
· F	highly flammable
· Flam. Liq.	flammable liquid
· GHS	"Globally Harmonized System of Classification and Labelling of Chemicals" developed by the United Nations
· PBT	Persistent, Bioaccumulative and Toxic
· ppm	parts per million
· REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
· Skin Irrit.	skin irritation
· Skin Sens.	skin sensitisation
· STOT SE	specific target organ toxicity - single exposure
· vPvB	very Persistent and very Bioaccumulative
· Xi	irritant

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HI-MACS® Joint Adhesive Kit - Component B [Safety Data Sheet]

SECTION 1
IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/ UNDERTAKING

1.1 Product identifier: HI-MACS® JOINT ADHESIVE KIT - COMPONENT B

1.2 Relevant identified uses of the substance or mixture and uses advised against:

Relevant identified uses: Adhesive.

Uses advised against: Do not use in medical applications involving permanent implantation in the human body.

1.3 Details of the supplier of the safety data sheet:

LG Hausys, Ltd
One IFC 10 Gookjegeumyoong-Ro,
Yeongdeungpo-Gu, Seoul 150-876
South Korea

E-mail address for a competent person responsible for the safety data sheet:
winlife98@lghausys.com

1.4 Emergency telephone number:

Korea Information Service : +82 2 6930 0825

SECTION 2:
HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture:

2.1.1 Classification according to Regulation (EC) No 1272/2008:
Skin sensitization: Skin Sens. 1, H317

2.1.2 Classification according to Directive 1999/45/EC:
Sensitising: R43

2.1.3 Additional information:
For full text of R-phrases and hazard statements: see SECTION 16.

2.2 Label elements:

· **Labelling according to Regulation (EC) No 1272/2008:**
· **Hazard pictograms:**

· **Signal word:** Danger
· **Hazard statements:**
- H317 May cause an allergic skin reaction.
· **Precautionary statements:**
- P261 Avoid breathing vapours.
- P280 Wear protective gloves/protective clothing/eye protection/face protection.
- P333+P313 If skin irritation or rash occurs: Get medical advice/attention.
- P363 Wash contaminated clothing before reuse.
- P501 Dispose of contents/container in accordance with local/regional/national/international regulations.
· **Hazardous ingredients for labelling:** Dibenzoyl peroxide.

2.3 Other hazards: There is no additional information.

SECTION 3:
COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances: Not relevant.

3.2 Mixtures: Description of the mixture: Plasticizer.
The mixture contains these substances:

Substance name	EC/CAS No.	Classification				Conc. (%)
		67/548/EEC	CLP			
			Hazard Class and Category Code(s)	Hazard statement	Pictogram/ Signal word	
Oxydipropyl dibenzoate	248-258-5/ 27138-31-4	–	–	–	–	94,2
Dibenzoyl peroxide[1]	202-327-6 / 94-36-0	Explosive E; R3 Oxidising O; R7 Irritant Xi; R36 Sensitising R43	Org. Perox. B Eye Irrit. 2 Skin Sens. 1	H241 H319 H317	GHS01 GHS02 GHS07 Dgr	2,9
Silica, amorphous, fumed, cryst.-free[1]	601-216-3/ 112945-52-5	–	–	–	–	2,9

1 Substance with workplace exposure limits.
For full text of H-statements and R-phrases: see SECTION 16.

SECTION 4:
FIRST AID MEASURES

4.1 Description of first aid measures:

General advice
Do not leave affected person unattended. Remove victim out of the danger area. Keep affected person warm, still and covered. Take off immediately all contaminated clothing. In all cases of doubt, or when symptoms persist, seek medical advice. In case of unconsciousness place person in the recovery position. Never give anything by mouth.

Following inhalation
If breathing is irregular or stopped, immediately seek medical assistance and start first aid actions. Provide fresh air.

Following skin contact
Wash with plenty of soap and water.

Following eye contact
Remove contact lenses, if present and easy to do. Continue rinsing. Irrigate copiously with clean, fresh water for at least 10 minutes, holding the eyelids apart.

Following ingestion
Rinse mouth with water (only if the person is conscious). Ingest activated charcoal. Do NOT induce vomiting. Call a physician immediately.

4.2 Most important symptoms and effects, both acute and delayed:
Symptoms and effects are not known to date.

4.3 Indication of any immediate medical attention and special treatment needed: None.

SECTION 5
FIREFIGHTING MEASURES

5.1 Extinguishing media:
Suitable extinguishing media: water spray, alcohol resistant foam, dry chemical, carbon dioxide (CO2).
Unsuitable extinguishing media: water jet.

5.2 Special hazards arising from the substance or mixture:
Hazardous combustion products: nitrogen oxides (NOx), carbon monoxide (CO), carbon dioxide (CO2).

5.3 Advice for firefighters: In case of fire and/or explosion do not breathe fumes. Co-ordinate firefighting measures to the fire surroundings. Do not allow firefighting water to enter drains or water courses. Collect contaminated firefighting water separately. Fight fire with normal precautions from a reasonable distance.

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HI-MACS® Joint Adhesive Kit - Component B [Safety Data Sheet]

SECTION 6
ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures:

For non-emergency personnel: Ensure adequate ventilation. Use personal protective equipment. Remove all sources of ignition. Remove persons to safety. For emergency responders: Wear breathing apparatus if exposed to vapours.

6.2 Environmental precautions: Keep away from drains, surface and ground water. Retain contaminated washing water and dispose it.

6.3 Methods and material for containment and cleaning up: Wipe up with absorbent material (e.g. cloth, fleece). Collect spillage (sawdust, diatomite, sand, universal binder). Place in appropriate containers for disposal. Ventilate affected area.

6.4 Reference to other sections:

- Hazardous combustion products: see section 5.
- Personal protective equipment: see section 8.
- Incompatible materials: see section 10.
- Disposal considerations: see section 13.

SECTION 7
HANDLING AND STORAGE

7.1 Precautions for safe handling: Use local and general ventilation. Keep away from sources of ignition – No smoking. Use only in well-ventilated areas. Wash hands after use. Do not to eat, drink and smoke in work areas. Remove contaminated clothing and protective equipment before entering eating areas. Never keep food or drink in the vicinity of chemicals. Never place chemicals in containers that are normally used for food or drink. Keep away from food, drink and animal feedingstuffs.

7.2 Conditions for safe storage, including any incompatibilities: Keep at temperatures below 30°C. Water mist may be used to cool closed containers. Incompatible products: Polymerization accelerators and easily oxidized materials. Reacts violently in contact with acids, amines, driers.

7.3 Specific end use(s): No data available.

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HI-MACS® Joint Adhesive Kit - Component B [Safety Data Sheet]

SECTION 8:
EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters:
Occupational exposure limit values in EH40/2005 Workplace exposure limits:

Substance	CAS Number	Workplace exposure limit				Comments
		Long-term exposure limit (8-hr TWA reference period)		Short-term exposure limit (15-minute reference period)		
		ppm	mg/m ^{3}	ppm	mg/m ^{3}	
Dibenzoyl peroxide	94-36-0	–	5	–	–	–
Silica, amorphous inhalable dust respirable dust	–	–	2,4	–	–	–

8.2 Exposure controls:
8.2.1 Appropriate engineering controls: General ventilation.

8.2.2 Individual protection measures, such as personal protective equipment:

8.2.2.1 Eye/face protection: Wear eye/face protection.

8.2.2.2 Skin protection:

Hand protection: Wear suitable gloves. Chemical protection gloves are suitable, which are tested according to EN 374. Check leak-tightness/ impermeability prior to use. In the case of wanting to use the gloves again, clean them before taking off and air them well. For special purposes, it is recommended to check the resistance to chemicals of the protective gloves mentioned above together with the supplier of these gloves.

Other: Take recovery periods for skin regeneration. Preventive skin protection (barrier creams/ointments) is recommended. Wash hands thoroughly after handling.

8.2.2.3 Respiratory protection: In case of inadequate ventilation wear respiratory protection.

8.2.2.4 Thermal hazards: No data available.

8.2.3 Environmental exposure controls: Use appropriate container to avoid environmental contamination. Keep away from drains, surface and ground water.

SECTION 9:
PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties:

Appearance	liquid colour: various
Odour	slight
Odour threshold	no data available
pH	not applicable
Melting point/freezing point	no data available
Initial boiling point and boiling range	no data available
Flash point	above 100 °C (closed cup)
Evaporation rate	no data available
Flammability (solid, gas)	not applicable
Upper/lower flammability or explosive limits	o data available
Vapour pressure (147°C)	1.3 hps
Vapour density	no data available
Relative density	1.03 - 1.07 kg/l
Solubility(ies)	immiscible in water
Partition coefficient: n-octanol/water	no data available
Auto-ignition temperature	no data available
Decomposition temperature	103°C
Viscosity	no data available
Explosive properties	no data available
Oxidising properties	no data available

9.2 Other information: No data available.

SECTION 10
STABILITY AND REACTIVITY

10.1 Reactivity: Concerning incompatibility: see below "Conditions to avoid" and "Incompatible materials".

10.2 Chemical stability: Decomposition starting from 103°C: Dibenzoyl peroxide 100%.

10.3 Possibility of hazardous reactions: No data available.

10.4 Conditions to avoid: Keep away from heat and ignition sources.

10.5 Incompatible materials: Reacts violently in contact with acids, amines, driers, polymerization accelerators and easily oxidized materials.

10.6 Hazardous decomposition products: Benzoic acid, biphenyls, benzene.

SECTION 11
TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects: Test data are not available for the complete mixture.

Substances:

Oxydipropyl dibenzoate
Acute toxicity: LD50, oral: 8000 mg/kg (RTECS, 59814)
Dibenzoyl peroxide
Acute toxicity: LD50, oral: 7710 mg/kg (RTECS, 19455)

Mixtures:

Acute toxicity: Based on available data, the classification criteria are not met.
Skin corrosion/irritation: Based on available data, the classification criteria are not met.
Serious eye damage/irritation: Based on available data, the classification criteria are not met.
Respiratory or skin sensitisation: May cause an allergic skin reaction.
Germ cell mutagenicity: Based on available data, the classification criteria are not met.
Carcinogenicity: Based on available data, the classification criteria are not met.
Reproductive toxicity: Based on available data, the classification criteria are not met.
Specific target organ toxicity (STOT) - single exposure: Based on available data, the classification criteria are not met.
Specific target organ roxicity (STOT) - repeated exposure: Based on available data, the classification criteria are not met.
Aspiration hazard: Based on available data, the classification criteria are not met.
Other information: Repeated and prolonged exposure to solvents may cause brain and nervous system damage.

Health & Safety

HI-MACS® Joint Adhesive Kit - Component B [Safety Data Sheet]

SECTION 12
ECOLOGICAL INFORMATION

12.1 Toxicity: Mixture is not classified as hazardous to the aquatic environment.

12.2 Persistence and degradability: No data available.

12.3 Bioaccumulative potential: No data available.

12.4 Mobility in soil: No data available.

12.5 Results of PBT and vPvB assessment: No data available.

12.6 Other adverse effects: No data available.

SECTION 13
DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods: Dispose off in accordance with local and national regulations. Do not empty into drains. Avoid release to the environment. Handle contaminated packages in the same way as the substance itself.

SECTION 14
TRANSPORT INFORMATION

14.1 UN number: No data available.

14.2 UN proper shipping name: No data available.

14.3 Transport hazard class(es): No data available.

14.4 Packing group: No data available.

14.5 Environmental hazards: No data available.

14.6 Special precautions for user: No data available.

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code: No data available.

Health & Safety

HI-MACS® Joint Adhesive Kit - Component B [Safety Data Sheet]

SECTION 15
REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture: The substances in the mixture are not subject to the authorisation under Title VII nor restrictions under Title VIII of Regulation (EC) No. 1907/2006.

15.2 Chemical safety assessment: Chemical safety assessment for substances in this mixture is not available.

SECTION 16
OTHER INFORMATION

List of relevant hazard statements:
H241 Heating may cause a fire or explosion.
H317 May cause an allergic skin reaction.
H319 Causes serious eye irritation.
R3 Extreme risk of explosion by shock, friction, fire or other sources of ignition.
R7 May cause fire.
R36 Irritating to eyes.
R43 May cause sensitisation by skin contact.

Instructions for the training:
Product handling instruction shall be included into the educational system about the safety work (initial training, training at the workplace, repeated training) according to specific conditions at the workplace.

Recommended restrictions on use (i.e. non-statutory recommendations by supplier):
Mixture should not be used for any other purpose than for which is appointed (point 1.2). Because of the fact that specific conditions of use of substance are out of supplier's control, it is responsibility of the user to adjust the prescribed warnings to local laws and regulations. Safety information describes the product in terms of safety and it cannot be considered as technical information about product.

Sources of key data used to compile the Safety Data Sheet:
SDS was elaborated according to requirements set in Annex II of Regulation (EC) No 1907/2006 of the European Parliament and of the Council. SDS was prepared using data from the producer. This information is based upon the present state of our knowledge. This SDS has been compiled and is solely intended for this product.

Health & Safety

HI-MACS® Joint Adhesive Kit - Component B [Safety Data Sheet]

Classification procedure:
Physical and chemical properties: The classification is based on tested mixture.
Health hazards/environmental hazards: The method for classification of the mixture is based on ingredients of the mixture (additivity formula).

Purpose of SDS:
Purpose of this SDS is to provide relevant information for users of product to ensure proper handling and control of risks/hazards.

Abbreviations and acronyms

· CLP	Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures
· EH40/2005	EH40/2005 Workplace exposure limits, Table 1: List of approved workplace exposure limits
· E	explosive
· Eye Irrit.	eye irritation
· GHS	"Globally Harmonized System of Classification and Labelling of Chemicals" developed by the United Nations
· O	oxidising
· Org. Perox.	organic peroxide
· PBT	Persistent, Bioaccumulative and Toxic
· ppm	parts per million
· REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
· Skin Sens.	skin sensitisation
· vPvB	very Persistent and very Bioaccumulative
· Xi	irritantG

Section 05.

Storage, Handling & Transportation

HI-MACS® Sheets

Storage, Handling & Transportation

HI-MACS® Sheets

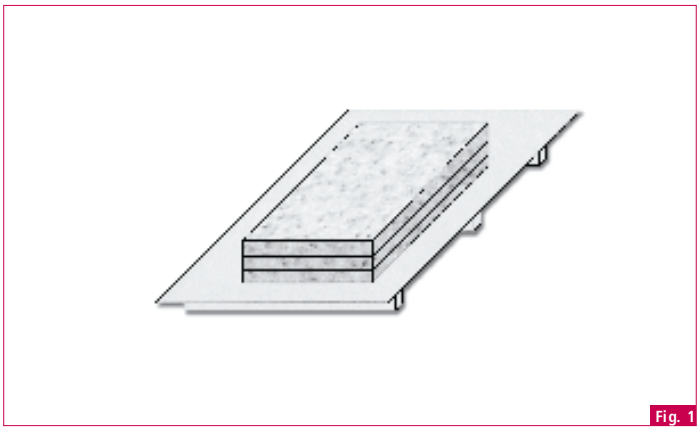


Fig. 1

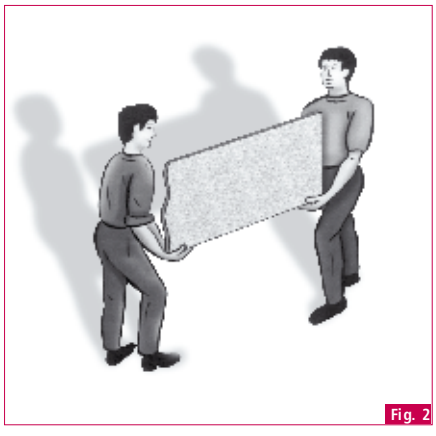


Fig. 2

5.1 HI-MACS® should always be stored flat on sturdy pallets with a cover board placed on the pallet before stacking the sheets (Fig. 1).

5.2 Keep the sheets in a dry, well ventilated area.

5.3 Using a shelving, HI-MACS® sheets must always be stored with sufficient support so that the sheets do not warp.

5.4 Never attempt to carry sheets of HI-MACS® on your own. The sheet should be lifted by two people, one at either end. Always lift in a vertical position (Fig. 2).

5.5 Never drag sheets of HI-MACS® along the floor as this will lead to chipped or broken edges.

5.6 Always support panels which have cut-outs and/or joins during transportation.

5.7 Store sinks and bowls in the same way as the sheets.

5.8 Pack fabricated elements made out of HI-MACS® using blister pack for protection.

5.9 Large fabricated elements are best supported on their edge.

5.10 Avoid transporting fabricated items of HI-MACS® in open top vehicles as this can cause extreme thermal movement and a change of air conditions.

5.11 Prevent panels and elements from moving during transportation.

5.12 HI-MACS® adhesive is best stored in cool conditions ≈ 8-15°C, and away from direct sunlight. This will increase the shelf life of the adhesive by up to 12 months.

5.13 Always check the expiry date of adhesives prior to use.

Section 06.

Quality Control

Sheet Inspection

Shape Inspection

Quality Control

Sheet Inspection

LG Hausys is continuously improving its manufacturing processes and controls to offer the highest quality of sheets.

6.1 Before using or fabricating HI-MACS® sheets, we strongly recommend that you visually inspect them for defects and colour match

6.2 Each sheet has a printed number on the side. Please state this number in case of complaint. This allows LG Hausys to trace back manufacturing process to continually improve our product.
Example :
sheet N° : **LG HI-MACS® Arctic White 1 3 D E 009**

LG = manufacturer's name
HI-MACS® = product name
Arctic White = color of the sheet

1 = production line no. 1 (2, 3, 4)
3 = year of production: 2003
D = month : April (A = January, B = February, C = March, D =April, .., L = December)

E = day : 15th (1 = 1st; 2 = 2nd; 3 = 3rd; 4 = 4th;...;
10 = 10th;
A = 11th; B = 12th; C = 13th; D = 14th;...;
U = 31st)
From day 11th to day 31st,each day corresponds to a letter (A to U)

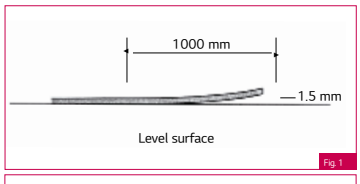
009 = running no (001, 002, 003,...)

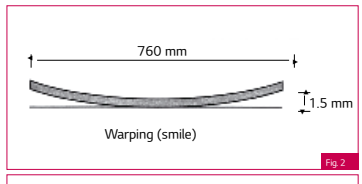
Disclaimer

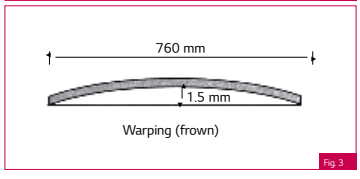
HI-MACS® should be joined with same Lot number sheet. Therefore, warranty will not cover the color difference by the join with different Lot number sheet.

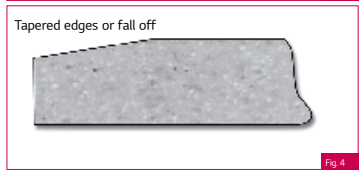
Products

Shape Inspection









6.3 Prior to cutting full sheets please check for visible defects. Make sure that there is no : Length warp. If the warp is greater than 1.5 mm per metre (Fig.1) contact your HI-MACS® supplier for inspection and product replacement if necessary.
• "Smile" warp. If the sheet is deflected along its edge in the shape of a smile (Fig. 2) and if the warp is greater than 1.5 mm per metre (Fig. 2), contact your HI-MACS® supplier for inspection and product replacement if necessary.
• "Frown" warp. If the sheet deflects on the edges to the shape of a frown (Fig. 3) and if the warp is greater than 1.5 mm per metre (Fig. 3), contact your HI-MACS® supplier for inspection and product replacement if necessary.

Specification for flatness				
Solids and Pearls Colours	≤	1.5 mm*	over	760 mm
Small Chip Colours Sands	≤	1.5 mm*	over	760 mm
Large Chip Colours Quartz and Granite	≤	1.5 mm*	over	760 mm

* Warp of the sheet should not exceed 1.5 mm

6.4 Make sure that the sheets are:
• Free from chipped or broken edges
• Free from tapered edges (Fig. 4) ;
• Free from pinholes (max. 10 par Ø 50 mm).

6.5 Make sure that the sheets are:
• Do not show any colour inconsistency
• Have an even distribution of particles
• Are protected on the face side with a poly coating film.

6.6 HI-MACS® shapes should also be checked for:
• Color consistency of the proposed sheet (see technical details for correct installation)
• Black spots and flakes
• Pinholes
• Cracks, chips or breakage
• Quality of top edge for bonding

6.7 Should you have any concerns about the quality of HI-MACS® products please call your local representative.

Section 07.

Tools & Accessories

Tools List

List of Equipment for Joinery Workshop

Tools & Accessories

Tools & Accessories

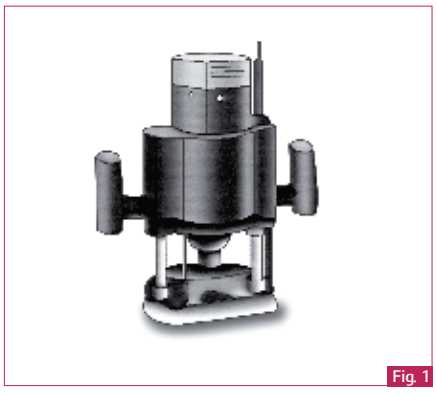


Fig. 1

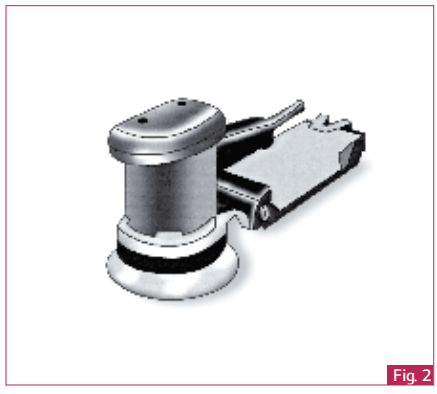


Fig. 2

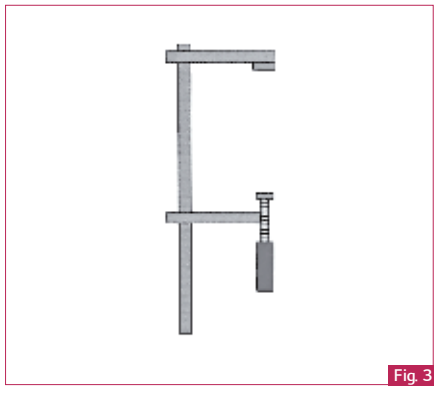


Fig. 3

7.1 LG Hausys recommends specific tool manufacturer(s) or specific supplier(s) to help to reduce fabrication and installation costs or allow fabricators to run fabrication processes in an efficient way.

7.2 Ideally, a table circular saw or panel saw should be used for sizing full sheets.

7.3 Spindle moulders, V-grooving machines and CNC`s can be used according to application needs.

7.4 Long and/or wide belt sanders may be helpful for specific HI-MACS® projects or other woodworking industrial materials.

7.5 Heavy-duty manual routers suitable for 12 mm shank cutters, with a minimum wattage of 1600 are recommended. (Fig. 1).

7.6 A range of sanders (electronic or pneumatic) including: Orbital, Random Orbital, Palm and Belt. Always select machines which use quick fix discs and pads up to Ø150 mm. (Fig. 2).

7.7 You should have a wide selection of Tungsten Carbide tipped router bits forstraight cuts, profile finishing and bowl installation. You should also have profiling cutters with bear rings (should be specified with nylon).

7.8 A range of sanding discs from 80 – 320 and/or larger will be required for the Random Orbital sander.

7.9 Polishing pastes and waxes will improve the gloss level to a previously sanded element but are only recommended for art and special purpose.

7.10 The recommended finish level is semi-gloss (320 sandpaper & Superpad S/G 1200).

7.11 High-gloss is not covered under the 10 years limited installed warranty of HI-MACS®.

7.12 Routers and templates should be used wherever possible.

Tools & Accessories

Tools List (1/2)

7.13 • A range of clamps for the bonding of drop edges and upstands, including 'A' style spring clamps.
• Screw clamps of various lengths i.e. 250 mm, 400 mm and 1200 mm.
• A few longer sash clamps. (Fig. 3)

7.14 Hot melt glue gun with cartridges or pellets.

7.15 Heavy duty paper towel dispenser.

7.16 Either a fixed point or portable extraction system.

7.17 Finally, in addition to the above, a selection of hand tools should also be available. See list below :

Tools List (1/2)

Tools/machines/equipment	Quantity needed
Safety code	x
Safety equipment (Safety glasses, ear plugs, safety shoes, work clothes, etc.)	x
Router (~ 1.8 kW) a. submount technique b. profiling	x
Router (~ 900 w) profile bit radius 2-3 mm	x
Random orbital sander (air or electric)	x
Orbital sander (electric) (adhesive mixer)	x
Hand belt sander	x
Stick saw	x
Quality saw blade	x
Drilling machine (electric accu)	x
Adhesives	x
Adhesive bulk gun	x
Mixer tips	x
Hot melt glue gun	x
Glue	x
Silicone pistol	x
Silicone cartridges	x
Planer	x
Cutter to change	x

Tools & Accessories

Tools List (2/2)

Tools List (2/2)

Tools/machines/equipment (continued)	Quantity needed
Set of chisels	x
Set of screw drivers	x
Set of spanners	x
Varnish	x
Measuring tape	x
Tube wringer	x
Hammer (500 gr)	x
Rubber hammer	x
Pencil	x
Pencil sharpener	x
Ruler (assorted)	x
Square edged angle (assorted)	x
Router bits (assorted)	x
Assembly table	x
Benches (height adjustment)	x
Benches with drawer	x
Clamp car (movable)	x
Clamps (assorted)	x
Sanding station (movable)	x
Vacuum	
Vacuum pipe	
Sand paper (micron assorted, Scotch Brite,	
Superpad S/G (Jöst))	
Tapes (assorted)	x
Cleaning paper	x
Denatured alcohol (or alternatives)	x
Spray bottle	x
Templates (assorted)	x
Thin skids (assorted)	x
Glue blocks	x
centralised electric switchbox	
centralised dust collection (swivel-mounted pipes)	
centralised air connection	

Tools & Accessories

List of Equipment for Joinery Workshop

Based on solid surface starters*

No. :	Machine/Equipment	Joinery Workshop Suggestion for Manufacturer	Quantity
	Dust collection system	Nedermann	
		Höcker - Polytechnik	
		xxx	
	Air compressor	Fini	
		xxx	
	Table circular saw	Altendorf	
		with sliding table L = > 2.80 m	
		xxx	
	Panel saw	Striebig	
		Holzher	
		xxx	
	Spindle motor	Martin	
		xxx	
	PLong belt sander	Klingspor	
		xxx	
	Long belt sander	Bütfering	
		Viet	
		Weber	
		xxx	
	Work benches	Ulmia	1 / employee
		alternatives/self-made	
		xxx	
	Work bench horses	wooden	
		self-made	
	Clamps	Cross-Stabile	
		Klemsia	
		xxx	
	Hand router	Dewalt	2 / employee
		Festo	2 / employee
		xxx	
	Random orbital sander	Festo	1 / employee
		Dynerbrade	
		xxx	
	Hand belt sander	Festo	
		Dewalt	
		Bosch	
		Holzher	
		Makita	
		xxx	

Section 08

Job Planning

Job Planning

Job Planning

Job Planning

8.1 Successful installation relies on accurate job planning, especially around kitchen appliances.

8.2 Never position joints near cut-outs. (Fig. 1).

8.3 Never position a joint over dishwashers or heat producing appliances.

8.4 Keep joints away from internal corners, minimum distance of 50 mm (Fig. 2).

8.5 Wherever possible reinforce all joints (Fig. 3) with a strip of 12 mm HI-MACS® at least 50 mm wide and angled to 45° along both long edges.Ensure that the strip covers the whole joint and spread adhesive over thecomplete surface of the strip. Clean joint smooth from underneath.

8.6 Inspect the site and check for anything that could interfere with fabricated elements.

8.7 Check for unevenness in the wall (Fig. 4).

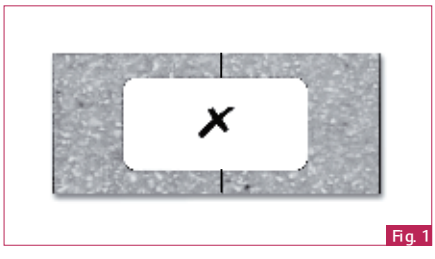


Fig. 1

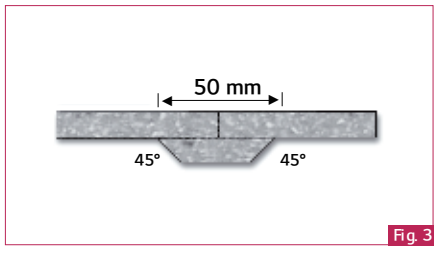


Fig. 3

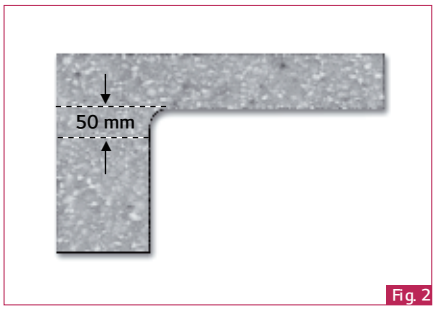


Fig. 2

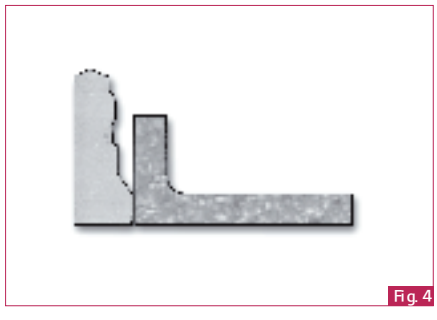


Fig. 4

8.8 The minimum inside corner radius for L shape and U shape in HI-MACS® should be ≥25mm.

Section 09

Cutting HI-MACS®

Cutting HI-MACS®

Cutting HI-MACS®

Cutting HI-MACS®

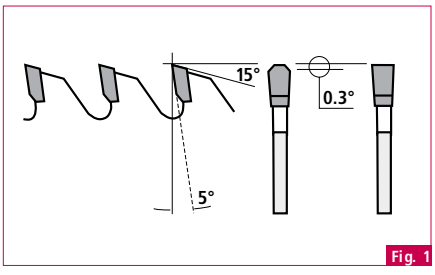


Fig. 1

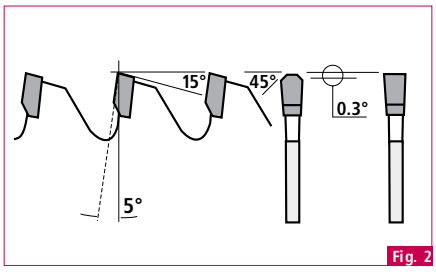


Fig. 2

9.1 Cutting full size sheets of HI-MACS® should initially be carried out using a panel saw, beam saw or table circular saw. Always remember to completely support the entire sheet during this operation.

9.2 Circular sawblades with triple chip teeth will provide the best possible result (Fig. 1).
A standard ø 300 mm saw blade should have 96 teeth and is best with a negative hook angle. (Fig. 2).

9.3 It is important to avoid stress fractures when sawing a HI-MACS® sheet; this can lead to crack formation later. In the event of small chips and cracks appearing when cutting, ensure the edges are always dressed using a routeror spindle moulder.

9.4 Never use hand held rip saws or portable jigsaws to cut sheets of HI-MACS®.
During on-site fabrication portable circular power saws can be used providing the edge is subsequently finished with a router. But the best and most efficient way is to use a router only with straight edge and/or template.

Section 10

Seam Preparation

Machining

Bonding Seams

Seam Preparation

Machining

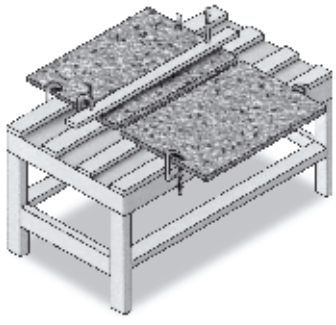


Fig. 1

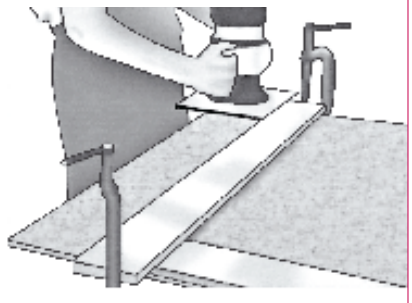


Fig. 2

Seaming table t ray
cove red with t ranspa rent paper

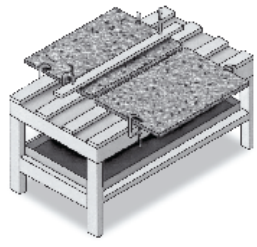


Fig. 3

10.1 The machining of two pieces of HI-MACS® to create a seam joint can be carried out in different ways. What is important however, is the quality of the machined edge.

10.2 The most reliable method is the "mirror cut" technique with a hand-held router, which works by cutting both adjoining edges in one cut. Place the two pieces onto a seaming table (Fig. 1), leaving a gap of 9 mm between them and secure with either G clamps or screw clamps. Clamp a metal or compact straight edge to one of the pieces and to a strong and stable table. With a 12 mm double flute tungsten router bit fixed into your hand router, move the machine steadily in one direction away from your body and cut both sections at once. Maintain a slow steady pace without stopping. After cutting check that the joint matches perfectly and mark the mating position with a pencil line.

10.3 Another possibility is to machine each edge independently using a standard workbench and straight edge (Fig. 2). First clamp the work piece to the bench and attach the straight edge to the sheet, so that the router will remove 1.5mm in total. Push the router at a slow steady pace without stopping. Repeat this exercise for the second piece and then check the accuracy of the joint. If the edges do not match then one or both of these edges will require re-machining. (Using a wavy profile router bit can avoid gauge difference between both work pieces).

10.4 After machining, both cut edges will require sanding with 150/180 grit abrasive sandpaper and to be cleaned using denatured alcohol (or Acetone) with a white clean cloth or white industrial paper, in preparation for bonding.

10.5 The use of CNC cutting and nesting programs is becoming more and more popular. Equipment, such as this, is becoming more and more efficient, especially for small serial production or individual requirements.

10.6 When edges have been machined, sanded and cleaned, they are ready for bonding.

10.7 Before bonding, cover the tray beneath the seaming table with a transparent tape in order to catch any overspill of adhesive (Fig. 3).

Seam Preparation

Bonding Seams

Blocks attached to the sheet

Fig. 1

Reinfo rced seams

Fig. 2

10.8 The sheets are to be clamped together using for example screw clamps. It will be necessary to fix small blocks to the sheet using hot melt adhesive. (Fig. 1). Additional working steps are needed till the work piece is finished.

10.9 Alternatively, sash clamps can be used, provided they are not over tightened.

10.10 Prepare the HI-MACS® adhesive system (see Section 016).

10.11 Apply tape at either end of the assembly prior to the application of adhesive.

10.12 Apply a continuous bead of adhesive along the entire part to be joined. (Fig. 2). Reinforce the length of the joint and push the sheets together so that an even bead of adhesive is forced out from the joint.

10.13 Clamp the assembly but do not over tighten it, as this will cause weak joints through starvation of adhesive.

10.14 Remove the clamps once the adhesive is fully cured and hard to the touch.

10.15 Remove excess cured adhesive with either a portable hand held router, set on skis or a small block plane with a sharp blade. Whenever possible avoid the use of chisels.

10.16 Standard butt seams will remain a weak part of the assembly, therefore to strengthen the joint, reinforce the underside with an offcut of HI-MACS® (Fig. 2). In cases where the joint could be affected by heat, it is strongly recommended to bevel (45°) the edges of the reinforced strip along the full length of the joint and to make a full adhesive film on the backside of the strip and to remove and finish off squeezed out adhesive till it is smooth.

10.17 Finish the joint by sanding it with 180/240 grit followed by 320 grit and Scotch Brite (grey) or Superpad S/G 1200. Do not simply concentrate on joint alone as this will cause shallow depressions around the joint.

10.18 For detailed sanding instructions see Technical Bulletin "Sanding HI-MACS®".

Section 11

Adhesive

Joint Adhesives

Adhesive

Joint Adhesives

11.1 HI-MACS® special formulated adhesive system is available in 250 ml cartridges, in many different colours.

11.2 Each adhesive tube has a maximum shelf life as described below. Check its suitability prior to use, see the date of manufacture on the label attached on the product itself and on the packaging boxes from LG Hausys.

Shelf life for all colours:
2-years after date of manufacturing

11.3 Storage of adhesive should be in cool (approx. + 8°C to maximum +15°C) and dry conditions. Keep the unopened HI-MACS® adhesive tubes package and HI-MACS® adhesive cartridges in a dark room, avoid sunlight and do not place them adjacent to any heating equipment.

11.4 Keep HI-MACS® adhesives away from children.

11.5 For more Health and Safety information read the MSDS sheet in section 004.

11.6 For more information about HI-MACS® - assembly glue please refer to page 47.

* Further information: Technical Bulletin 11

Adhesive

Joint Adhesives

SOLID

HI-MACS		ADHESIVE	
S001	Satin White	H01	S/White
S002	Almond	H04	Peanut
S005	Grey	H03	Grey
S006	Arctic White	H02	A/White
S009	Cream	H121	Creemy
S022	Black	H45	V/Black
S025	Fiery Red	H18	Red
S026	Banana	H17	Banana
S027	Orange	H19	Orange
S028	Alpine White	H16	Al/White
S029	Ivory White	H32	Ivory
S033	Nordic White		
S034	Diamond White	H113	Diamond White
S100	Coffee Brown	H37	Mocha
S102	Babylon Beige	H52	Babylon Beige
S103	Concrete Grey	H53	Concrete Grey
S104	Toffee Brown	H54	Toffe Brown
S106	Lemon Squash	H104	Lemon Squash
S107	Mazarin Blue	H102	Mazarine Blue
S108	Marta Grey	H107	Mata Grey
S109	Steel Grey	H101	Steel Grey
S111	Dark Night	T09	Dark Night
S115	Deep Indigo	T08	Deep Indigo
S116	Festival Pink	H106	Festival Pink
S117	Midnight Grey	H109	Miud Grey
S201	Nougat Cream	H20 H04 (EU)	Cream Peanut (Eu)
S203	Sky Blue	H30	Dawn Misty
S212	Light Green	H56	Light Green
S302	Opal	T02	Opal
S303	Sapphire	T03	Sarrhire
S304	Ruby	T04	Ruby
S305	Emerald	T05	Emerald

LUCIA

HI-MACS		ADHESIVE	
W001	Ice Queen	H16	Al/White
W003	Shadow Queen	H58	Pebble Pearl
W004	Star Queen	H42	Merapi
W002	Cloud	H16	Al/White
W005	Pistachio	H20	Cream
W006	Macadamia	H34	I/Crystal
W007	Lentil	H20	Cream
W008	Acorn	H20	Cream
W009	Marron	H52	B/Beige
W010	Red Quinoa	H39	Latte

GRANITE

HI-MACS		ADHESIVE	
P001	Perna White	H21	P/White
P004	Perna Black	H07	Black
G001	Desert Sand	H04	Peanut
G002	Grey Sand	H03	Grey
G004	White Quartz	H36	Silver
G005	White Granite	H44	Mikeno
G007	Platinum Granite	H03	Grey
G008	Almond Pearl	H04	Peanut
G009	Black Sand	H42	Merapi
G010	Black Pearl	H07	Black
G015	Midnight Pearl	H10	Blue
G017	Grey Granite	H03	Grey
G019	Natural Quartz	H04	Peanut
G023	Natural Granite	H03	Grey
G030	Ivory Quartz	H04	Peanut
G031	Black Granite	H07	Black
G034	Arctic Granite	H36	Silver
G038	Sea Oat Quartz	H44	Mikeno
G042	Venetian Sand	H26	Sand Brown
G047	Black Bird	H07	Black
G048	Beach Sand	H04	Peanut
G050	Tapioca Pearl	H36	Silver
G053	Stardust Granite	H07	Black
G058	Moonscape Quartz	H04	Peanut
G063	Allspice Quartz	H14	Sephia
G065	Tundra Quartz	H02	Arctic White
G074	Mocha Granite	H37	Mocha
G100	Peanut Butter	H04	Peanut
G101	Crystal Beige	H01	S/White
G102	Grey Crystal	H03	Grey
G103	Grey Onix	H65	Grey Onyx
G105	Brown Pearl	H35	Dark
G106	Riviera Sand	H20	Cream
G107	Pebble Pearl	H58	P/Pearl
G108	Lunar Sand	H36	Silver
G109	Beige Island	H34	Ivory Crystal
G110	Corona	H36	Silver
G111	Macchiato	H20	Cream
G112	Caramel	H20	Cream
G113	Iceberg	H36	Silver
G114	Clay	H62	Clay
G117	Cappuccino	H52	Babylon Beige
G259	Persian Cream	H36	Silver
G260	Persian Sand	H26	Sand Brown
G235	Candy White	H24	Candy White
G130	Vanilla Sugar	H02	A/White
G131	Oatmeal	H116	Oatmeal
G132	Walnut	H117	Walnut
G133	Cinnamon	H119	Cinnamon
G134	Wholegrain	H118	Wholegrain
P101	Kreemy Grey	H112	Kreemy Grey
P100	Key Lime	H110	Key Lime
P103	Kandy Pink	T14	Kandy Pink
P104	Kanada Violet	H10	Blue
P105	Kopp	H37	Mocha
P106	Koal	H42	Merapi
P102	Kold Silver	H111	Kold Silver

Adhesive

Joint Adhesives

VOLCANICS

HI-MACS		ADHESIVE	
VE01	Tambora	H20	Cream
VW01	Gemini	H36	Silver
VA01	Santa Ana	H03	Grey
VE04	Maroa	H20	Cream
VE02	Mikeno	H44	Mikeno
VB02	Cima	H45	V/Black
VA22	Frosty	H03	Grey
VB21	Taos	H48	Taos
VE26	Shasta	H52	Babylon Beige
VG21	Maui	H49	Maui
VL21	Santorini	H10	Blue
VN24	Kohala	H67	Jupiter
VR21	Stellar	H47	Steller

ASTER(GALAXY)

HI-MACS		ADHESIVE	
T001	Black Hole	H35	Dark
T002	Uranus	H60	Uranus
T004	Saturn	H37	Mocha
T008	Jupiter	H67	Jupiter
T010	Nebula	H02	A/White
T011	Venus	H01	S/White
T016	Mars	H34	Ivory Crystal
T017	Andromeda	H16	Al/White
T018	Carina	H02	A/White
T019	New Moon	H01	S/White
T020	Hercules	H22	P/Grey
T024	Spica	H36	Silver
T025	Capella	H04	Peanut
T026	Rigel	H60	Uranus

MARMO

HI-MACS		ADHESIVE	
M103	Bologna	H34	Ivory Crystal
M104	Roma	H22	P/Grey
M105	Verona	H61	Verona
M201	Terni	H68	Terni
M203	Lucca	H50	Kohala
M205	Parma	H39	Latte
M206	Monza	H07	Black
M207	Pisa	H46	Hekla
M301	Siena	H50	Kohala
M302	Pompei	H35	Dark
M303	Capri	H62	Clay
M304	Bari	H39	Latte
M305	Modena	H52	Babylon Beige
M309	Savona	H116	Oatmeal
M306	Breeze White	H02	A/White
M307	Mist	H01	S/White
M401	Veladero	H52	Babylon Beige
M402	Goldstrike	H115	Coloseum
M403	Cortez	H35	Dark
M322	Pantheon	H114	Pantheon
M323	Colosseum	H115	Coloseum
M351	Milan	H02	A/White
M352	Vernazza	H34	Ivory Crystal
M411	Messina		
M412	Foggia		

Section 12

Cut-outs in HI-MACS®

Cut-outs in HI-MACS®

Cut-outs in HI-MACS®

Cut-outs in HI-MACS®

12.1 Internal corner cut-outs for sinks, hobs and other accessories will always be subject to higher stress and as such will require to be handled very accurately in accordance with the latest instructions given in these Fabrication Guidelines or additional Technical Bulletins.

12.2 Machine the cut-out using a CNC router or hand router and a template.

12.3 Always machine a radius around these corners and make the radius as large as practical, (R > /= 5 mm). (Fig. 1).

12.4 Always ensure that there is a radius of R 3mm on both sides of the edge of the cut-out (or using a profile router bit.: Titman no XC 341*12). (Fig. 2).

12.5 Do not position a joint or any glueline across any kind of hob.

12.6 HI-MACS® needs the high strengthen cut-outs for heat generating appliances. This fabrication method will prevent excessive heat build up and the potential risk of stress cracking. Therefore, the internal edge of hob cut-outs should be covered with heat resisting materials. Self adhesive Neoprene tape or Koawool tape and cover with self adhesive aluminum reflective tape (3M, tape no.: 425) are good example.
Or, other heat resisting materials that have enough performance for each residential or commercial heat generating equipment can be considered. The temperature that conveys from a hob appliance and any other heat source to HI-MACS® is limited up to 85℃.

12.7 Always leave a minimum of at least 3 mm space between the underneath of the appliance and the edge of the HI-MACS® if possible (depending on the type of hob you may have to include a filling piece)

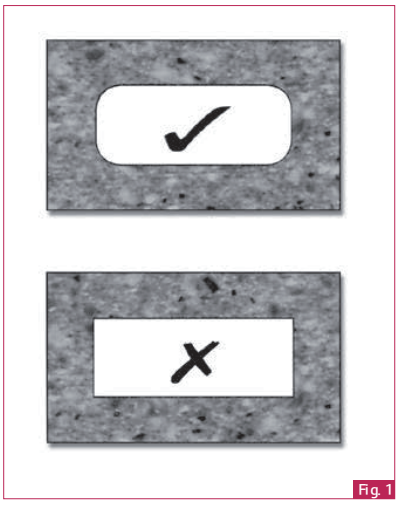


Fig. 1

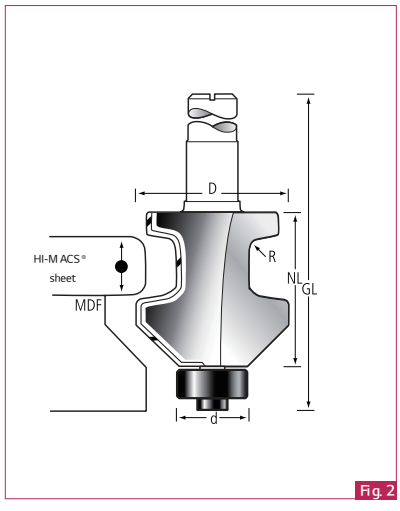


Fig. 2

Réf.	D (Largest diameter of router bit)	d (Diameter of bearing)	NL (Maximal use of router bit)	GL (Total length)	R (Radius)	HI-MACS®
XC341*12	35 mm	16 mm	36 mm	107 mm	3 mm	12 mm ±

Section 13

Drop Edges & Downturns

Drop Edges & Downturns

Drop Edges & Downturns

Drop Edges & Downturns

13.1 Drop edges applied to sheets of HI-MACS® can create a multitude of design possibilities.

13.2 One of the easiest ways to produce a drop edge is to simply stack layers of HI-MACS® on the underside of the sheet. (Fig. 1).

13.3 Start by cutting strips which are slightly oversized and sand the underside with 120 grit paper. Clean with denatured alcohol and white cloth.

13.4 Apply a sufficient amount of HI-MACS® joint adhesive to each of the strips and smooth out using a wooden or plastic spatula.

13.5 Attach 'A' style spring clamps every 70 mm to 80 mm and allow to cure (approx. 45 min/+20°C). Ensure that, once the clamps have been applied, a reasonable amount of adhesive is forced out from the joint (Fig. 2).

13.6 When the adhesive is completely dry, smooth down the surface using a circular table saw, then machine the required profile using a portable hand-held router or a table planer (Fig. 3).

13.7 Drop edges can sometimes be applied on edge, primarily for deeper downturns. The best way to achieve this detail is to first rebate the underside of the sheet to a depth of approx. 1-2 mm (Fig. 4).

13.8 The rebate serves two functions, firstly it increases the bond strength and secondly it minimizes the effect of uneven particle distribution.

13.9 As you would normally do, sand both the internal edges of the rebate and the corresponding edges of the downturn with 150/180 grit paper, cleaned with denatured alcohol with a white cloth (Fig. 4).

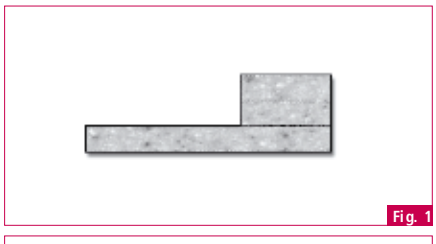


Fig. 1

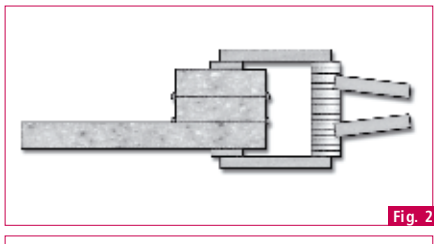


Fig. 2

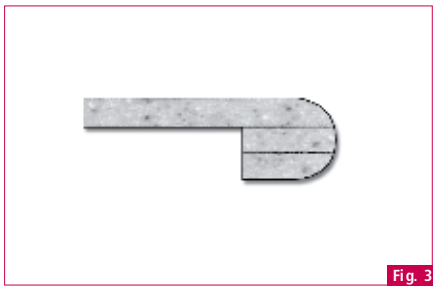


Fig. 3

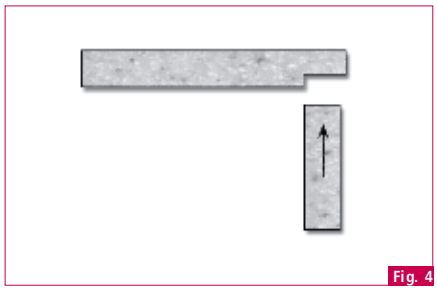


Fig. 4

Drop Edges & Downturns

13.10 Apply a sufficient amount of adhesive and clamp edge in position with screw clamps set 70 mm - 80 mm apart (Fig. 5).

13.11 Ensure that beads of adhesive are formed at both the internal and external edge of the joint (Fig. 5). Once fully cured trim the overhang using a portable hand router, use a straight cutter with Nylon bearing attachment.

13.12 It is possible to create curved downturns to shaped counters, simply by thermoforming the edges prior to bonding. Please refer to **Section 020** for thermoforming techniques (but more time-intensive and limited in terms of profile)

13.13 For internal/external corners, thermoforming will provide one solution, alternatively simply stack up and bond sheets of HI-MACS® at theses corners and machine using a portable hand router.

13.14 When it comes to a 'waterfall' edge, the top sheet will need to be rebated while the edge will need grooving (Fig. 6).

13.15 Ensure that the connection between the rebate and the grove is neither too tight nor too slack (Fig. 7).

13.16 Clamp the section together using sash clamps and allow the adhesive to fully cure.

13.17 Machine the two edges using a purpose made router tool with a Nylon bearing, working from the top edge (Fig. 7).

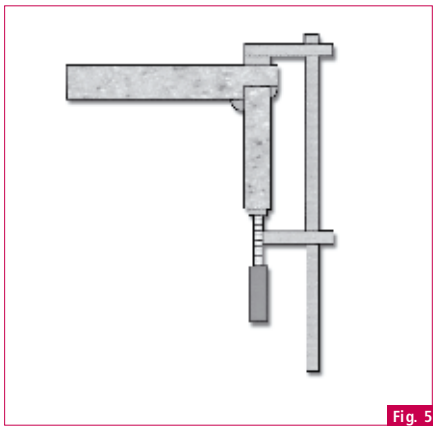


Fig. 5

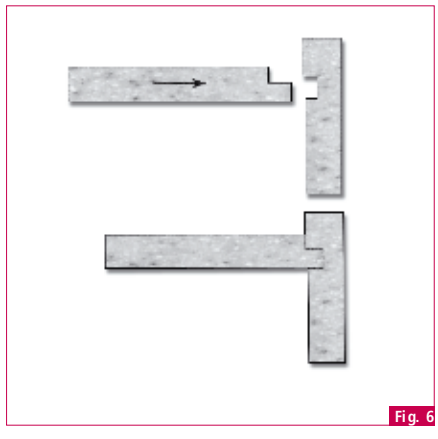


Fig. 6

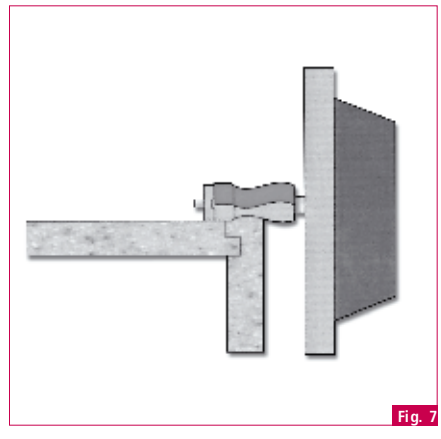


Fig. 7

Section 14

Backsplashes

Backsplashes

Backsplashes

Backsplashes

14.1 Upstands or curved backsplashes can be created with either a square or a coved detail at the internal joint (Fig. 1).

14.2 One method is to attach a square cut upstand to the top edge of a counter with either HI-MACS® adhesive or a suitable colour matched silicone sealant.

14.3 A common alternative method is to form a coved upstand with an internal radius.

14.4 Start by rebating the face side of the sheet which will form the counter, to a depth of 2 mm x 25 mm wide (Fig. 2).

14.5 Cut a section of HI-MACS® 25 mm wide, this will form the internal cove. The machine you must use is a 10/12 mm radius using an overhead router or spindle moulder (Fig. 3).

14.6 Cut a square section of HI-MACS® to the required height for the final upstand.

14.7 Rub down all edges to be bonded with 150/180 grit paper and clean with denatured alcohol and a white cloth.

14.8 Apply a sufficient amount of adhesive to all edges and secure with screw clamps. Allow adhesive to fully cure before sanding (Fig. 4).

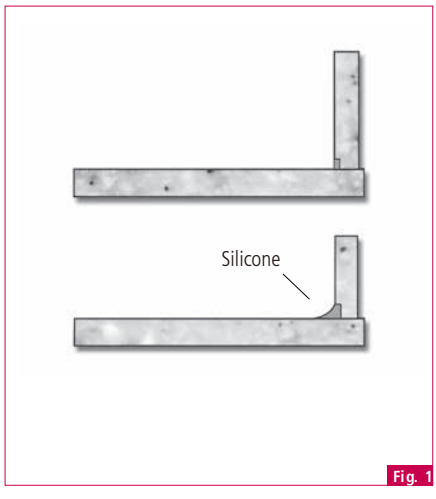


Fig. 1


Fig. 2

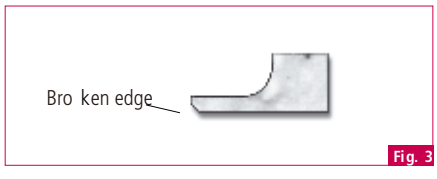


Fig. 3

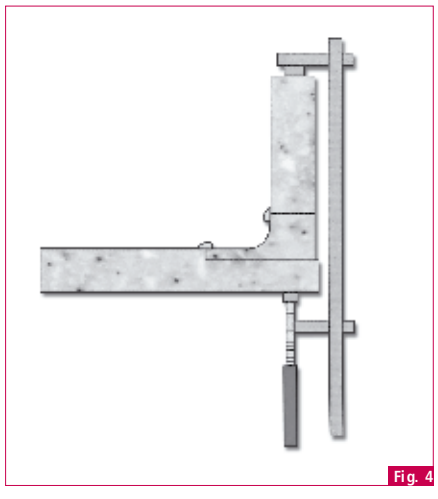


Fig. 4

Section 15

Shape Installation

Shape Installation

Shape Installation

Shape Installation

15.1 Thermoformed Sinks and Bowls can be fitted in two ways: undermount with a rebate if using the same colour of sheet and moulding (Fig. 1) or without a rebate if using different colours of sheet and moulding (Fig. 1a).

15.2 A rebate (45°) must be made when working with sheets & moulding of the same colour in order to minimise potential colour differences between the thermo-formed bowl and the sheet and to be covered by limited installation warranty.

15.3 Position cut-out template correctly from the back of the HI-MACS® and fix it with clamps.

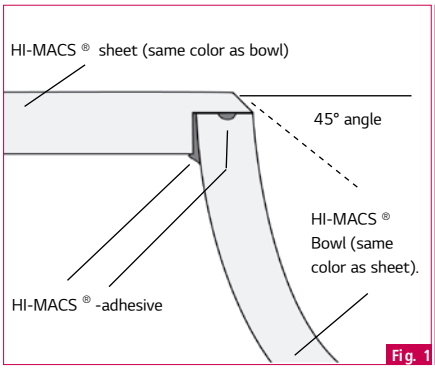
15.4 Route cut-out (clockwise). Use a sharp 10 mm single flute carbide router bit with a 30 mm sleeve guide.

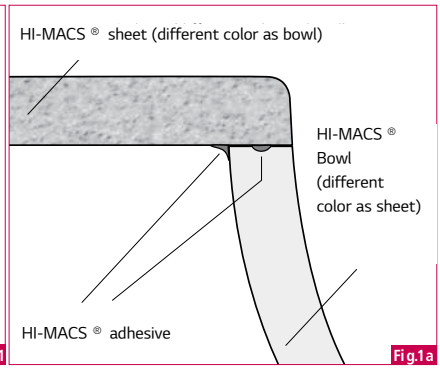
15.5 Remove cut-out template and position rebate template. Use a sharp 20 mm double flute carbide. Router (side and ground cutter) with a 30 mm sleeve guide. Install depth of router to leave a gap of 4 mm.

15.6 Remove rebate template and proceed with normal cleaning procedure (dena tured alcohol/white cloth).

15.7 Prepare HI-MACS® adhesive and glue bowl into work top.

15.8 Clamp bowl. Do not over-tighten pressure and let adhesive cure (ca. 45 min/+18°C).





Shape Installation

Shape Installation

15.9 Take off clamp system and turn over sheet.

15.10 Trim cut-out with a tungsten carbide profile router bit with Nylon bearing. Always use a profile of 45°. Do not use any radius as it may cause a potential colour difference between the sheet and moulding.

15.11 Sand and finish off to a standard semi-gloss finish as recommended.

15.12 To butt under-mount sinks and bowls, simply attach the sink to the underside of the sheet using HI-MACS® adhesive after sanding the back of the sheet with 180 grit sandpaper.

15.13 Position the moulding and fix position plugs (Fig. 2).

15.14 With a separate template made out of wood, make a smaller cut-out.

15.15 Sand both bonding surfaces with 150/180 grit sandpaper and clean with denatured alcohol and a white cloth prior to bonding.

15.16 Prepare HI-MACS® adhesive and bond both parts with a clamp (Fig. 3).

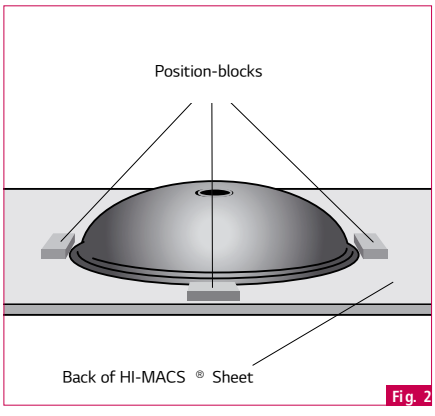


Fig. 2

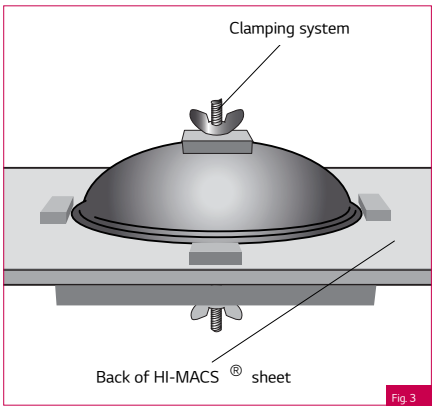


Fig. 3

Shape Installation

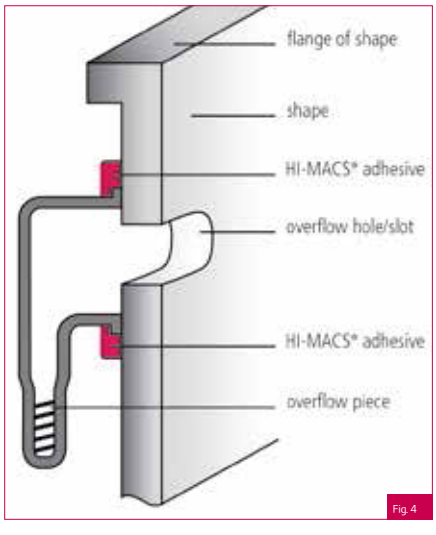
Shape Installation

15.17 Once the adhesive is fully cured, plunge a 12 mm tungsten carbide tipped router cutter through the sheet to create access for a straight roller bea ring cutter. Change the cutter in the router and remove the unwanted sheet above the bowl or sink.

15.18 Sand down the joint in the normal way with various grades of abrasive paper.

15.19 Safety checklist :
- Check all electrical tools prior to use.
- Only use sharp cutters.
- Always wear safety glasses or goggles or a visor.
- Do not wear loose clothing.
- Work in a well-lit and well ventilated area.

15.20 The overflow and the sink/bowl that you received are not yet bonded together. Before installation, please proceed as follows:
- Place overflow piece into the right position behind the overflow hole on the back side of the sink/bowl.
- Use a WHITE HI-MACS® adhesive and place an adhesive bed around the plastic part as per figure 4.
- Ensure that adhesive does not drop down.
- Hold the overflow piece in position with a removable tape.
- Ensure that the positioning of the overflow piece is correct and not too much adhesive is squeezed out from inside of the plastic overflow piece as this may not look nice when looking at the shape after installation.
- Keep overflow still and in place until adhesive is totally cured then remove tape.



Section 16

Sanding Process

Sanding Process

Sanding Process

Sanding Process

16.1 The final process in the fabrication of all HI-MACS® elements is to sand (and/or to polish for special applications).

16.2 Under normal circumstances, begin by sanding the entire element with 120 grit paper. In instances where there has been no prior fabrication of the sheet, it is possible to start with 280 or 320 grit.

16.3 Always use dust extraction systems at all times when sanding, this will help pick up loose particles of grit and prevent unwanted scratches.

16.4 Build up to finer and finer levels of grit size, taking care to clean down between each change with a damp cloth. Finish with a 320 grit paper, followed by Superpad S/G 1200 from Jöst to reach a recommended semi-gloss level.

16.5 To improve the gloss level of the surface use 1200/1500/1800 wet or dry Scotch Brite pads, or polishing pastes available from 3M or other manufacturers. High-gloss finish level is very high-maintenance and not recommended for normal use, but is ideal for art subjects. High-gloss finish Level is NOT covered under the 10 - years limited installed warr anty program.

16.6 Keep the sander moving slowly in circles at all times, first in an East – West direction then North – South (Fig. 1). Ensure that you use proper equipment, like a random orbital sander with a flat pad. For straight surfaces always use a hard pad. Soft or super-soft pads are recommended for curved surfaces.

16.7 Never concentrate on one specific area, particularly near joints, as this can lead to dipping.

16.8 After each sanding step, wipe off dust, then start with the next step.

16.9 Be aware that some dark colours need more careful sanding than some other lighter colours.

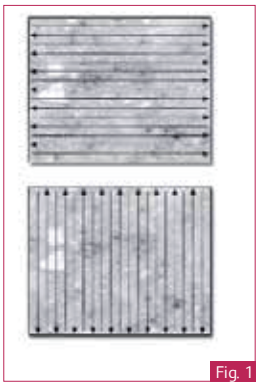


Fig. 1

Section 17

Substructure

Substructure

Substructure

Substructure

17.1 HI-MACS® Natural Acrylic Stone™ mainly needs to be supported to avoid any kind of dip.

17.2 Depending on the application, the following support materials are recommended:
- Steel/stainless steel profiles
- Aluminum/aluminum profiles
- Moisture-resistant MDF, plywood or particle board
- Plasterboard or other alternative constructional boards

17.3 When used as a kitchen work surface, a frame substructure is strongly recommended. A full sub-structure can, but need not, be used (Fig. 1).

17.4 Adjust all substructures with elastic silicone or with an permanent elastic PU adhesive to the back of the HI-MACS® sheet, preferably in dots at a maximum spacing of approximatly 100 mm.

17.5 Wooden strips should have a width of approx. 80 mm.

17.6 Rebate for reinforcement strips should be provided.

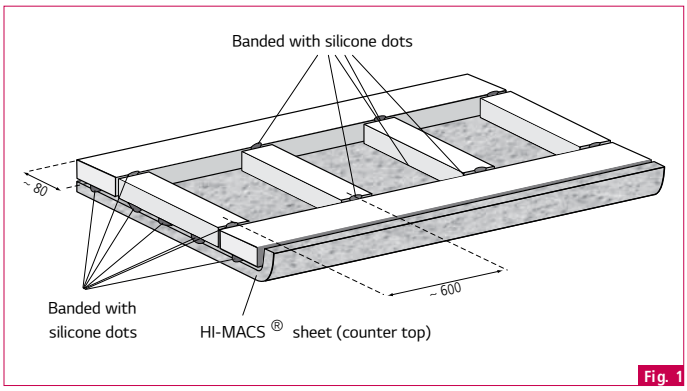


Fig. 1

* For more information on installation at customer's place: Technical Bulletin 2 + 3

Section 18

Repairs

Repairs


Fig. 1

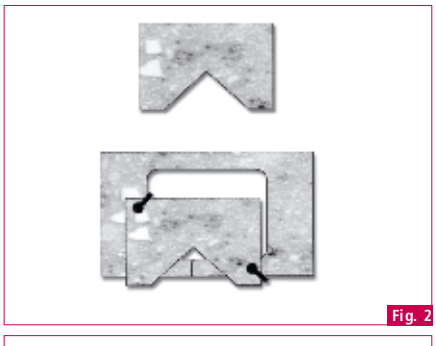


Fig. 2

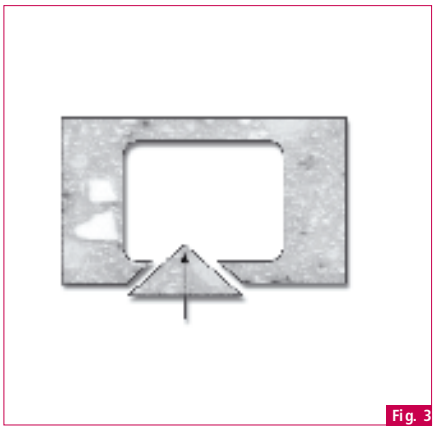


Fig. 3

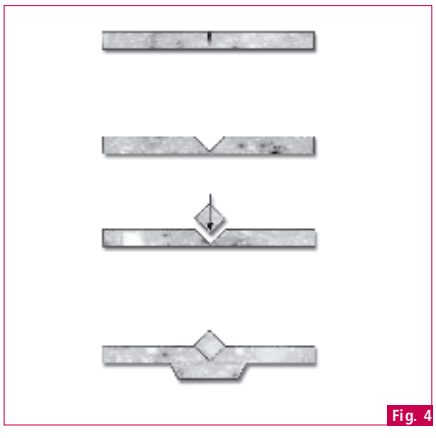


Fig. 4

Repairs

Repairs

18.1 One of the main advantages of HI-MACS®, 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.

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

18.3 With small indentation marks it is possible to drill out the affected area and fill the hole with HI-MACS® 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.

18.4 For larger areas of damage, particularly with the Granites and Sands, a plug repair is a possible alternative solution. Router cutters are available from Titman or Trend (Fig. 1).

18.5 For major damage, such as cracks or burn marks, a 9 or 12 mm triangular piece of HI-MACS® (same thickness as installed) will need to be fitted. Make a template as shown in Fig. 2, 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 off-cut of colour matched HI-MACS® sheet or, even better from the same sheet, to minimize any colour difference.

18.6 Bond the triangular spare piece with HI-MACS® adhesive and reinforce the underside (Fig. 3).

18.7 To repair a broken joint, first machine a 'V' groove down the entire length of the crack.

18.8 Cut a square section of matching HI-MACS® so that when turned through 90°, it fits the groove (Fig. 4).

18.9 Apply HI-MACS® - adhesive into groove and push the square section home until sufficient adhesive is forced upwards.

18.10 Once fully cured sand down the new section as normal. Ensure that the seam has a reinforcement beneath prior to completion.

18.11 Always leave sink or bowl cutout in your drawer for repair.

Section 19
Thermoforming

Thermoforming

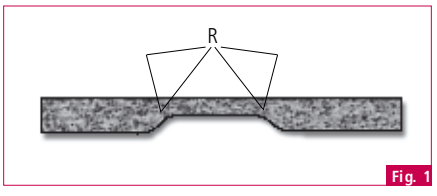


Fig. 1

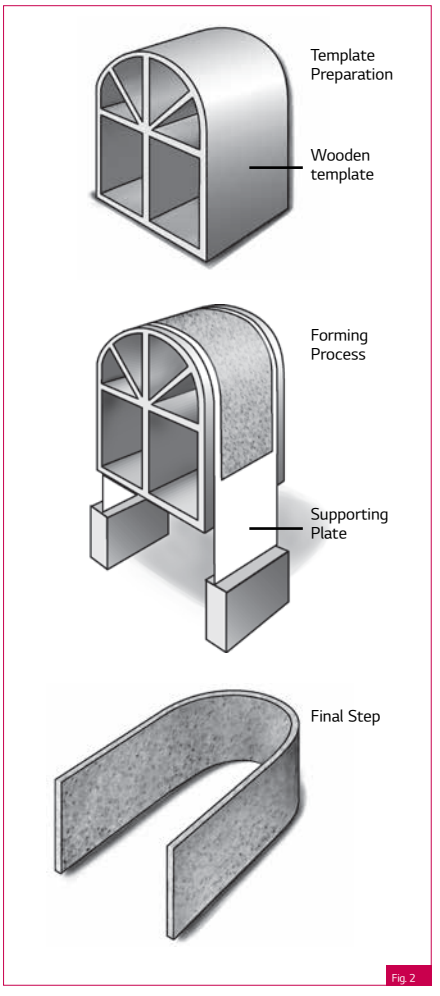


Fig. 2

Thermoforming

Thermoforming

19.1 HI-MACS® can be moulded to a tight radius by means of heating. The oven must heat the entire sheet for the thermoforming to be successful.

19.2 The sheets need to be heated to a temperature of 160 – 180°C, but should never exceed 200°C.

19.3 Remove the protective film prior to heating.

19.4 The minimum moulding radius for 12 mm HI-MACS® is approx. 45 mm for Solids, Pearls and Sands and a minimum moulding radius for 12 mm HI-MACS® Quartz and Granite approx. 100 mm to 120 mm. Be aware that the darker the colour and the smaller the radius, the more whitening there may be.

19.5 The sheets should normally be heated for 15 to 30 minutes, depending on batch (manufacture date), heating temperature and pre-heated oven. Rebating the reverse side in the area to be moulded can result in shorter heating times and smaller radius. Fig. 1.

19.6 Once heated to the required temperature remove workpiece with heatresistant gloves from the oven and place directly into a mould. Fig. 2. Male and female moulds are required. Allow heated material to shrink in the mould.

19.7 Leave the sheet in the mould until the sheet has cooled down, to approx. 60° C at least, (typically 20 – 40 minutes, depending on the material of the mould). Always wear heat-protection gloves for this operation.

19.8 Never attempt any shock cooling as this can cause stress to the material.

19.9 Attempting to bend HI-MACS® at lower temperatures or shortening the heating cycles will often result in “whitening” or cracking of the edge.

19.10 Normal sanding and finishing of the moulded edge can be carried out once the sheet is fully rigid.

* Further information: Technical Bulletin 8

Section 20

Use & Care

Use & Care

Use & Care

Use & Care

If you have searched long and hard for a superior quality, durable and tough material, we would like to congratulate you for choosing HI-MACS® Natural Acrylic Stone™. The material is hard-wearing, extremely repellent to stains and is therefore very easy to look after. We would like to provide you with a few simple tips and hints for caring for your product so that you can enjoy its exceptional quality for many years to come.

General day-to-day stains

HI-MACS® is a completely homogenous material. As it does not have any pores, you can simply and easily clean it with a damp cloth or sponge and a mild detergent. You can also use a domestic scouring agent on all matt finishes. It is also useful to wipe your surface occasionally with a scouring agent or wet sponge to retain the even finish of your product.

Tougher stains

Tougher stains, caused by food colouring, tea or fruit juice can easily be removed using a bleaching agent (do not leave in contact with the work surface for more than five minutes). Clean the surface with a domestic all-purpose cleaner and rinse with clean water. You can also use a scouring agent on matt finishes. Nail varnish can easily be removed with nail varnish remover (acetone-free) or a scouring agent.

Acidic cleaning agents

A number of cleaning agents contain acids, such as methyl chloride or acetone. You should avoid using these on a HI-MACS® surface. Should one of these products accidentally come into contact with the material, as a precautionary measure you should rinse the surface with soapy water to prevent any discolouring taking place.

HI-MACS® is an ecological material. Its mineral and acrylic composition, environmentally-friendly and virtually ”waste-free“ manufacturing process give it top marks in terms of “eco-friendliness.”

There can be no dirt build up where there are no joints. HI-MACS® can be simply and easily joined seamlessly.

Renowned hotels and restaurants rely on HI-MACS® because of its ease of care.

Use & Care

Use & Care

Hot objects
Hot saucepans or pots straight out of the oven or from the hob should not be laid directly on the HI-MACS® surface. Place a mat or board underneath to prevent any damage to your product.
If you pour boiling liquids into HI-MACS® sinks or basins, you should also pour in cold water at the same time.

Burn marks
Small burn marks or marks caused by nicotine can simply be removed using a scouring agent or an abrasive sponge. Should this give the high-gloss finish a matt appearance, rubbing the surface with a scouring pad will quickly return it to its high-gloss state.

Sharp objects
HI-MACS® copes effortlessly with the wear and tear of everyday life, however pointed or sharp-edged objects can leave cuts or scratches on the HI-MACS® surface. You can repair smaller cuts and scratches without too much trouble but we recommend the services of a professional for especially deep cuts.

Quality and environmental awareness
All HI-MACS® products are manufactured in accordance with the ISO-9001 Quality Process for Systems and Processes and the ISO 14001 Environmental Management Standard.

LG Hausys

www.himacs.com

HI-MACS®

Fabrication Guidelines

Technical Bulletin – Interior 2016

Acrylic Solid Surface

Contents of Technical Bulletin - interior

Interior 01.

Application Specifications

Application Specifications

Technical Bulletin – Interior – 01

This bulletin summarizes specific characteristics and properties of HI-MACS® which have to be taken into account when designing, specifying and selling a HI-MACS® product of sheet and shape to obtain a successful application. This Technical Bulletin is a base element to ensure the correct use of this high performing material and meet customers and end-consumers expectation while building further a cornerstone for our HI-MACS®-Warranty Program.

Color influences

Dark and heavily pigmented colours of HI-MACS® will show dust, dirt and ordinary wear and tear more readily than light colours or colours with a structured texture. Dark and heavy pigmented colours are more delicate (e.g. G-09, G-10, G-15 etc.) and are best used for decorative applications. When used in heavy-frequent-use installations, such as kitchen countertops, it is very difficult for an end-consumer to maintain the finish of the product to his expected satisfaction. Ensure to inform a customer of such kind of potential problems that could show up later on.

Do not oversell the product, but promote its fantastic and special performance for many, many applications, e.g.:

- Vanities and thermoformed design-vanities
- Check-in counters at airports, train stations or bus terminals
- Fruit-counters and shopping mal counters
- Reception desks and conference tables
- Bars and restaurants
- Wall cladding, dividing walls and ceiling projects
- Hospitals and health care sectors
- Columns and arts etc.

Any complaints belonging to above mentioned material restrictions with reference to dark and heavy pigmented colours in certain application limitations will not be accepted for any warranty case.

Particulate colors

A continues distribution of different sizes of particulate colors gives HI-MACS® Sands, Pearls, Granite, Quartz, and Volcanics-families their unique natural stone appearance and aesthetic beauty. Random particulate distribution is a feature of those colour families.
This random spread of particulates goes through the whole material thickness.
Because of the complexity of this manufacturing process, particles may congregate in one or another area or even appear brighter but may slightly show a different look in colour. Those irregularities cannot be 100% controlled but the investment of quality control is increasing every time to provide our customer with best products every time. Be aware about those specifics and take this into account when fabricating such colours using specific methods, such as described in the Fabrication Guidelines or specific Technical Bulletin. Always check the work you have done before transport starts.

Application Specifications

Technical Bulletin – Interior – 01

Artificial light

Artificial light might change the colour slightly into different ranges of the light spectra.
The material translucency of HI-MACS® will apparently absorb room colours and may change the material colour look by intensive room color pigments.

Horizontal applications

A) Use of 12mm HI-MACS® sheet thickness:
For horizontal application, like kitchen countertops or food counters use 12mm HI-MACS® only. This is mandatory to all applications where heat zones are integrated or in immediate neighbourhood.

B) Use of 9mm HI-MACS® sheet thickness:
For such applications, where there is no heat or structural need, like e.g. in shop fitting applications as flower shops, optician shops or coffee shops, tables, furniture etc. 9mm HI-MACS® can be used and will be covered by the LG Hausys.

C) Use of 6mm HI-MACS® sheet thickness:
Not to be used for horizontal applications, will NOT be covered by LG Hausys if you do so.

Vertical applications

HI-MACS® sheets in 6mm thickness should be used for vertical applications, but 9mm and 12mm thick HI-MACS® sheets can be used as well as vertical applications.
Seams need to be supported by a reinforcement strip in the same thickness as the cover material.
This needs to be taken in consideration when planning a wall cladding job or any other vertical use properties.
In areas where successive heat is created, like heat radiators or fire places a minimum of 400mm distance is to be taken in consideration and/or special insulation material needs to be installed.
Use of 6mm HI-MACS® sheets in vertical applications are covered under the HI-MACS® Warranty Program, when following the published fabrication guidelines (Fabrication Manual and Technical Bulletins) and special substructure and specific fixing methods have been foreseen.

Applications in Steam room, Sauna & Swimming pools

It is not recommended to use HI-MACS® sheets in such applications as saunas, steam rooms or in swimming pools. Due to the high influence of constant exposure to moisture and humidity, expansion and contraction are very difficult to control. Such applications are NOT covered under the HI-MACS® Warranty Program.

Applications in flooring, tiles & stairs

HI-MACS® sheets can be successfully installed in non heavy traffic flooring applications, limited to non large areas. Due to heavy use and mainly in reference to dark colours, dirt, dust and ordinary wear will be more visible and therefore demand more regular and/or special maintenance. Flooring applications are NOT covered under the HI-MACS® Warranty Program.

Application Specifications

Technical Bulletin – Interior – 01

Product finishing

All products manufactured by LG Hausys or for LG Hausys are delivered with a uniform Semi-Gloss Finish.
For all general applications of fabricated products a "Semi-Gloss-Finish" is highly recommended. Follow the recommended Fabrication Guidelines for the latest "Sanding Technique" to achieve the preferred results in the most efficient way.

High-Gloss-Finish is possible but not recommended for normal and high traffic use of surface area.This finish requires much more permanent care and will take end-consumers full attention and may not meet their expectations. Therefore the material can be handled best by professionals only.

High-Gloss-Finish should mainly be used for decorative purposes and subject to designers' special specifications or very special applications within a signed agreement of LG Hausys. Designers / consumer should be made aware of this specific "Use & Care" of High-Gloss-Finish.
High-Gloss-Finish is NOT covered by the HI-MACS® limited installed warranty.

Thermoforming

The material property of HI-MACS® allows with specific controlled heat to thermoform HI-MACS® 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.

LG Hausys covers within the Warranty Program such products only,where all parameter (like e.g. proper mould materials and mould conditions, range of temperature and heating time, cooling time and cooling temperature of the mould, Tg of the sheet material, minimum radii are not undertaken, etc) are recorded and approved.

Exterior applications

The contents of HI-MACS® sheets, such as acrylic and natural colour pigments have a good resistance to UV light and Xenon light. But it is a matter of fact that some colours perform better than others.
A weather resistance test showed no visible change after 1000h (ASTM D 1499).

Long term external applications of HI-MACS®, like any other material, will be impacted by elements like acid rain, heavy sunshine, thin layers of dust and algae - weather influence that will impact the surface or slightly fade the colour. Those changes can be removed by periodic maintenance but needs to be handled via specialists with special equipment.

Application Specifications

Technical Bulletin – Interior – 01

For use in external applications specific techniques, structures and hanging systems are required, taking into account ventilation, insulation, wind factor resistance, draught and pressure etc.
Always consider to allow expansion and shrinking of HI-MACS® sheet material.

National and local building rules and laws need to be fulfilled. Ensure all necessary test criteria for HI-MACS® or its combination with other building materials have been certified before applying HI-MACS® in external applications. At this stage, external use of HI-MACS® is NOT covered under the LG Hausys Warranty Program.

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It is offered exclusively to provide possible suggestions for your own experiments and needs approval from LG Hausys, Branch for Warranty. This bulletin is not intended to replace for any testing you may need to conduct to determine for yourself the suitability of our products for your particular purpose. Since LG Hausys cannot anticipate all variations in actual end-use conditions, LG Hausys makes no warranties and assumes no liability in connections with any use of this information.
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Interior 02.

Installation Guidelines

Installation Guidelines

Technical Bulletin – Interior – 02

This bulletin summarizes the standards that must be applied within the HI-MACS® Warranty Program when installing HI-MACS® at end consumers place.

Safety

The installer is responsible to ensure that all workers follow the local Health and Safety regulations, before, during and after the job installation.

Preparation

- Check delivered goods for any potential transportation damage. (it is recommended to do this check upon receipt of the material)
- Do not install any damaged goods.
- Allow material to reach room temperature before placing it into final position for installation.
- Work in an environment temperature of at least +18°C to ensure that the adhesive cures properly.
- Tops of cabinets or support angles have to be flat and leveled.
- Ensure the fabricated goods have enough support, at least every 600 mm, when installing in a horizontal position to prevent flexing and long term deformation.
- Bring all necessary tools in the right position and check adhesive for expiration date.
- Always use dust collectors whenever needed - especially when sanding HI-MACS® sheets or / and shapes or any other kind of product made out of HI-MACS®.

Trial fit of a HI-MACS® countertop

- Make a dry fit of all countertop parts.
- Adjust factory prepared seam with a mirror cut if necessary.
- On each sidewall leave a gap of at least 1,5 mm between wall and HI-MACS® countertop or 1mm per runningmeter (overall min. of 3mm).
- Ensure all edges left have been sanded and trimmed with a radius of min. 1,5mm.
- In case of any kind of heat protect the HI-MACS® sheet with an insolating slab (if not already foreseen from the factory side). (Styropoor or Styrodur etc.)
- Corner carrousel units:
- fit support material like battens to the kitchen walls behind the carrousel unit
- support the rear edges of the countertop into a proper way to avoid warping of the countertop.
- do not allow any flexing at the inside corner by placing support material like thin stripes of wood or laminate etc. on the kitchen cabinet.
- Place enough support when countertop will have an oversize or housing niche to avoid any kind of dip.

Installation Guidelines

Technical Bulletin – Interior – 02

Installing the hob

When installing a hob into the HI-MACS® cutout of the countertop ensure the insulation tape like a Koawool tape (thickness of 2mm) or a Neoprene tape (thickness of 1,2mm) or an Aluminum tape (thickness of min. 0,13mm, exp.: no. 425 from 3M) is installed all around the edges of the cutout.

If insulation taps are not installed, do so and place mentioned taps above on the edge of the cutout to avoid conducting heat.Make sure that the tape goes just beyond the flange on the surface and is placed down vertically inside of the cutout.

Check before installing the hob, that all edges have a min. radius of 3mm. If not, touch-up all edges (top and underneath edge). If there is a sub-frame construction underneath use the profile router bit of Titman (Ref.: XC341*12).

Ensure inside corners have a radius of at least R ! 5mm. (preferably made with a router and a straight cutter router bit of 10mm or 16mm to adjust to the Titman bearing of ø 15,9mm of the router XC341*12) .

Do NOT damage any insulating or protecting tape during installation of the hob.

Installation of the tap

- If the whole is prepared, check size of the whole to fit the tap.
- When tap whole is needed best is to use a hand router with a straight cut router bit, sleeve guide and template.
- Ensure all edges are not sharp and have a radius of min. 1,5mm (top and underneath edge of the HI-MACS® sheet).

Bonding

- When seams fit perfect together, start preparing all necessary tools to bond the two pieces of HI-MACS®.
- Clean the surface of the seam which you want to bond with clear denatured alcohol and a clean white cloth (or a white industrial paper).
- The glue line should be smaller than the thickness of a paper to make the seam almost inconspicuous after finish.
- In case of butt joint ensure both pieces of HI-MACS® are perfectly even.
- Ensure the HI-MACS® adhesive color matches the HI-MACS® sheet color as per our recommendation list (see "Adhesive Color Recommendation list").
- A reinforcement strip underneath of each seam is mandatory. For a kitchen countertop both edges have to have a 45° angle, glued on with a fulfilled HI-MACS® adhesive. Squeezed out adhesive needs to be cleaned off and smoothly sanded.
- A continuous bead of HI-MACS® adhesive is squeezed out when clamping both pieces of HI-MACS® together.
- Do NOT apply excessive pressure as this may squeeze out to much adhesive, which will weaken the seam strength.

Installation Guidelines

Technical Bulletin – Interior – 02

Fixing countertops

• Fix countertop to cabinet with wooden screws into the sub-frame of the countertop.
• Choose the length of screw that it does not touch HI-MACS® sheet from underneath.
• Do NOT directly screw into HI-MACS®.
• If you have to do so, use plastic or brass inserts only. Do NOT place such whole very close to the edge. Leave a distance of 15mm at least.
• Ensure length of the screw does not touch surface from underneath at any time.
• Install protection tape or special protection profile for washing machine or dishwasher to avoid steam and moisture will access to the sub-frame construction.

Finishing the countertop

When the adhesive has set in the seams (ca. after 45 minutes at an room temperature of approximately +20°C), remove the excess with a sharp planer and sand flush with a random orbital sander using a plane and straight hard disc with 150/180 grit sandpaper (or 80/100 micron finishing abrasive disk).

Sand further through all necessary steps up to a semi-gloss finish (220/240, 280, 320, 360) and finish off with a Scotch Brite pad or "Superpad S/G". Alternative sandpaper is "micron" finish disks (100, 60, 30) - (see Technical Bulletin "Sanding").

After each step of sanding, clean off the countertop by using a soft industrial paper following one direction only.

Ensure to avoid irregularity of the HI-MACS® surface patina. (be aware that dark color pigmented sheets and shapes needs to have more care in finishing).

Hand over the HI-MACS® and Care & Maintenance to the end user

- Clean up and do final check.
- Get the customer to check and approve the installation.
- Explain to the customer the daily and the weekly use of his HI-MACS® application. Show and demonstrate how to clean and how to remove stains or small, little scratches.
- Go with the customer through the Care & Maintenance leaflet point by point and specially point out NOT to put hot kitchen or ovenware directly on the surface. Advice customer to use always a heat protection.
- Fill in the Warranty documents and hand over all necessary documents to the end consumer

For customer service, always leave a piece of color match material (e.g. hob-or sink cutout) from each counter at the job side to be placed for safe keeping to ensure to have an original piece available for any future minor repair need. (put it e.g. underneath the bottom drawer of the kitchen cabinet with a label on it to mention for potential repair of HI-MACS®, original matching piece from installation).

Installation Guidelines

Technical Bulletin – Interior – 02

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Interior 03.

Hob cutout

Hob cutout

Technical Bulletin – Interior – 03

This bulletin summarizes the standards that must be applied within the HI-MACS® Warranty Program when fabricating HI-MACS® to prepare the countertop for hob installation.

Safety

The fabricator is responsible to ensure that all workers follow the local Health and Safety regulations, before, during and after the job.

Safety checklist

- Check all electrical tools prior to use.
- Use sharp cutters of router bits only.
- Always wear safety glasses.
- Do not have loose clothing.
- Use dust collection systems whenever necessary.
- Work in a light, well ventilated area.
- Wear gloves when handling with cut sheets

Preparation of cutouts for hobs
Step by Step

Internal corner cutouts for hobs will always be subjected to higher stress. Therefore this installation requires a sensitive area to be handled very accurately.

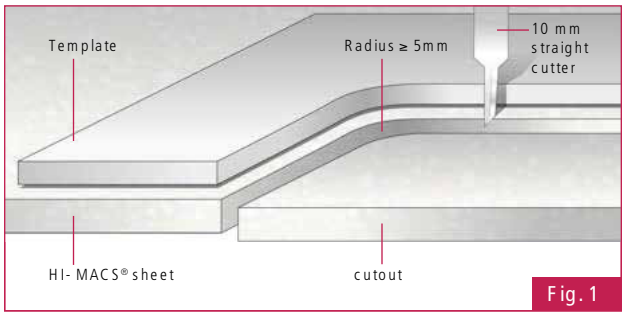

Fig. 1

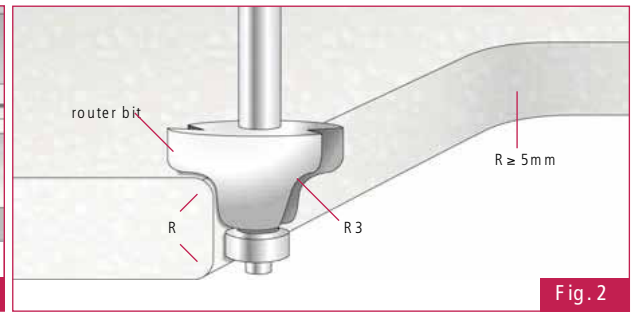

Fig. 2

Do NOT use any jigsaws or any mason's hand-saw when preparing a hob cutout in a HI-MACS® counter top.
Machine the cutout using a CNC router or a hand router with a straight cutter and sleeve guide and a template according to the hob which needs to be installed. **Fig. 1**
The internal corner radius should have a minimum size of at least R ≥ 5mm.

When you have worked with a hand router: after the cutout is finished, take away the template and trim the edges to put a minimum radius of R ! 3mm on both sides (top and bottom).
Using a single fluid radius router bit or the profile router bit of Titman (Ref. no.: XC341*12). **Fig. 2**
For CNC user, run a second lap to trim the edges with a radius of 3mm both sides of the HI-MACS® material.
After cutting the cutout proceed further with:
Sand all edges smooth, using 180 grid sandpaper (or 60 micron).

Hob cutout

Technical Bulletin – Interior – 03

Clean off the working area and make it dust free.

The internal edge of hob cut-outs should be covered with heat resisting materials. Self adhesive Neoprene tape or Koawool tape and cover with self adhesive aluminum reflective tape (3M, tape no.: 425) are good example. Or, other heat resisting materials that have enough performance for each residential or commercial heat generating equipment can be considered. **Fig. 3**

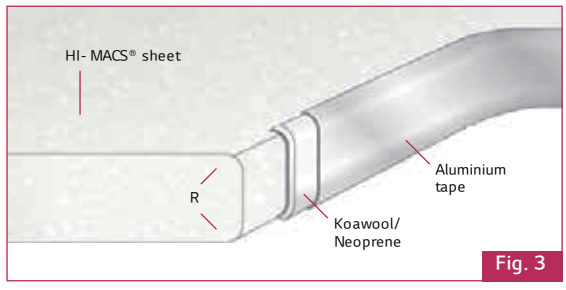

Fig. 3

Do NOT place any seam through a hob cut-out. Alwayswork in a non glued top for any hob installation. Always leave a minimum of at least 3mm space between the finished edge of the cut - out of sheet and the undercarriage of the appliance - if possible (pending on chosen hob type and its flange size.)

Installing a flush mounted hob

Prepare hob cut-out as described above, round and sand the edges smooth. The installation of a flush mounted hob needs to be fixed into the sub-frame construction of thecounter top.

Do not screw directly into the HI-MACS® sheet. Close the gap between the edge of the cut-out and the "ceran"-field of the hob with heat resistant elastic adhesive (exp.: elastic PU, SIKA). **Fig. 4**

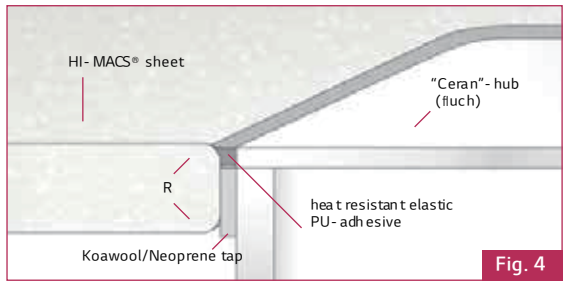

Fig. 4

The temperature that conveys from a hob appliance and any other heat source to HI-MACS® is limited up to 85℃.

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Interior 04.

Sanding of HI-MACS® products

Sanding of HI-MACS® products

Technical Bulletin – Interior – 04

This bulletin summarizes the standards that must be applied within the HI-MACS® Warranty Program when fabricating HI-MACS® sheet and HI-MACS® shapes with HI-MACS® - Adhesive.
Sanding is the most sensitive part of the entire project and can be a very huge issue to win or to loose a customer.

Safety

The fabricator is responsible to ensure that each worker follows the local Health and Safety regulations, before, during and after the job.

Tools & Technique required:

- Best experiences have been made using a random orbital sander by air or electrical power.
- For large areas use a sanding pad as big as possible up to ø 500 or ø 600mm (if available) when working with hand machines.
- Most of the time working with a pad of ø 150mm will be done, because sandpaper disks of this size are more available in the market.
- A special sanding technique is required to minimize or to avoid sanding marks or cloudy shadow marks on the surface. (See description below)
- For flat areas use a hard pad.
- For edges and profiles use a soft or super soft pad or special foam connected to the pad for edges and profiles.
- Do not apply too much pressure during sanding but use equal pressure and speed.
- Large sections of HI-MACS® sheets can also be sanded with a wide belt sanding machine having at least 3 belts in one row. Such work process allows to achieve a better calculation price of fabrication and labor costs.
- Run small steps only, and take off not more than 0.1mm per process flow. Taking off more material in one go causes heat and will deform the sheet flatness. Ensure HI-MACS® sheets will not heat up because of too high or low speed of the sanding machine.

Sanding requirements:

Under normal circumstances, follow the sanding steps mentioned in the spread sheet below. Ensure to run the sanding process in a professional and consistent method as described in this Technical bulletin.
Be aware, that the recommended gloss finish for HI-MACS® standard fabrication is a “Semi-Gloss-Finish”.
High-Gloss-Finish can be done as well, but should be used for art applications only and is NOT covered under the LG Hausys Warranty Program.
Be aware, that some colors of HI-MACS®, especially darker colors with higher color pigmentation need to have more sanding and finishing care. (This should be taken into consideration when calculating a project.)
Always use a dust extraction system when sanding.

Sanding of HI-MACS® products

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Recommended Sanding Steps:

Finish-Level	**Matt-finish**		**Semi-Gloss-finish**		**High-Gloss finish**	
HI-MACS® color family	for all Solid colors		for all colors of: Sands, Pearls, Quartz, Granite, Pernas, Volcanics		for all Solid colors	
Sanding steps	micron-sandpaper	grid-sandpaper	micron-sandpaper	grid-sandpaper	micron-sandpaper	grid-sandpaper
Step 1	100/80µ	150/180	100/80µ	150/180	100/80	150/180
Step 2	60	220	60	220	60	220
Step 3	"useit" ® Superpad S/G 240 or Maroon Scotch Brite ™ 7447	280	40/30	280/320	30	280/320
Step 4	industrial paper towel	"useit" ® Superpad S/G 240 or Maroon Scotch Brite ™ 7447	"useit" ® Superpad S/G 240 or Maroon Scotch Brite™ 7447	380	15	380/400
Step 5		industrial paper towel	industrial paper towel	"useit" ® Superpad S/G 240 or Maroon Scotch Brite™ 7447	9	600/800
Step 6				industrial paper towel	Finesse-it ™ Finisch-component	1200
Step 7						1500
						1800
						2500

Sanding of HI-MACS® products

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Sanding Technique:

When starting with the sanding process using the manual method, follow the direction < West - East > and than changing into < South - North > direction. **Fig.1**

Use ex-center position of the machine for rough sandpaper and change the adjustment to fine sanding by using finer grid sandpaper.

Run those directions two times in moving the random orbital sander in small circulars motion, where each move will overlap the small circle before. **Fig.2**

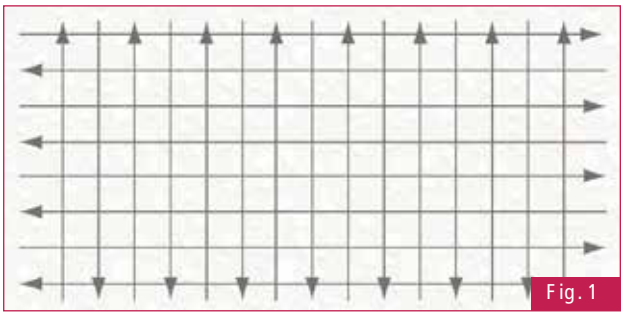
Fig. 1

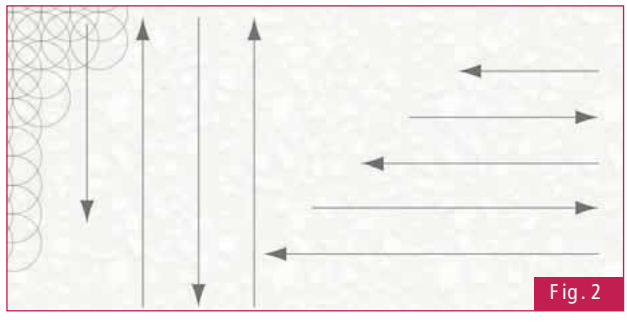
Fig. 2

Ensure the sandpaper disc does not start to clog.

Always take off dust when changing to the next step using asoft cloth.

When changing sanding process to step 3 or/and step 4 change the sanding direction into a diagonal direction and also change the sanding moves into - movements. Always ensure to overlap the movements. **Fig. 3**

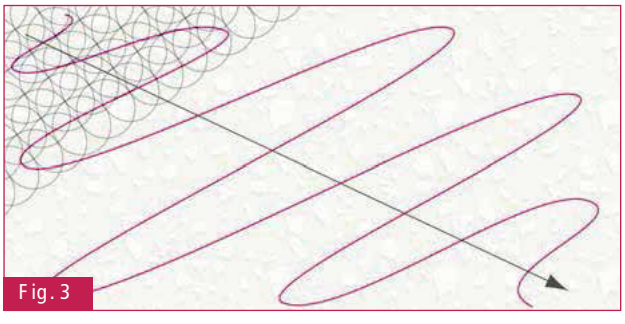
Fig. 3

Sanding of HI-MACS® products

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Interior 05.

Shape installation

Shape installation

Technical Bulletin – Interior – 05

This bulletin summarizes the standards that must be applied within the HI-MACS® Warranty Program when fabricating HI-MACS® sheet and HI-MACS® shapes with HI-MACS® - Adhesive.

Safety

The fabricator is responsible to ensure that each worker follow the local Health and Safety regulations, before, during and after the job.

Safety checklist

- Check all electrical tools prior to use.
- Use sharp cutters of router bits only.
- Always wear safety glasses.
- Do not have loose clothing.
- Use dust collection systems whenever necessary.
- Work in a light, well ventilated area.
- Wear gloves when handling sheets that are cut (sharpedges)

Shape installation

The overflow and the sink/bowl that you received are not yet bonded together. Before installation, please proceed as follows:

- Place overflow piece into the right position behind the overflow hole on the back side of the sink/bowl.
- Use a WHITE HI-MACS® adhesive and place an adhesive bed around the plastic part as per figure 1.
- Ensure that adhesive does not drop down.
- Hold the overflow piece in position with a removable tape.
- Ensure that the positioning of the overflow piece is correct and not too much adhesive is squeezed out from inside of the plastic overflow piece as this may not look nice when looking at the shape after installation.
- Keep overflow still and in place until adhesive is totally cured then remove tape.

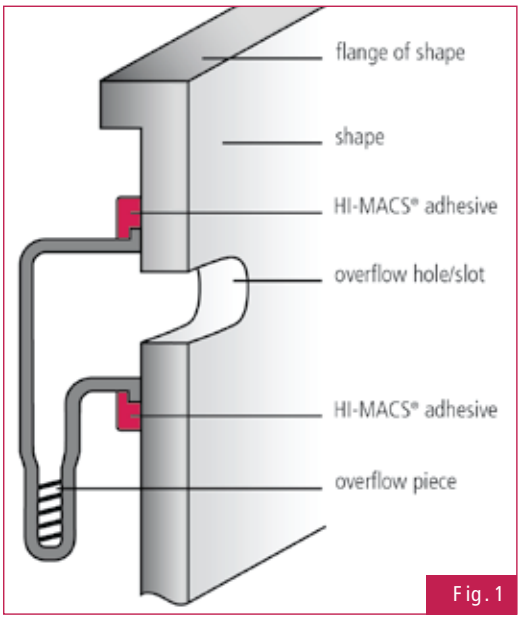

Fig. 1

Shape installation

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HI-MACS® cast sinks and bowls, HI-MACS® Thermoformed sinks and bolws can be fitted with the undermount technique with or without a rebate.
Using therebate method is mandatory when sheet and shape have the samecolor to be covered by the 10-years limited installed Warranty Program. **Fig.2**
When the color of the sheet and shape is different an easy butt seam undermount technique can be done. **Fig.3**

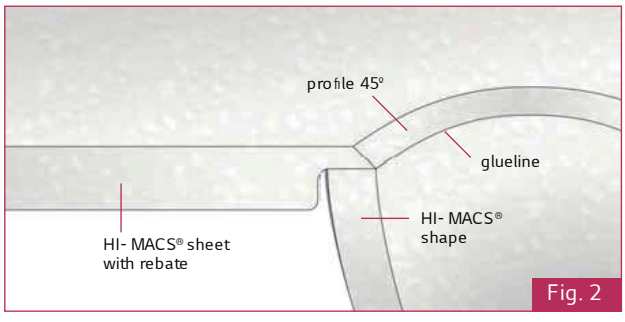

Fig. 2

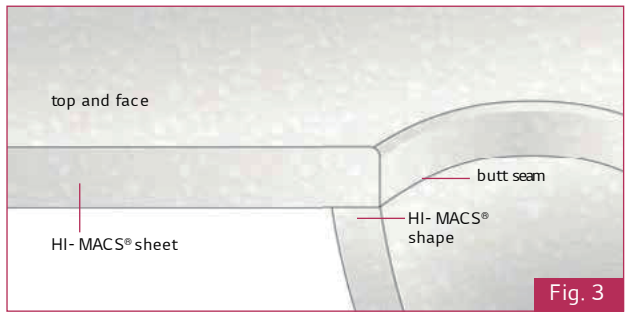

Fig. 3

Other shapes like stainless-steel orceramic shapes can be installed as shown in **Fig. 3** undermount and **Fig. 4** topmount.

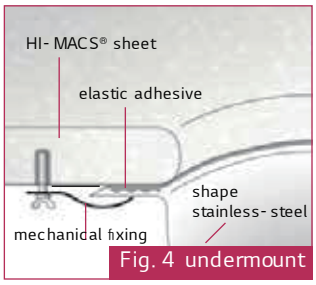

Fig. 4 undermount

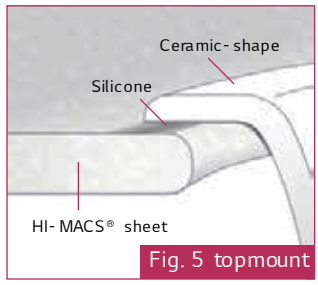

Fig. 5 topmount

Shape installation with rebate

Use a pre-made cut-out template made out of MDF or any other wooden material. Calculate the cutout so, that the whole of the final cutout in the sheet is smaller than the inside diameter of the shape. An overhang (oversize) of 2 to 3mm is fine. Bring the "cutout template" in position and fix it properly with clamps. Ensure the workpiece is in a straight position and properly supported. Rout the cutout (clockwise) by using a handrouter with a min. of 1,8KW power and which is ableto take a 12mm shank, a 10mm single flute carbide router bit with a 12mm shank and a 30mm sleeve guide. **Fig. 6**

Remove the"cutout template" and position the "rebate template". Use a sharp 20mm double flute carbide router (side andground cutter) with a 30mm sleeve guide. Install the depth of therouter in a way that at least 4mm of material thickness of the HI-MACS® sheet will be left.

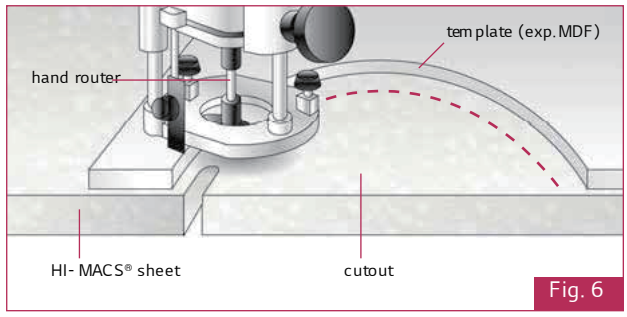

Fig. 6

Shape installation

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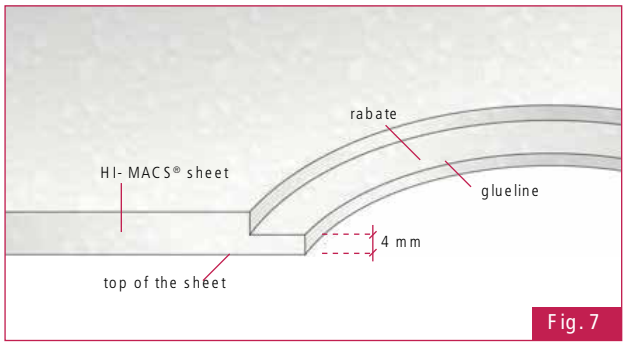

Fig. 7

After finishing this step, take off the "rebate template" and proceed with the normal cleaning procedure, using denatured alcohol and a white clean cloth or a white industrial paper. **Fig.7**

Clean the rebate and the edge of the shape which will be bounded to remove any dust, grease or pen marks – best with denatured alcohol and a white cloth. After cleaning do not touch with your fingers. If so, clean it again because dirt may show up in the glue line later.

Prepare HI-MACS®-Adhesive. Fill in the tube with the filler component of the tube with the hardener. Squeeze out some air and close the top of the tube with the plug. Put the tube in an orbital sander and mix it properly for at least 1,5 min. by moving the tube to the left and to the right direction. Ensure the mixing of the adhesive is properly done. Put on the adhesive in an continuous line into the rebate or on the edge of the shape. **Fig. 8**
Turn over the shape and position it into the rebate. Ensure the drain whole is on the right place when turning the sheet later and that the shape is placed square.
When the shape is in the right position, clamp it down with clamps or with a thread through the drain whole protected by a thick sheet of wood and additional clamps in front if needed. Ensure not to over tighten the strip. **Fig. 9**

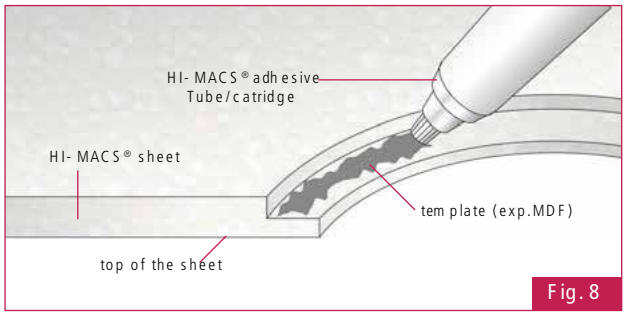

Fig. 8

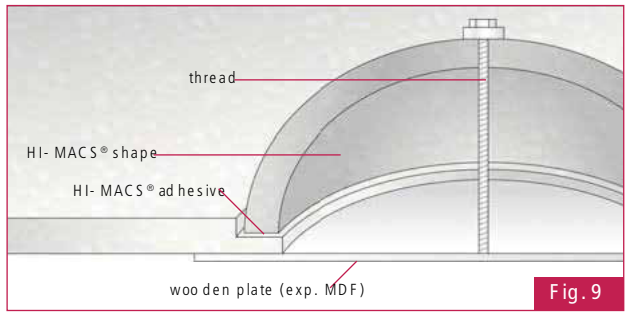

Fig. 9

Leave the HI-MACS®-Adhesive cure for at least 35min. by min room temperature of +17°C.

Take off the clamping systems and turn over the sheet.

Trim the cutout with a tungsten carbide profile router bit with Nylon bearing and a shank of 12mm.

Always use a profile of 45° and start exactly at the glue line between shape and sheet. Do not use any radius it causes to see more of an eventual slight color difference between sheet and shape of the same color. **Fig. 10**

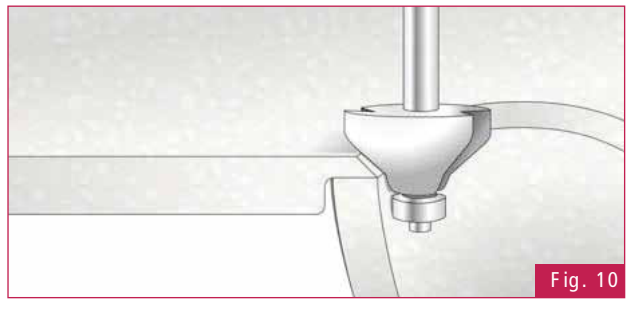
Fig. 10

Sand and finish off to a standard "Semi-Gloss-Finish" as recommended.

Shape installation

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Shape installation without rebate (butt undermounting)

Mark position of the shape from the back of the sheet. Ensure the position of the shape is correct when turning over the sheet later on. **Fig. 11**

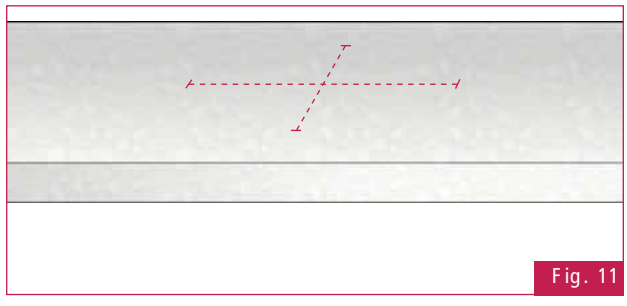
Fig. 11

Bring the "cutout template" in position and clamp it down properly with clamps. Ensure the workpiece is in a straight position and properly supported.

Cutout the hole with a hand router of at least 1,8 KW power and which is able to take a 12mm shank, a 10 mm single flute carbide router bit with a 12mm shank and a 30mm sleeve guide (*). Ensure the work length of the router bit is well measured.

Sand a stripe of approx. 80 mm next to the cutout on the back of the HI-MACS® sheet smooth by using a random orbital sander with sandpaper of 100 and 60 micron (or 150/180 grit sandpaper). Ensure all marks and scratches of the pre-sanded back of the sheet are removed. **Fig.12**

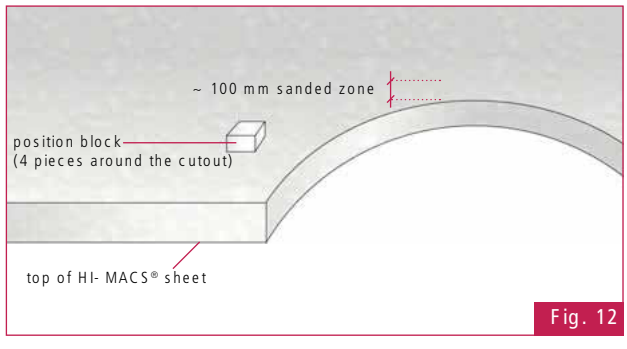

Fig. 12

Bring the shape in the right position again and glue 3-4 position blocks (with a size of approximate 2cm x 2cm made of HI-MACS® or in wood) and fix them with hot-melt glue. (Remove them after finishing).

Clean parts, the sheet and the edge of the shape which will be bounded to remove any dust, grease or pen marks - best by using denatured alcohol (or Acetone) and a clean white cloth.After cleaning do not touch with your fingers. If so, clean it again because dirt may show up in the glue line later.

Prepare HI-MACS®-Adhesive. Fill in the tube with the filler component in the tube of the hardener. Squeeze out some air and close the top of the tube with the plug. Put the tube in an orbital sander and mix it properly for at least 35 seconds by moving the tube to the left and to the right direction. Ensure the mixing of the adhesive is properly done.

Put on the adhesive in a continuous line, best onto the edge of the shape.

Turn over the shape and position it. Ensure the drain whole is on the right place when turning the sheet later and that the shape is placed square.

When shape is in the right position, clamp it down with clamps or with a thread through the drain whole protected by a thick sheet of wood and additional clamps in front if needed. Ensure not to over tighten the strip.

Leave the HI-MACS® -Adhesive cure for at least 35min. by min room temperature of +17°C.

Shape installation

Technical Bulletin – Interior – 05

Do not clean off non cured adhesive with Acetone or denatured alcohol.
This could causeweakness of the adhesive.

Take off the clamping systems and turn over the sheet.

Trim cutout with a tungsten carbide profile router bit with Nylon bearing
and a shank of 12mm (exp. Titman, XC201-12,7-12-25*12).
Sand and finish off to a standard "Semi-Gloss-Finish" as recommended.

Other shape installation

- With a separate template make a smaller cutout into the top so that the shape fit and the flange of the shape can be properly fixed to the top.
- Put aradius on both edges of the sheet thickness – top and bottom.
- Sand edges with 150/180grit sandpaper (or 100/60 micron sandpaper) smooth.
- Topmount: Install the sink from the top when insert into the cutout and fix it with elastic adhesive (like silicone). **Fig. 13**
- Undermount: Install the shape from underneath with elastic adhesive (like silicone) and additional mechanical fittings. **Fig. 14**

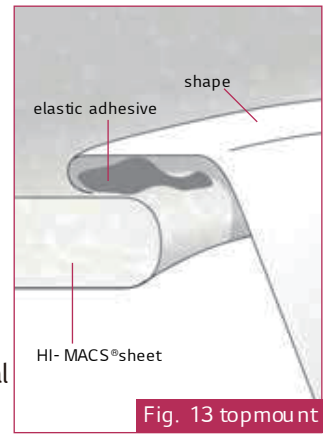

Fig. 13 topmount

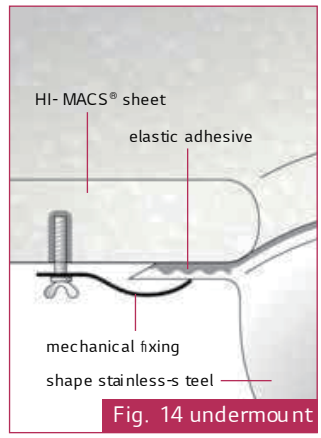

Fig. 14 undermount

Warranty

The 10-years limited installed warranty for HI-MACS® where offered, does not cover damage caused by failure to follow proper fabrication and installation procedures and maintenance care, for which LG Hausys does not have published procedures, or damages causedby customer abuse. The above Technical description shows mandatory procedures – for complete details, refer to HI-MACS® Fabrication Guidelines and/or additional Technical Bulletins of latest relevant updates.

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Interior 06.

Edge treatments

Edge treatments

Technical Bulletin – Interior – 06

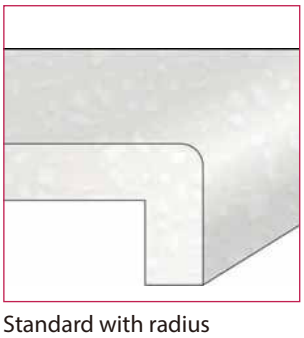
This bulletin summarizes the standards that must be applied within the HI-MACS® Warranty Program when fabricating HI-MACS® sheet and build up edge treatments with HI-MACS® - Adhesive.

Safety

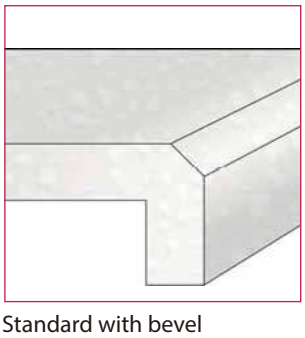
The fabricator is responsible to ensure that each worker follow the local Health and Safety regulations, before, during and after the job.

Front edges

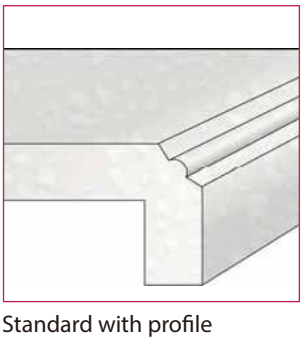
Edges can be designed in many variations, for example:



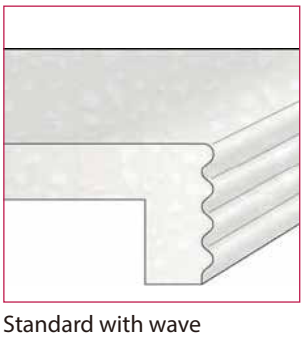
Standard with radius



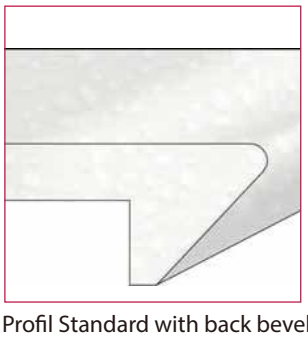
Standard with bevel



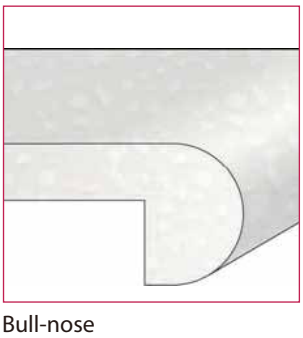
Standard with profile



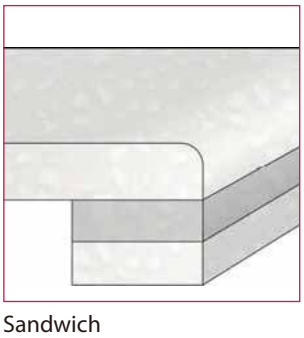
Standard with wave



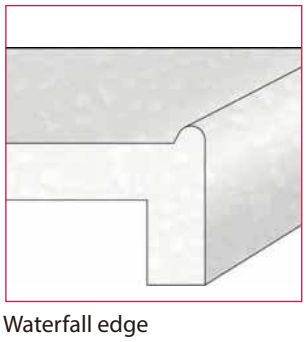
Profil Standard with back bevel



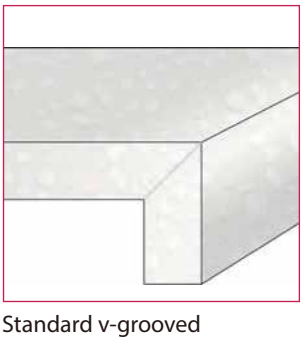
Bull-nose



Sandwich



Waterfall edge



Standard v-grooved

Edge treatments

Technical Bulletin – Interior – 06

Edge preparation & build up

HI-MACS® sheets are delivered with a sanded backside of the sheet where it is highly recommended to sand smooth **(Fig.1)** or to trim the edge making a rebate. **Fig. 2**

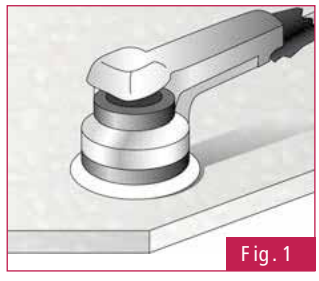


Fig. 1

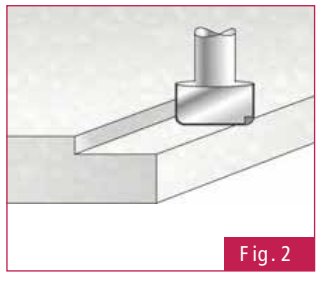


Fig. 2

Turn the sheet over so that the back of the sheet is upside-down and you can work comfortably.

Ensure the HI-MACS® sheet does not sag and the sheet is properly supported at each position and do not round the edge of the bonding area.

Using a rebate at the back of the sheet for the edge treatment also has the advantage to

- take away the rough sanding marks and
- allows stopping the edge on a fine line
- to avoid using gluing blocks or
- any kind of ruler or gluing templates. **Fig. 3**

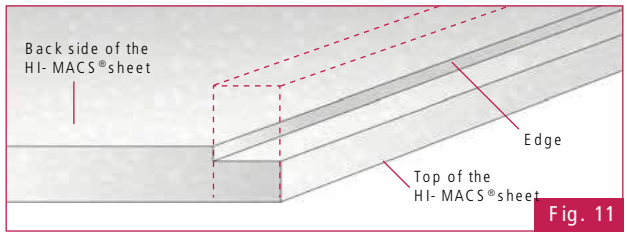


Fig. 11

Check all edges carefully before bonding. Ensure that no chips are broken out and no heavy marks of the saw blade or any whitening of the edge is visible.

Create the rebate that approximately 0,5mm of the sheet will hang over (see Fig. 3) to trim off later after the adhesive cured.

Put all necessary materials and tools in place which you will need for bonding:

- Clean, white cloth
- Denatured Alcohol
- HI-MACS® - Adhesive (check the right color) (tube or cartridge)
- Cutter or knife
- Tube Wringer (when using tube)
- Orbital sander (when using tube)
- Adhesive dispenser and mixer-tips (when using cartridge)
- Clamps (C-clamps or best use Klemsia)

Edge treatments

Technical Bulletin – Interior – 06

Prepare and mix HI-MACS® - Adhesive.

Put a continues glue line on the edge of the HI-MACS®- strip or alternative into the rebate when one has been prepared.

Avoid any kind of air bubbles in the glue line and ensure, that some adhesive will be squeezed out when putting on the edge in a continues line. **Fig. 4**

Place clamps all 8cm to 10cm. Do NOT over tighten the pressure of the clamps. **Fig. 5**

When HI-MACS® - Adhesive has cured (after ca. 35min. / +17°C), turn over the sheet and trim the edge with a profile router bit or machine it at the moulding machine or by using a CNC machine. **Fig. 6**

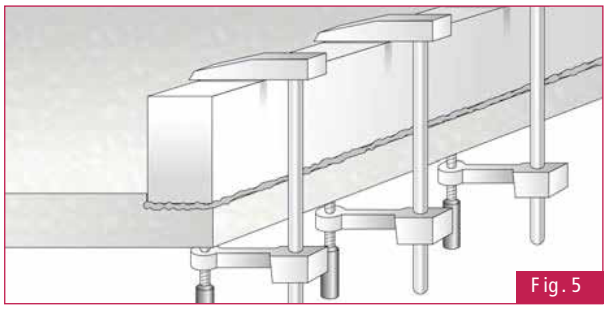


Fig. 5

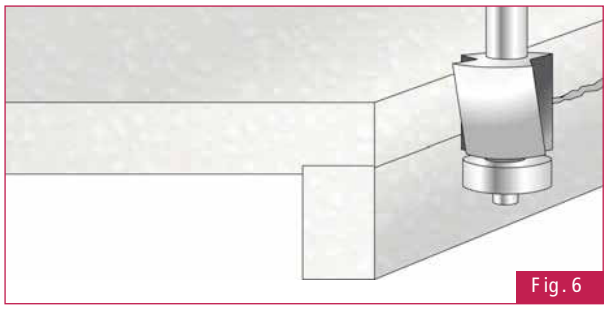


Fig. 6

After the trimming process, finish off by sanding to the recommended Semi-Gloss-Finish or as specified, like:

- Matt finish
- Semi gloss finish
- High gloss finish

Edge treatments

Technical Bulletin – Interior – 06

Edge detailed design

The unique aesthetic of the HI-MACS® sheet design in the different color families makes it possible that during fabricationprocess a different manufacturing of the edge details needs to be implemented.
Although there is a very good distribution of big crunchies throughout the whole material thickness of the sheet, special fabrication techniques have to be taken in consideration to meet customer's expectations.

It is each fabricators and each installers responsibility to manufacture the edge detail in the recommended way for each single color family as per the following instructions:

For color families SOLIDS, GRANITES (except G 50) a standard butt seam is recommended. **Fig. 7.**
As described above, always use a small rebate to avoid heavy sanding from the back of the sheet **Fig. 8.**

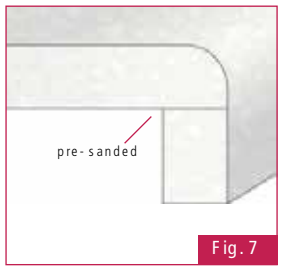


Fig. 7

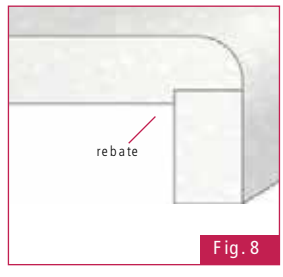


Fig. 8

For color families QUARTZ, GRANITE and Tapioca Pearl (G 50) a rebate is recommended. **Fig. 9**

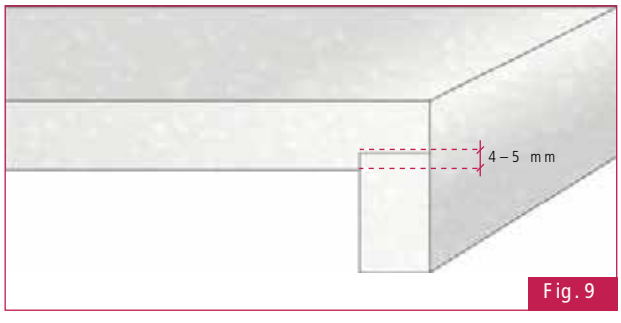


Fig. 9

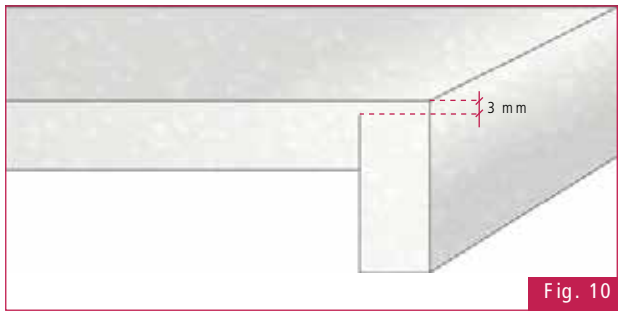


Fig. 10

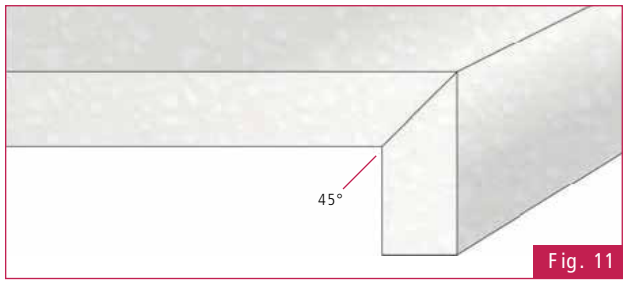


Fig. 11

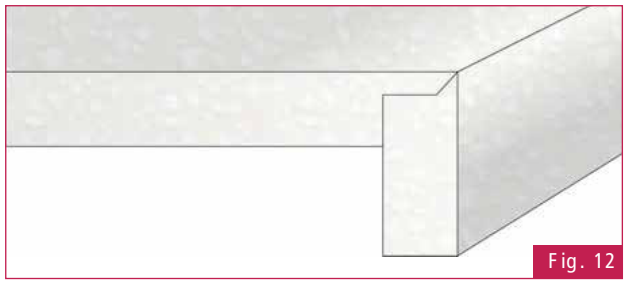


Fig. 12

For the color family VOLCANICS or others showing a marbled structure a rebate, **Fig. 10** or a 45° angle, **Fig. 11** or a profile with the combination of both, Fig. 12 is recommended.

Edge treatments

Technical Bulletin – Interior – 06

Edge design with other materials

Edge combination of HI-MACS® sheets and acrylics can be best bonded with HI-MACS® - Adhesive. **Fig. 13**
Other materials like glass, metal and aluminum, laminate or plastics should be best glued with an elastic adhesive, like for e.g. Silicone (different thermal expansions needs to be taken in consideration). **Fig. 14**
Depending on the application a primer or special elastic adhesives, like elastic PU-adhesives is needed.

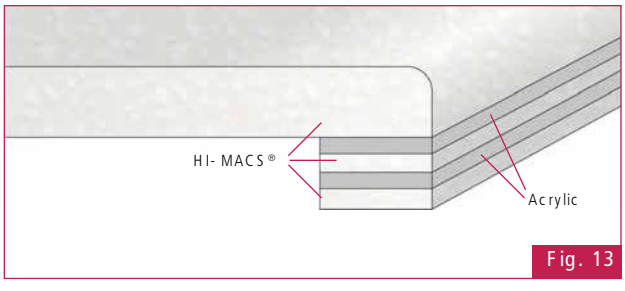


Fig. 13

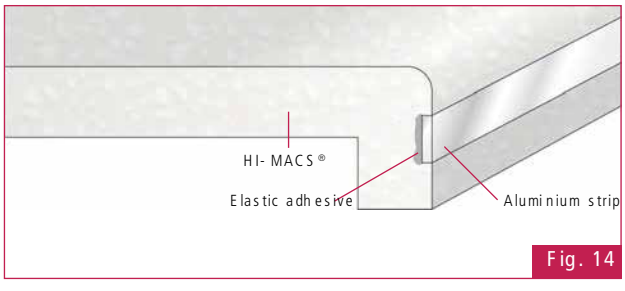


Fig. 14

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Interior 07.

Backsplashes

How to create a curved backsplash:
Inside corner
Outside corner
Warranty
Disclaimer

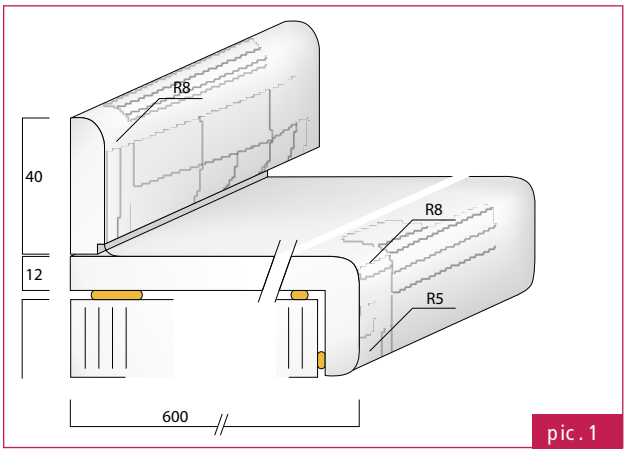
Backsplashes

Technical Bulletin – Interior – 07

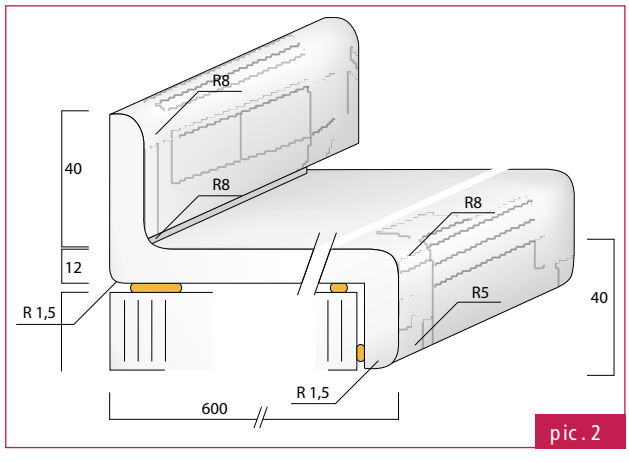
This bulletin summarizes specific characteristics and properties of HI-MACS® which have to be taken into account when designing, specifying and selling a HI-MACS® product of sheet and shape to obtain a successful application. This Technical Bulletin is a base element to ensure the correct use of this high performing material and meet customers and end-consumers expectation while building further a cornerstone for our HI-MACS®-Warranty Program.

There are different possibilities of backsplashes (up stand) in different designs and manufacturing costs involved. The different design can be fabricated in different manufacturing processes - depending on the methods to be chosen. The Standard backsplash **(pic.1)** is a strip of HI-MACS® trimmed off with a radius of ca 6mm and fixed with acrylic based silicon adhesive.

To avoid any build up moisture or bacteria the curved backsplash **(pic.2)** recommended as the most ideal solution, especially in wet areas, like sinks or vanities. But also many other applications can be designed in a way that´s easy to clean.



pic . 1

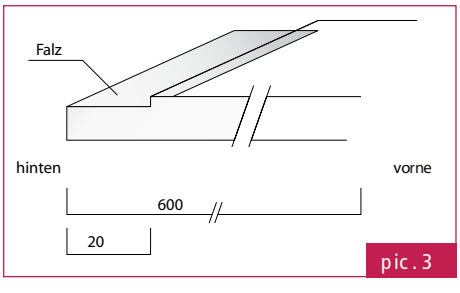


pic . 2

How to create a curved backsplash:

Suggestion sample: step by step

1. Make a rebate on the back of a counter top **(pic.3)**

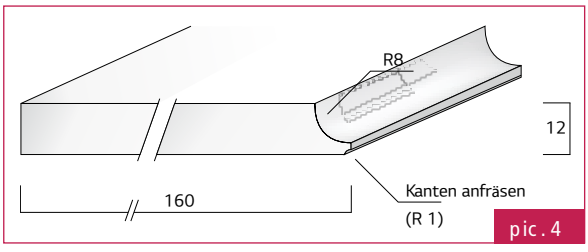


pic . 3

Backsplashes

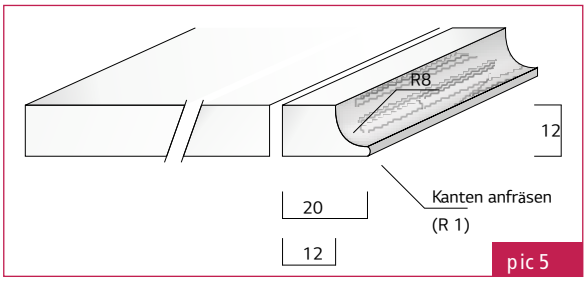
Technical Bulletin – Interior – 07

2. Trim a radius (r = 8mm(10mm)) on a strip of HI-MACS® with a width of approx.160mm **(pic.4).**



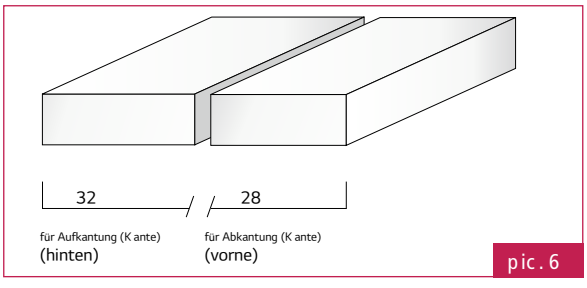
pic . 4

3. Cut the right length off (w = 20mm(22mm)) from your 160mm wide strip **(pic.5).**



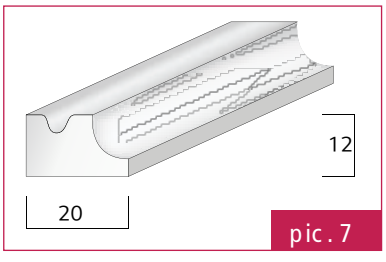
pic 5

4. Cut a piece for the up stand: (32mm(30mm) **(pic.6).**



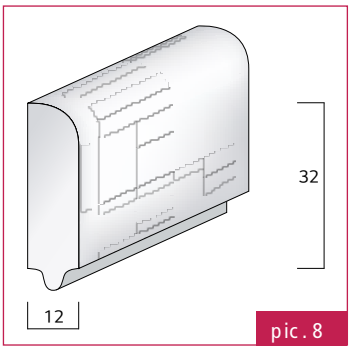
pic . 6

5. Put a female profile on the strip with the curve **(pic.7).**



pic . 7

6. Put the male profile on the up stand **(pic.8).**

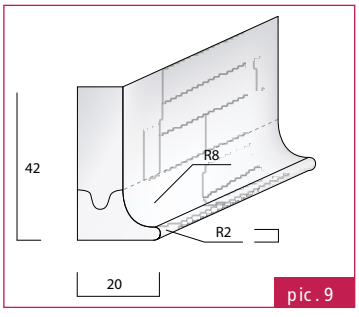


pic . 8

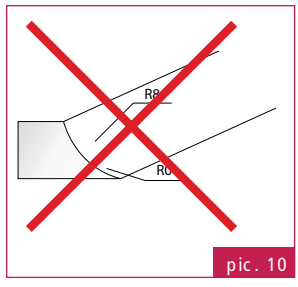
Backsplashes

Technical Bulletin – Interior – 07

7. Bond the strip of the curve **(pic.5)** and the upstand **(pic.6)** together **(pic.9).** After curing time sand it and finish it off. Leave at least a minimum of a 2mm step. Never run against "0"mm **(pic.10).**

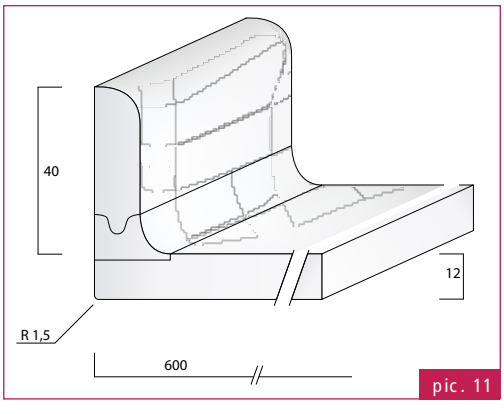


pic. 9

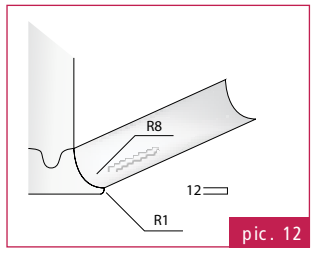


pic. 10

8. Insert the curved backsplash into the counter top **(pic.11)** and finish off by trimming and sanding according to the guidelines.

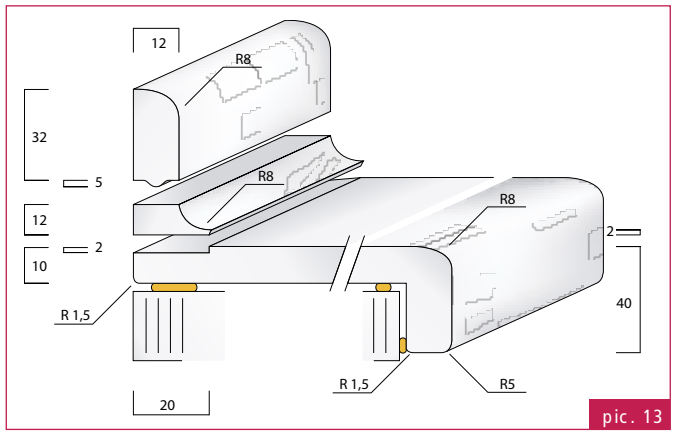


pic. 11



pic. 12

Tip: Before bonding the curved backsplash into the counter, apply an arris to the edge of the curved section.



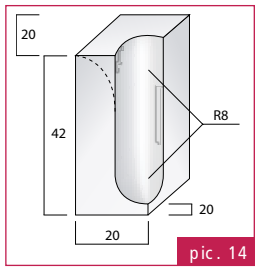
pic. 13

Backsplashes

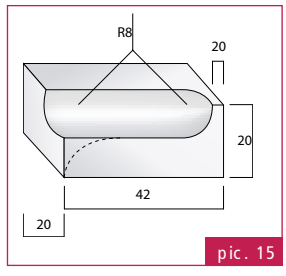
Technical Bulletin – Interior – 07

Inside corner:

To set up a inside corner, prepare a corner piece according to the radius you have chosen – here radius (R8). Based on a standard height prepare a block of 20mm x 20mm x 42mm. On a special router prepare the inside radius or plunge in with a router bit after positioning and gluing (pic.14, pic.15).



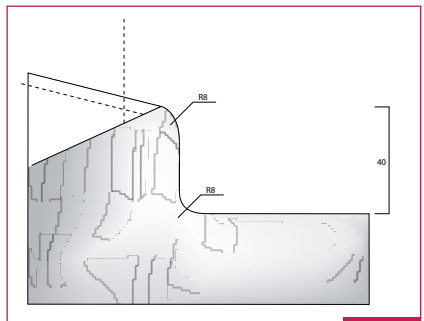
pic. 14



pic. 15

Outside corner:

Prepare a standard curved backsplash and put your standard radius on the outside edge –left or right hand side. Finish off by sanding to a semi gloss level. To ensure homogenous surface use HI-MACS® only.



pic. 16

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Interior 08.

Thermoforming

Heating temperature for HI-MACS®
Criteria which influence the thermoforming possibilities
Positives and negatives of thermoforming
Possible achievable minimal radii
Work piece preparation
Some fabrication tips
After thermoforming process
Warranty
Disclaimer

Thermoforming

Technical Bulletin – Interior – 08

This bulletin summarizes the specific characteristics and properties of HI-MACS® which have to be taken into account when designing, specifying and selling an HI-MACS® product of sheet and/or shape to obtain a successful application.
This Technical Bulletin is a base element to ensure the correct use of this high performance material and meet customers' and end-consumers' expectations whilst building further a cornerstone for our HI-MACS®- Warranty Program.

The technology of thermoforming is one of the most sophisticated fabrication techniques of HI-MACS®. 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 HI-MACS® 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.

www.globalvacuumpresses.com


pic. 1

pic.1: Global vacuum machine


pic. 2

pic.2: Global pre- heating oven

To ensure that the job will take place successfully you have to understand the HI-MACS® 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 the Technical Bulletin is to the best of our knowledge at the present time, LGCE does not protect any defects or mistaken results under its Warranty of the QC Program.

So please check the material quality before starting with the project and keep record of:

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

Thermoforming

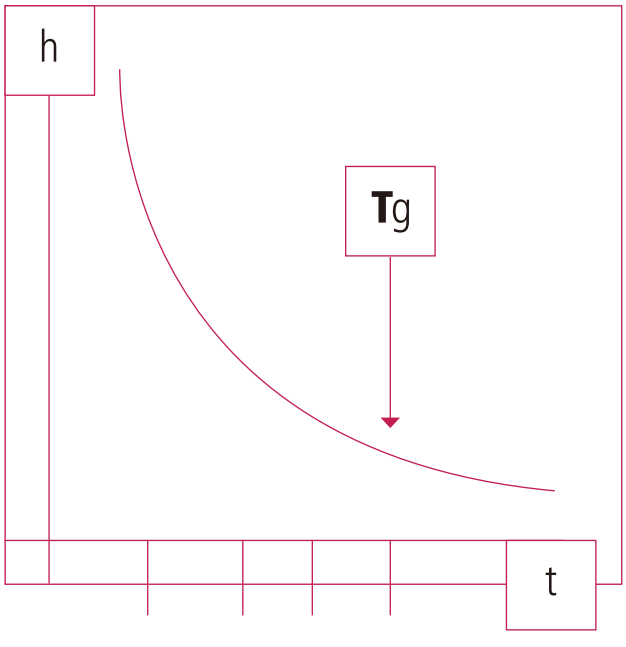
Technical Bulletin – Interior – 08

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 HI-MACS® 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)



Therefore it is important to reach the "glass transition" temperature (**T**g) of the HI-MACS®;

This means it is best to get the ideal softness of its material performance.

This point is where the material has the best softness for optimum thermoforming performance.

h= material softness (hardness)
t = time
Tg = glass transition point

Thermoforming

Technical Bulletin – Interior – 08

Heating temperature for HI-MACS®:

between + 155 ° C up to + 175 ° C	Danger heating point: **+ 204 ° C**

The correct temperature depends on many different factors and needs to be established before starting the job.

Criteria which influence the thermoforming possibilities:

- Colour / colour family
- Batch of product
- Design
- Air circulation heat or contact heat
- Accuracy of temperature
- Environment
- (large/small radii)

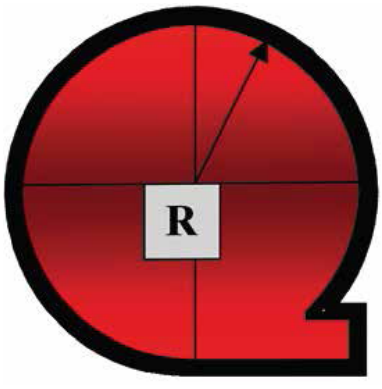
Positives and negatives of thermoforming:

Positives	Negatives
• High production output when large quantities are fabricated • Cost value thermoforming tools • 2D thermoforming 3D thermoforming • Special effects, like: pressing of motifs or logos in the surface	• Higher energy costs depending on heating system • Small volume – relatively high costs

Thermoforming

Technical Bulletin – Interior – 08

Possible achievable minimal radii:



depending on color family:
more or less / bigger or smaller radius

- **6 mm: 2D**
  approx. R = **~ 20 mm**
- **9mm: 2D**
  approx. R = **~ 40 mm**
- **12 mm: 2D**
  approx. R = **~ 50 mm**
  » for Solids, Sands, Pearls, Sparkle (P100, P102, P103)

approx. R = **~ 60 mm**
» for Quartz

approx. R = **~ 85 mm**
» for Granite, Marmo, Sparkle (P101, P104)

approx. R = **~ 200 mm**
» for Volcanics, Galaxy

pic.3 2D radius

pic.4 2D small radius with whitening effect by darker colour

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. 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.
- If your work-piece has an engraved motif or logo – handle with care.

Thermoforming

Technical Bulletin – Interior – 08

Some fabrication tips:

- Do not heat up a seamed sheet due to higher visibility of the adhesive after thermoforming process.
- 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 HI-MACS® sheets pull off the protective film on the surface side.

Keep record of

- temperature
- heating time
- environment conditions
- sheet production-no etc. (for later reference if needed)

Be aware that there may appear to be a colour difference when working with dark or highly pigmented colours.

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 min. + 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 with a:

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

Thermoforming

Technical Bulletin – Interior – 08

According to the quantity 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.

pic.5 MDF mould

pic.6 thermoformed HI-MACS® piece

pic.7 Global press & alu cooled mould

pic.8 thermoformed HI-MACS® piece

For more information:

GLOBAL VACUUM PRESSES

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www.globalvacuumpresses.com

Thermoforming

Technical Bulletin – Interior – 08

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Interior 09.

Storage – Handling – Transportation

Sheets
Adhesive
Shapes
Transportation
Warranty
Disclaimer

Storage – Handling – Transportation

Technical Bulletin – Interior – 09

This bulletin summarizes specific characteristics and properties of HI-MACS® material which have to be taken into consideration when handling, storing and transporting HI-MACS® products. This Technical Bulletin gives a basis to ensure the correct use of this high performance material and meet customers' and end-consumers' expectations whilst building further a cornerstone for our HI-MACS® Warranty Program.

Sheets:

Always handle HI-MACS® with care.

Always use your personal safety protection material (like gloves, safety shoes…etc.).

Always keep the environment of your workplace clean.

Use proper and safe handling equipment.

When moving HI-MACS® sheets in your warehouse or fabrication shop drive and move slowly – but continuously.

Ensure the area where you are moving material back and forward is smooth and free of any unevenness in the floor.

When using a fork lift ensure the lifting arms are long and strong enough to take the heavy pallets from the front side, so that the pallet can be lifted free.

If you receive a standard container delivery you must unload from the head side and have prepared the folk lifting arms to unload in the best and safest way.

In case of taking the pallets from the side ensure to use a wide fork lifter arm to avoid any dangerous bending of the material.

It is best to unload and move pallets singly to prevent any harmful bending of the sheets.

DO NOT STORE HI-MACS® MATERIAL OUTSIDE

Best is to store HI-MACS® sheets in a well covered room or warehouse hall with closed and protected walls.

Storage – Handling – Transportation

Technical Bulletin – Interior – 09

Ensure the sheet material is positioned on a flat and level base or level floor.

Preferred storage:
one pallet maximum on a one rack unit.

Ensure the lifting arms are the correct distance apart and are all leveled in one and in a straight direction.

Place pallets only when the shelve arms are leveled to ensure to avoid any warping or wave bending.

In case you have to store several pallets putting on top of each other for a very short period of time ensure you put enough support under the pallet to avoid any waving of sheet possibility and that those are absolutely aligned to be able to take all the heavy weight.

When putting a pallet in stock open its transportation steel band and remove the clear plastic sheet of the pallets to minimize the effect of moisture.

When the pallet is placed in the rack always cover the top with a protective wooden sheet.
This avoids the top sheet becoming dirty or easily scratched.

DO NOT PULL OFF THE PROTECTIVE FILM

Always protect the sheets & pallets against the weather.
Do not leave them outside for hours and days.

Storage – Handling – Transportation

Technical Bulletin – Interior – 09

When handling a sheet always do it best with two people or using a vacuum lifting system (for example: company "Schmalz GmbH", Germany, www.vacuworld.com).

pictures from Schmalz´ website

When lifting by hand always turn the sheet on the edge before lifting up.

Ensure to have proper support to handle the weight of the sheet.

When providing cut sheets to your customers store the left of sheets by size but avoid mixing long and short sheets due to warping and waving effect of the sheet material.

In case of any complaint, please always provide the sheet-no. to be filled in a QC- "Complaint Request Form" (latest published version).

Storage – Handling – Transportation

Technical Bulletin – Interior – 09

Adhesive:

Store adhesives in a well ventilated room.

Avoid any direct sunlight to the adhesive cartridges.

Storage temperature should be best approximate between + 8 ° C and + 15 ° C.

If possibly store adhesive in a separate refrigerator.

DO NOT STORE ADHESIVE IN UNCONTROLLED CONDITIONS OR OUTSIDE.

Shelf life of all cartridges is two years starting from the production date printed on the labels of adhesive.

In case of complaint please always provide this production date as reference to be filled in a Complaint Request Form.

Shapes:

Always handle with care. Do not allow any package to be dropped on the floor.

Leave shapes in there original packaging when storing:
Put the labels in the direction where those can be read from outside.

Always store shapes inside a well ventilated room and do not put them outside.

Ensure the shelf system is strong enough to easily take the weight of the shapes.

Depending on packaging size do not put more than 8 to 10 packages on top of each other.

Do not put several pallets on top of each other.

Store the material properly leveled.

In case of complaint please always provide this production date as reference to be filled in a Complaint Request Form.

Storage – Handling – Transportation

Technical Bulletin – Interior – 09

Transportation:

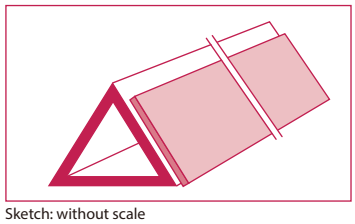
Ensure the pallets loaded on the lorry (truck) are place leveled and have full support any time.

Pallets and boxes should be stopped to avoid any movement during transportation.

Do not store more than 5 pallets on top of each other.

Fabricated items to be protected by a bubble wrap pack for protection.

Edges and corners need to be protected with pasteboards or other packaging materials.



Sketch: without scale

Fabricated elements are best transported on the edge of the back and stored on a special A-Support-Rack.

pic. from web – unknown origin

Any cutouts on fabricated items need to have a proper protection to avoid any breaking by loading and unloading and during transportation.

Avoid transporting fabricated items of HI-MACS® in open vehicles as this can cause extreme thermal movement and a change of atmospheric conditions.

Storage – Handling – Transportation

Technical Bulletin – Interior – 09

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Interior 10.

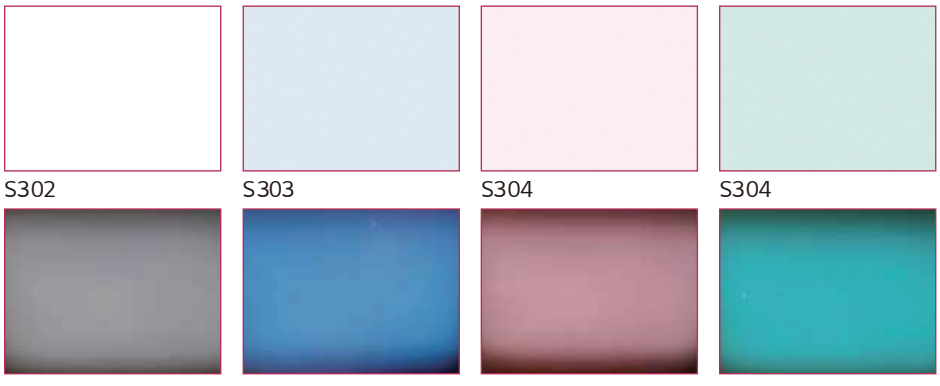
Translucent Colours

Translucent Colours

Technical Bulletin – Interior – 10

This bulletin summarizes specific characteristics and properties of HI-MACS® translucent material which have to be taken into consideration when fabricating or installing HI-MACS® products. This Technical Bulletin gives a basis to ensure the correct use of this high performance material and meet customers' and end-consumers' expectations whilst building an additional cornerstone for our HI-MACS® Warranty Program (10 years).

Translucent Colors:



S302 S303 S304 S304

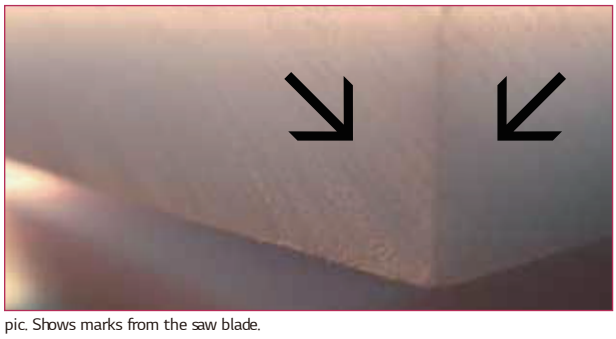
Material preparation:

When fabricating translucent colours of HI-MACS® there is almost no difference from the standard HI-MACS® products in fabricating or installing. There is even no difference to the smell during the fabrication process due to the acrylic based material where the formulation has been changed slightly but composed of the same ingredients.

Always handle the material with care to avoid any additional uncontrolled scratching from the top or the back of the sheet. When cutting HI-MACS® translucent material always use anew and sharp saw blade or trim off with an CNC router to the size required.

Ensure the sawing machine is properly adjusted and that it is running correctly and absolutely straight.

For bonding an absolute straight and clean cut is mandatory.



pic. Shows marks from the saw blade.

If marks of the saw blade or cuter of the trimmer are visible ensure to re-sand the edges by using 180 or 220 (240)grit sandpaper.

Ensure not to sand the edge round to avoid a bad result of the seam afterwards.

When chips break out during cutting, change saw blade or trim off with an electrical plane or spindle moulder.

Translucent Colours

Technical Bulletin – Interior – 10

Ensure the edge is sharp, smooth and cleaned off from dust before starting the bonding process.
Be aware that any uneven marks or dirt or any left marks of a pencil may show up in the seam afterwards.

Please note that Lucent sheets need to be sanded on the backside top optimize the translucency effect with backlighting.

Bonding:

In case of bonding – clean edges as usual and press the work pieces as standards.

Using the recommended translucent adhesive colours. Squeeze and press out the first couple of cm of glue line and control if the color and color pigments of adhesive are proper mixing. Then proceed with the usual bonding process and procedure of HI-MACS® adhesive.

When storing the adhesive don't leave the cartridge in a vertical position but store it horizontal.

sheet	**sheet**		**adhesive**	**adhesive**
color code	color name		color code	color name
S302	Opal		T02	Opal
S303	Sapphire		T03	Sapphire
S304	Rubby		T04	Rubby
S305	Emerald		T05	Emerald

Translucent Colours

Technical Bulletin – Interior – 10

Thermoforming:

Thermoforming can be done in a similar way to the standard solid colour family.

12 mm → R 50

Be aware when thermoforming highly pigmented colours like, blue, rose and emerald or others, more whitening can be visible when under cutting the limits or clamping the sheets under stress.

pic. Shows comparison between S28 and S303

pic. Shows a thermoformed S303 R = 85

Spec Data Sheet:

Translucent Colour

	test	unit	result	test
1	specific gravity (23 / 23 ° C)	#	1.686	ASTM D 792 : 2000 (methode A)
2	Rockwell Hardness	#	91	ASTM D 785 : 2003 (procedure A)
3	Tensile Strength	MPa	35,6	ASTM D 738 : 2003 (*)
4	Tensile Modulus of Electricity	GPa	9,84	ASTM D 738 : 2003 (*)
5	Flexual Streth	MPa	66,1	ASTM D 790 : 2003 (**)
6	Flexual Modulus of Electricity	GPa	8,18	ASTM D 790 : 2003 (**)
7	Izod Impact Strangth	kJ/ m^2	5,8	ISO 180 : 2000 (notch Type : unnotched)
8	Water Absorbtion	%	0,028	ASTM D 570 : 1998 (24 h immersion)
9	Density (23° C)	g / cm^3	1,681	ASTM D 792 : 2000 (methode A)
10	Appearence (Discolouration) after Heat	#	no defect	by client
	Resistance (170 + / - 2 ° C 1 h)			
11	Heat Water Resistance	#	no defect	JIS K 6902 : 1998
12	Deflection Temperature Under Load (1.82 Mpa)	° C	108	ASTM D 648 : 2007 (methode B)
13	Thermal Expansion	1 / ° C	30,0 x 10^{-6}	JIS K 6911 : 1995

(*) speed of test 5 mm / min test speciment : type I (**) speed of test 5 mm / min support span : 190 mm usage: Quality Control

Translucent Colours

Technical Bulletin – Interior – 10

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Interior 11.

Adhesive

Storage
Warranty
Disclaimer

Adhesive

Technical Bulletin – Interior – 11

This bulletin summarizes specific characteristics and properties of HI-MACS® material which have to be taken into consideration when bonding HI-MACS® products to each other (HI-MACS® to HI-MACS®). This Technical Bulletin gives a basis to ensure the correct use of this high performance material and meet customers' and end-consumers' expectations whilst building an additional cornerstone for our HI-MACS® Warranty Program.

The adhesive of HI-MACS® is a special formulated two component system and is available in 45ml and 250ml cartridges.

For each size of cartridge a dispenser gun is available (see latest price list).

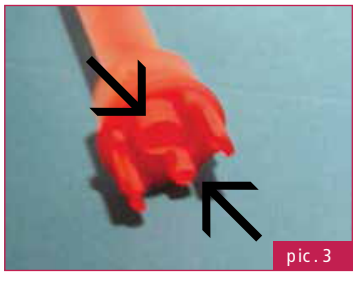

pic. 1

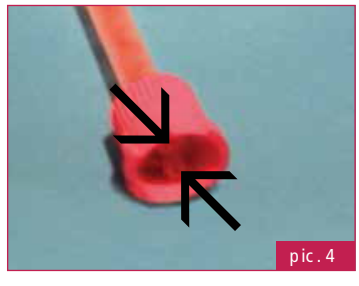

pic. 2

The cartridges are delivered with their specific mixer tip to ensure correct mixing before applying adhesive to the work piece.

The workplace conditions should be approx. + 17 ° C and dust free when using HI-MACS® adhesive. Prepare the work pieces to bond according to section 10 in the Fabrication Manual.

The mixer tips have one wide and one small connection piece to allow the docking to the cartridge only in one position.


pic. 3


pic. 4


pic. 5

Lock mixer tip with the delivered nut (bayonet-lock).

Put the cartridge into the dispenser gun. Ensure the correct positioning of the two different parts of a cartridge (filler and hardener) in the dispenser.

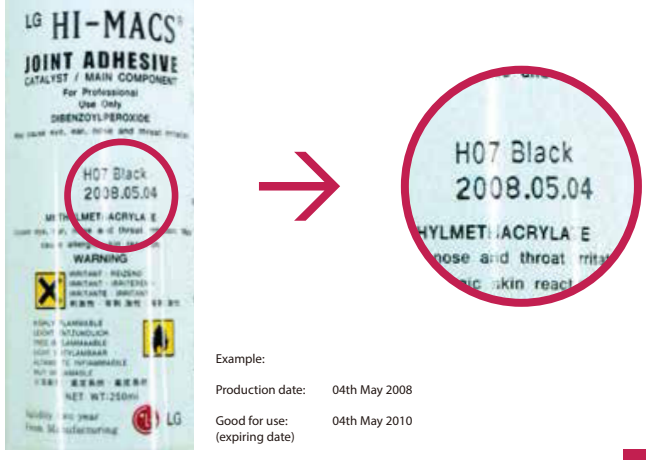
Squeeze out adhesive slowly but continuously.

Adhesive

Technical Bulletin – Interior – 11

Ensure the components are mixing properly and the correct colour is squeezed out and moving out through the mixer tip. Put the first "shot" (approx. 5 to 8 cm) to one side to ensure to apply only well mixed adhesive to the work piece.

Each adhesive cartridge has a two year shelf life. Check its suitability prior to use, see date of manufacture on the label attached on the product itself and on the packaging boxes of LG Hausys.



pic. 6

Note the production date of adhesive into your drawing of fabrication instruction for further Quality Control.

Shelf life for all cartridges and all colours: 2-years after manufacturing date

For any complaint issue please provide always manufacturing date of adhesive.

Storage:

Storage of adhesive should be done by cool (approx. + 8 ° C to maximum + 15 ° C) and dry conditions. Keep the adhesive cartridges in a dark room, avoid sunlight and do not place them adjacent to any heating device.

When storing adhesive cartridges used or unused place them horizontally in your shelves so as not to allow pigments eventually to settle when not using it for some time.
Always handle HI-MACS® adhesive with care and keep away from children.

For more Health and Safety information read the MSDS sheet of HI-MACS® adhesive in section 4 of the latest Fabrication Manual.

pic. 7

Adhesive

Technical Bulletin – Interior – 11

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Interior 12.

Marmo and Aster(Galaxy) – fabrication properties

1. Aster(Galaxy) with sheets
2. MARMO with sheets

STANDARD COLORS
Fabrication Process / tips & tricks

1.) Sheets Bonding
2.) Edge Bonding
3.) Thermoforming Process
4.) Sanding Process

Marmo and Aster(Galaxy) – fabrication properties

Technical Bulletin – Interior – 12

This bulletin summarizes the specific characteristics and properties of HI-MACS® Aster (Galaxy) and MARMO material. These have to be taken into consideration when fabricating and/or installing HI-MACS® products. The Technical Bulletin gives a platform to ensure the correct use of this high performance material and meet customers' and end-consumer expectations whilst providing an additional cornerstone for our HI-MACS® Warranty Programme.

1. Aster (Galaxy) with sheets

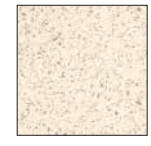

T001 Black Hole


T002 Uranus


T004 Saturn


T008 Jupiter


T010 Nebula


T011 Venus


T016 Mars


T07 Andromeda


T018 Carina


T019 New Moon


T020 Hercules

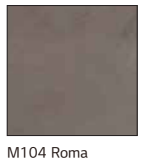

T024 Spica


T025 Capella


T026 Rigel

2. MARMO with sheets:


M103 Bologna


M104 Roma

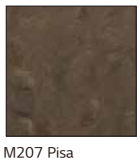

M105 Verona


M201 Terni

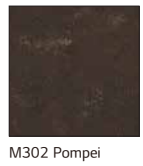

M203 Lucca

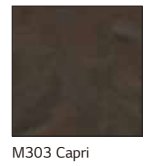

M205 Parma


M206 Monza


M207 Pisa


M301 Siena


M302 Pompei


M303 Capri


M304 Bari


M305 Modena


M309 Savona


M306 Breeze White


M307 Mist


M401 Veladero


M402 Goldstrike


M403 Cortez


M322 Pantheon


M323 Colosseum


M351 Milan


M352 Vernazza


M411 Messina


M412 Foggia

Marmo and Aster(Galaxy) – fabrication properties

Technical Bulletin – Interior – 12

STANDARD COLOURS

ASTER(GALAXY)

HI-MACS		ADHESIVE	
T001	Black Hole	H35	Dark
T002	Uranus	H60	Uranus
T004	Saturn	H37	Mocha
T008	Jupiter	H67	Jupiter
T010	Nebula	H02	A/White
T011	Venus	H01	S/White
T016	Mars	H34	Ivory Crystal
T017	Andromeda	H16	Al/White
T018	Carina	H02	A/White
T019	New Moon	H01	S/White
T020	Hercules	H22	P/Grey
T024	Spica	H36	Silver
T025	Capella	H04	Peanut
T026	Rigel	H60	Uranus

MARMO

HI-MACS		ADHESIVE	
M103	Bologna	H34	Ivory Crystal
M104	Roma	H22	P/Grey
M105	Verona	H61	Verona
M201	Terni	H68	Terni
M203	Lucca	H50	Kohala
M205	Parma	H39	Latte
M206	Monza	H07	Black
M207	Pisa	H46	Hekla
M301	Siena	H50	Kohala
M302	Pompei	H35	Dark
M303	Capri	H62	Clay
M304	Bari	H39	Latte
M305	Modena	H52	Babylon Beige
M309	Savona	H116	Oatmeal
M306	Breeze White	H02	A/White
M307	Mist	H01	S/White
M401	Veladero	H52	Babylon Beige
M402	Goldstrike	H115	Coloseum
M403	Cortez	H35	Dark
M322	Pantheon	H114	Pantheon
M323	Colosseum	H115	Coloseum
M351	Milan	H02	A/White
M352	Vernazza	H34	Ivory Crystal
M411	Messina		
M412	Foggia		

Marmo and Aster(Galaxy) – fabrication properties

Technical Bulletin – Interior – 12

Fabrication Process / tips & tricks:

Material Preparation:

When fabricating the new Aster (Galaxy) and the new Marmo colours of HI-MACS® there is almost no difference from the standard HI-MACS® products in fabricating or installing. There is no difference in smell during general fabricating processes due to the same acrylic material and same composed ingredients used for the standard products.

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

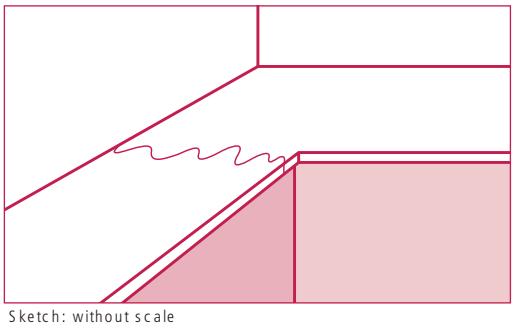
Note and be aware of two new disclaimer(*) colors of the MARMO family:
• ROMA*
• VERONA*

When cutting HI-MACS® material always use a new and sharp saw blade or trim off with an CNC router to size required. Ensure the sawing machine is properly adjusted and that it is running correctly and absolutely straight.

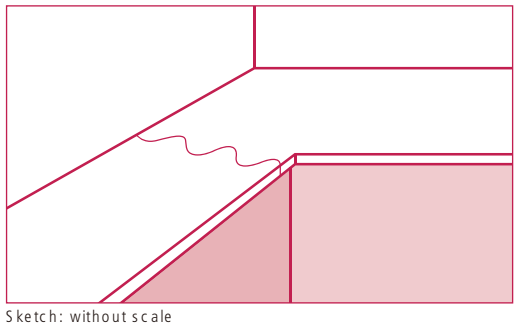
1.) Sheets Bonding:

a. The bonding / jointing process of the standard fabrication of the new Colour Ranges Aster (Galaxy) and MARMO can be done as recommended for all other available colours.

b. To achieve the best result of the visible pattern direction, particularly with the MARMO colours: an irregular seam flow may be more effective and shows less pattern chip/structure cut between one to the other sheet.



Sketch: without scale



Sketch: without scale

Marmo and Aster(Galaxy) – fabrication properties

Technical Bulletin – Interior – 12

c. But an even more irregularly directed cut has to be prepared absolutely straight and also parallel.

d. Re-sand with sandpaper of approx. 180grit (or 60 micron).

e. Always clean the cut edges with a white cloth and use denatured alcohol or acetone.

f. Ensure the edge is absolutely straight when making a "butt"-seam.

g. Better still, make a profile, such as a tongue and groove.

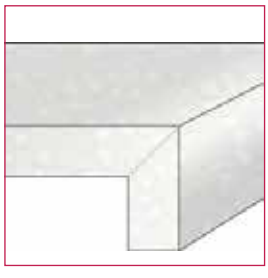
h. Ensure always to fabricate a re-enforcement strip (for kitchen worktops a 45° angled edge and smooth the adhesive line) from underneath.

i. Always tighten pressure – but do not over tighten the pressure to the seam.

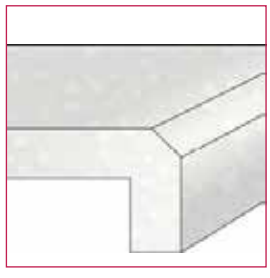
j. Note: the adhesive is not developed as filler for repairs. In the case of damage to the surface it is strongly recommended to make a plug repair if possible (tools are available on the market – please contact your local technical support).

2.) Edge Bonding:

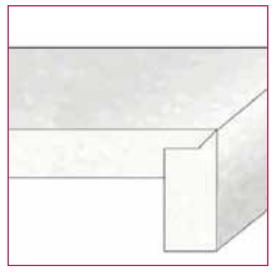
a. To let the pattern flow around the edges a 45° angled cut of the edge or an alternative rebate is one of the best solutions.



Standard v- grooved



Standard with bevel



Standard v- grooved and angle

b. For the bonding process of the edges please follow the instructions 1.) b. – 1.) j. above or TB 06 Edge Treatments

3.) Thermoforming Process:

a. The heating time is similar to the general heating time of HI-MACS® products for the thermoforming process.

b. The classification of a minimum radius for MARMO is approx. >/= 85mm (the same as for Granite).

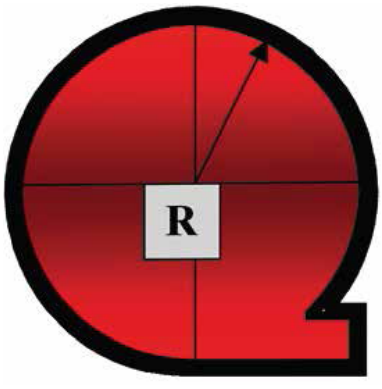
c. The classification of a minimum radius for Aster (Galaxy) is approx. >/= 200mm (the same as for Volcanics).

d. Be aware that any undertaking of recommended radii can cause some colour change or create some cracks.

Marmo and Aster(Galaxy) – fabrication properties

Technical Bulletin – Interior – 12

Possible achievable minimal radii:



depending on colour family:
more or less / bigger or smaller radius

- **6 mm: 2D**
  approx. R = **~ 20 mm**
- **9mm: 2D**
  approx. R = **~ 40 mm**
- **12 mm: 2D**
  approx. R = **~ 50 mm**
  » for Solids, Sands, Pearls, Sparkle (P100, P102, P103)

approx. R = **~ 60 mm**
» for Quartz

approx. R = **~ 85 mm**
» for Granite, Marmo, Sparkle (P101, P104)

approx. R = **~ 200 mm**
» for Volcanics, Galaxy

e. For further details of thermoforming process see also our Technical Bulletin TB 08 Thermoforming.

f. For any technical inquiry contact your local technical support.

g. For more detailed thermoforming equipment or any thermoforming accessories please contact global@nabuurs.com or visit the web-side: www.globalvacuumpresses.com

4.) Sanding Process:

a. The sanding process is similar to the standard sanding process.

b. Depending on available tools and equipment sanding time will be within the same range.

c. For processing details see additional our Technical Bulletin TB 04 Sanding of HI-MACS® products.

Sanding with a random orbital hand sanding machine

Interior 12.

MARMO colour family: Additional Technical Information

Assembling principle of a worktop
Warranty
Disclaimer

MARMO colour family: Additional Technical Information

Technical Bulletin – Interior – 12

MARMO is a unique colour family which needs special guidelines when fabricating and the installation MUST be carried out more precisely and carefully than usual. This is necessary to obtain the same standard of fabrication quality expected when using HI-MACS®.

Therefore, we want to stress that this colour family has its unique characteristic performance which is comparable to the natural structure of granite or marble.

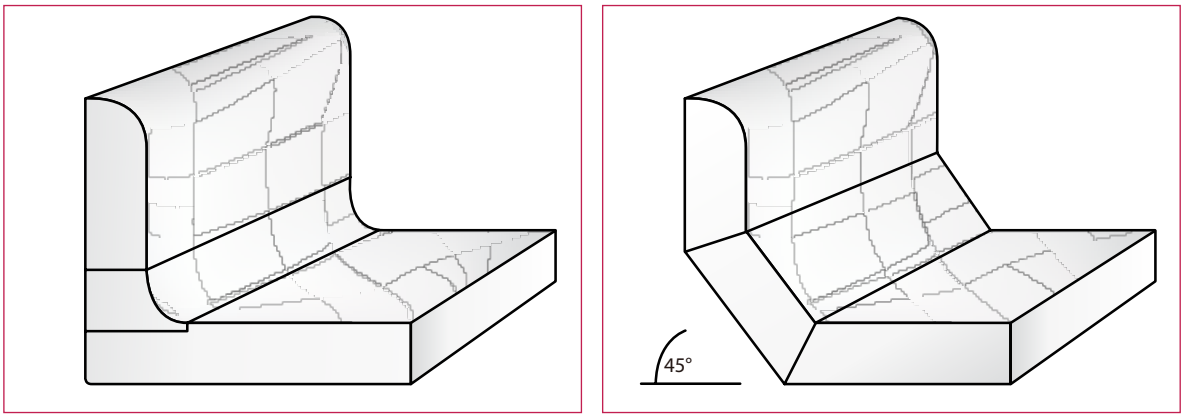
Pic. 1

Pic. 2

This means that there are different colour layers within the material thickness as shown in the pictures1 & 2 above. These unique characteristics – the veined structure- need to be taken into consideration when fabricating HI-MACS® – MARMO.

When preparing a curved upstand or downturn, customers may not accept the final result. One may not compare, though with UNI colours used in the kitchen market.

A downturn or an upstand are best achieved with a 45° angle or a profiled folding option – see picture 3 (V-grooving).

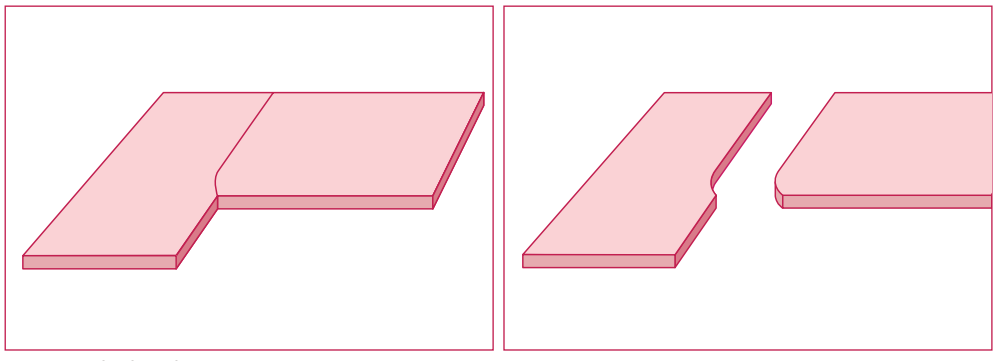


Pic. 3

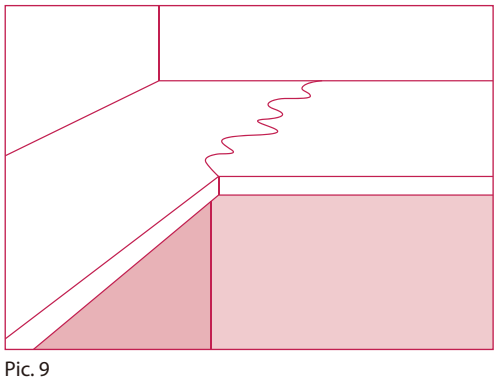
MARMO colour family: Additional Technical Information

Technical Bulletin – Interior – 12

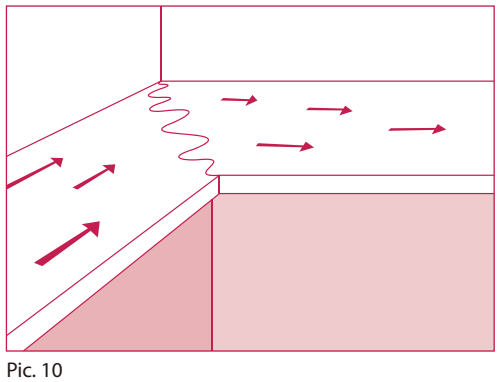
Assembling principle of a worktop



Pic. 8 Standard worktop corner

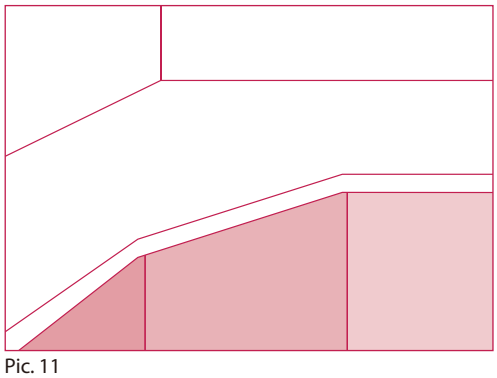


Pic. 9



Pic. 10

The best option is to fabricate the seam of the worktop at an angle of 45° (see pic.10) or alternatively choosing a 45°-corner unit following the veined structure, similar to veneer.



Pic. 11

Straight cuts can be allowed but these would need to be approved by your customer with a written confirmation. Therefore, a sample would be recommended and also you would need to make quality checks before installing.

MARMO colour family: Additional Technical Information

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Disclaimer

The information provided in this specific technical bulletin corresponds to our best knowledge on the subject at the date of its publication. This information may be subject to revision as new knowledge and experience becomes available. The data provided fall within the normal range of product properties and relates only to specific material designated. These data may not be valid for such material in combination with other materials or in any process, unless expressly indicated otherwise. It is offered exclusively to provide possible suggestions for your own experiments and needs approval from LG Hausys.
This bulletin is not intended to replace for any testing you may need to conduct to determine for yourself the suitability of our products for your particular purpose. Since LG Hausys cannot anticipate all variations in actual end-use conditions, LG Hausys makes no warranties and assumes no liability in connections with any use of this information. Nothing in this publication is to be considered as a license to operate under or a recommendation to infringe any patent right.

Interior 13.

HI-MACS® 3mm

HI-MACS® 3mm

Technical Bulletin – Interior – 13

This bulletin summarizes the specific characteristics and properties of HI-MACS®-3mm sheet material which have to be taken into consideration when designing, specifying and selling this product. This Technical Bulletin serves as a base in order to ensure the correct use of this high performance material and to meet customers' and end-consumers' expectations while at the same time serving as a cornerstone for our HI-MACS® - Warranty Program.

Material composition:

HI-MACS® 3mm sheet is composed of approximately:

- 65% Aluminum-hydroxide (ATH),
- 30% Acrylic (PMMA),
- 3% natural color pigments and
- approx. 2% activator.

The colour composition goes through the entire thickness of material.

Material Specification:

- Thickness: ..... 3 mm
- Length: .....3.000 mm
- Width: ..... 930 mm
- Standard Colour: S28 Alpine White
- On special order: S06 Arctic White, S09 Cream, S201 Nougat Cream, S25 Fiery red, S22 Black

Material Application:

This material is designed for interior furniture applications and for interior vertical application without any heat sources

The application limitation is restricted and has to be respected in all circumstances. Not following the outlined rules of fabrication aspects and recommendations will invalidate the warranty of the Quality Club Program. The interior application is limited to vertical application of: furniture doors, dividing walls, interior wall cladding systems including door applications, ceiling panels, column cladding or kitchen wall panels (not behind the hob), bathroom furniture, window cills (without heating device), show case applications or shop fitting accessories, such as jewellers, etc….

"Quality Check" before fabricating:

- The 3mm sheet has been manufactured under LG's Highest Quality Manufacturing aspects and high performance care - but
- To avoid any complications during fabrication and installation, please check your incoming goods first.

- It is good practice to check in advance if the sheets have defects and are unsuitable to fabricate.
- Before starting, check the production sheet identification no's and ensure the sequential flow when adding the sheets.
- This will help to ensure color consistency.
- If possible mark the production direction and assemble always in the same direction. Do not put sheets together in opposite directions

HI-MACS® 3mm

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Expansion:

One of the main characteristics of the material is the importance of the material's expansion and contraction due to temperature change. This means: always allow the material to expand or to shrink without any possible barrier.

△t = 10 (-6) K → D = +/-30° → 100 cm → +/-0,9 mm (expansion / shrinking)

Fixing to sub-construction material:

All connections to other materials, like:

- wooden sheet material
- MDF
- Aluminum
- Steel …etc.

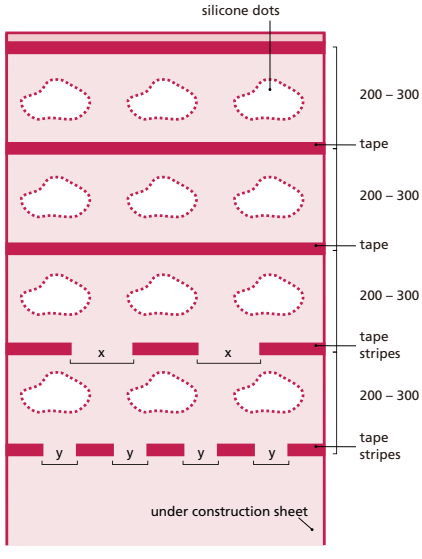
have to be done with a permanent elastic adhesive, such as a PU (polyurethane) adhesive.

Summery: all connections to other materials have to be done with a permannent elastic adhesive, such as a PU (polyurethane) adhesive.

To ensure that the work piece can be applied absolutely straight and true to the surface we strongly recommend to use the newly developed **LG Hausys Acrylic tape.**
And if no elastic adhesive or acrylic tape is used, it will not be covered by the Quality Club Program.

Tip:

Prepare a sample and ensure the sub-construction chosen does not show any shadow effects when looking at the panel from a distance.



Strips should be applied every 200 – 300mm as well as in between to be supported by permanent elastic adhesive – most suitable in white or translucent color.

HI-MACS® 3mm

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Tip:

Double check if the back of the 3mm sheet is smooth enough. If not, re-sand the backside of the sheet by using approx 220 grit or 30micron sandpaper.

Preparation of sub-construction:

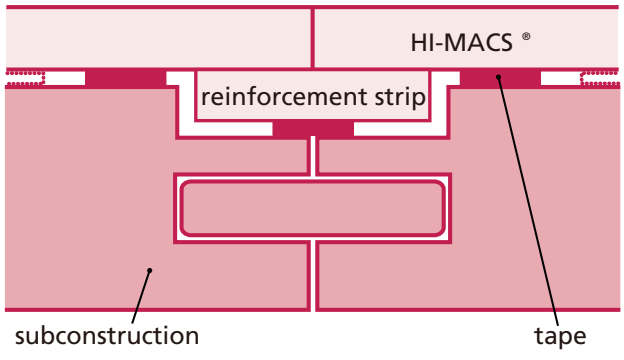
When applying HI-MACS® to a substrate sheet ensure the surface is pre-painted dry and free from any dust or oil. The best is to have the substrate in a white colour to avoid any shadow effects (telegraphing).
The smoother the sub-layer is, the better the LG Acrylic tape will stick to the surface.
Ensure primer, paint or laminate of the support material sticks properly to avoid any unexpected removing.

Sheet Preparation:

The same basic fabrication process used for our standard HI-MACS® e.g. cutting, drilling, routing, thermoforming and sanding can be applied to the 3mm sheet.
The general fabrication temperature should be at min. +17°C.

HI-MACS® 3mm bonding together with HI-MACS® 3mm:

When bonding two sheets of HI-MACS® together always use HI-MACS® joint adhesive.
Ensure you choose the recommended adhesive color in accordance with the sheet color.
The seams have to be cut absolutely straight and the edges have to be smooth.
Clean off the dirt and dust with a white clean cloth and denatured alcohol or Acetone.
Ensure all marks or prints have been removed.
The curing time of adhesive at normal room temperature (+17°C) is approximate 45min.
A reinforcement strip is essential when bonding two sheets of HI-MACS® together.



Tip:

**Do not use any other adhesive to bond together two HI-MACS® pieces.
Never use Cyanacrylate adhesives (Super glues).**

HI-MACS® 3mm

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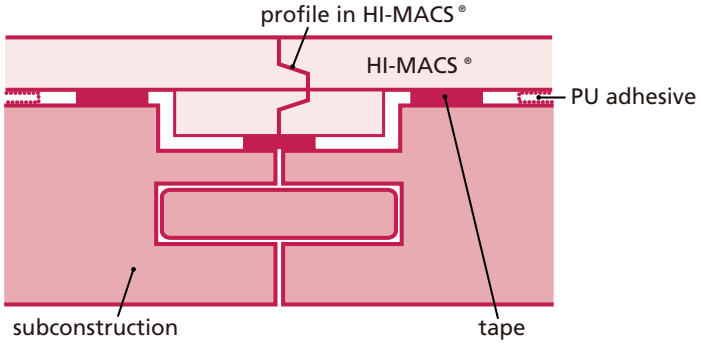
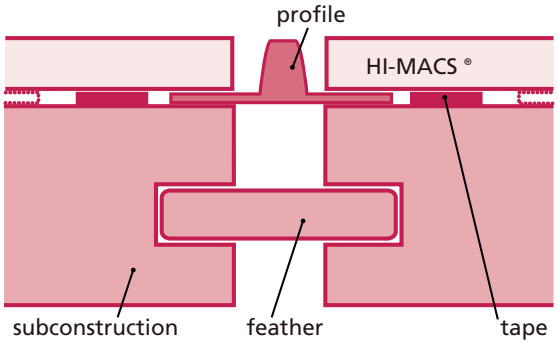
As a butt-seam can be a weak point, we strongly recommend always to use a profile or tongue and groove connection support.

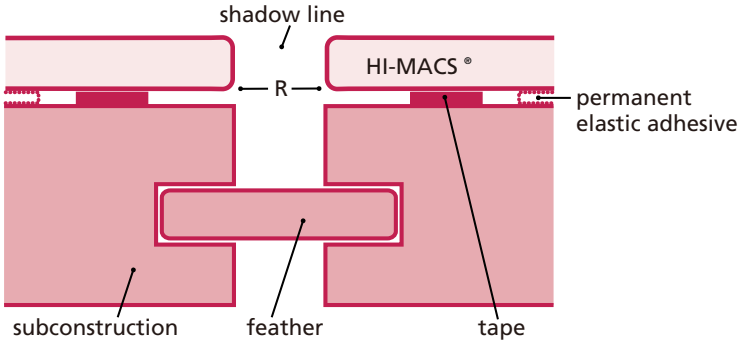


When preparing panels, like dividing walls or back-wall panels you may use a metal profile as a distance piece or just a simple shadow line in between two pieces, as shown below.

Sample with a metal profile:



Sample of a shadow line:



HI-MACS® 3mm

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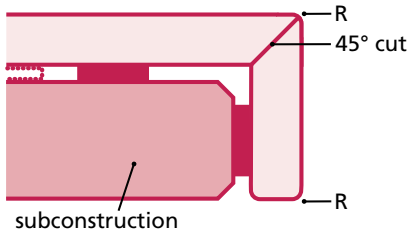
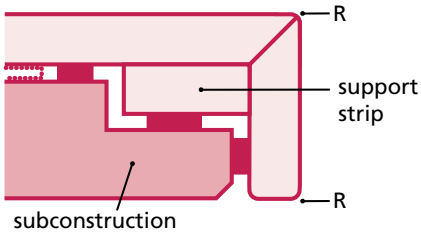
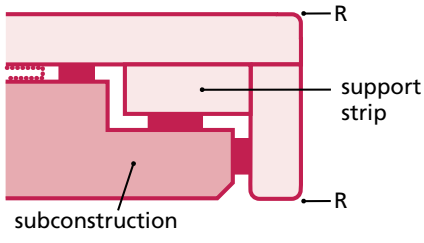
Edge (downturn/up-stands) preparation:
The edge preparation should be done in accordance with our standard guidelines. Which means: straight cut –› proper smoothing –› clean off with a white cloth and denatured alcohol (or acetone).

As 3mm is quite thin we strongly recommend always to place a support strip of approx. 15 – 20mm width behind the edge (downturns/up-stands).



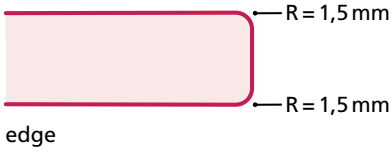
Below two samples for correct edge (downturn/up-stands) details with support strip:

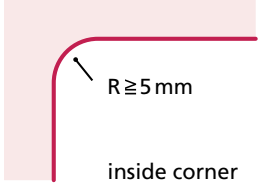




Cut-outs & Edges:

To avoid any stress in a corner or on an edge, always put a radius on:
- For edges: >= 1,5mm
- For cutout edges (up and down): = 1,5mm
- For inside corners: >= 5mm





Tip:

Do not place any shape or heating device or any heavy weight on to the 3mm HI-MACS® surface.

Tip:

Ensure the HI-MACS® surface is properly supported on all sides and is able to shrink or to expand if needed.

HI-MACS® 3mm

Technical Bulletin – Interior – 13

Sanding & Finishing:

The sanding process should be done in accordance with our standard guidelines.
This means: choose the right grit of sandpaper to start with and follow the steps as recommended in the FM, Section 16 or in the Technical Bulletin No.4 "Sanding".

Tip:

- **Remember that 3mm HI-MACS® surface is much thinner than all other products of HI-MACS® materials.**
- **Therefore sand carefully to avoid any irregular defect of gauge variations in the surface as it would be difficult to eliminate such issues when using hand machines.**
- **Avoid any clogging of the sandpaper**

Clean off the surface from final dust best by using at final step the "use-it" "Superpad S/G" (German patent: E3903204.3) from the company "JOEST" (www.Joest-abresives.de) and a white cotton cloth

Thermoformability:

The thermoforming of the 3mm HI-MACS® sheet should be done following our standard thermoforming procedures – see Technical Bulletin No.8 – "Thermoforming".

- Heating temperature: .....approx. +165°C
- Heating time: ..... approx. 3-5min. by contact heat
- Maximum small achievable radius: .....R=10mm

Quality check after fabrication:

All outgoing goods should be subject to a Quality Check Control before leaving the production place.
This will avoid any inconvenience at the place of installation.

For example:

- Check for visible damages?
- Any material spec failures?
- Enough air gap between HI-MACS® 3mm and sub-construction?
- All edges / cut-outs rounded?
- Enough support to avoid any warping?
- All seams perfect?
- Sanding properly finished?
- Critical point for transportation protection (for example: side seams)?
- etc.

Draft 3mm

Technical Bulletin – Interior – 13

Acrylic Foam Tape – AF1085 – Product Data

Description:

• Feature

AF1085 is white acrylic foam tape providing a balance of conformabilityand high bond strength

- High Durability & Bond Strength
- Thermal Resistance and Weatherability
- Absorption of Vibration and Shock

• Application

Many interior and exterior industrial applications for bonding a variety of Substrates,including most metal, glass, many plastics, painted surface.

Note: All Acryl Foam Tapes should be evaluated by the user under actual use conditions with intended substrates to determine whether these Tapes is fit for a particular purposed suitable for users method of application

Physical Properties

Constructor		Feature
Foam Tape	Thickness Colour Density	• 0,80mm ± 15% • White • 800 kg/m ^{3}
Liner	Thickness Colour	• 0,13mm • White Release Paper

Propiedades

Method	Standard	Result	Test Conditions
Peel Strength (kgf/10mm)	ASTM D-3330	2.5	• Substrate : SUS(Aging Time : 72hr) • 90° Peeling Velocity : 300mm/ min • Temperature (25°C) / RH (50%)
Dynamic Shear Strength (kPa)	ASTMD-1002	700	• Substrate : SUS (Aging Time :72hr) • Test Speed: 12.7mm/ min • Temperature (25°) / RH (50%)
Static Shear Test	ASTM D-3654	Pass	• Substrate: SUS/SUS • 1kg weight for 10,000min using 3.23 cm • Temperature (25°C) / RH (50%)

Values presented have been determined by standard test methods and are average values not to be used for specification purposes. We recommend that you carry out your own test in each case, to confirm that the LG Hausys Pressure Sensitive Adhesive Tapes which you consider using is appropriate for your own particular application. Otherwise, LG Hausys shall not be any responsibility or liability direct or consequential for loss or damage caused as a result of your own tests to determine their suitability for your applications

For More Further Product Information or Sales assistance, Adress correspondence to: High Performance Materials Division, LG Twin Towers, 20 Yeouido-dong, Yeongdeungpo, Seol 150-721, Korea. Call toll free 82-080-005-4000, Fax : 82-2-3773-3459

Draft 3mm

Technical Bulletin – Interior – 13

The quick and cost-saving way to a gloss finish

with useit™ made by JÖST

step 1

first sanding with
Superpad P 220 *

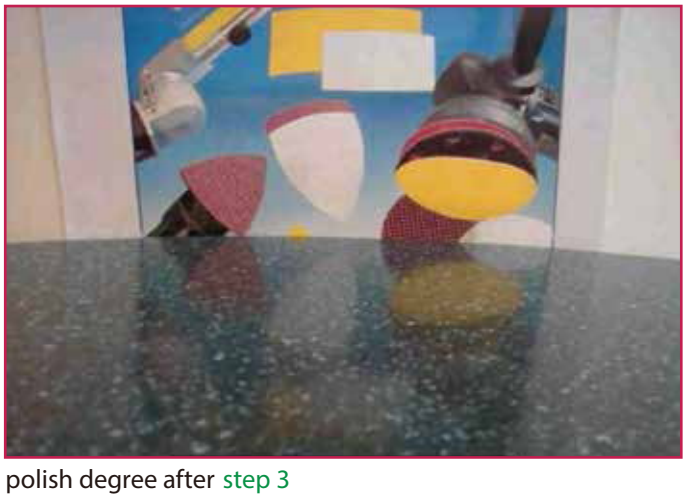
step 2

semigloss finish with
Superpad S/G 600

step 3

gloss finish with
Superpad S/G 1200

shedeless brightnes – high color-brilliance for dark colours



polish degree after step 3

*Use grit 120 , 150 or 180 to remove factory sanding mar or to other surface defects

JÖST GmbH

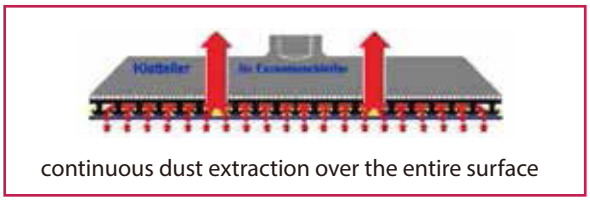
D 69483 Wald-Michelbach
Beerfeldener Str.77
Fax: 06207-2463
Tel: 06207-94100
E-Mail: joest-abrasives@t-online.de
Internet: www.Jaest-abrasives.de

Draft 3mm

Technical Bulletin – Interior – 13

The quick and cost-saving way to a gloss finish

useit™ abrasives patentet by JÖST … the superior way of sanding.



continuous dust extraction over the entire surface

Superpad S/G

a high performance abrasive

- For surface conditioning with a sanding performance that is up to 6 times higher compared to conventional paper abrasives in fine grades.
- Due to the special structure of the useit™ Superpad S/G minerals like Corian™, Varicor™, Wilsonart™ etc. as well as acrylic glasses and high gloss suffices can be sanded and polished with considerably less expenditure of time and abrasives than usually.
- With Superpad S/G it is also possible to archive with relatively little labour expenditure high polished surfaces on stainless steel and non-ferrous metals.

With our product Superpad S/G you are always able to deliver

- Superpad S/G fits always; regardless of different hole patterns and numbers in the sanding discs and plates. A 100% readiness for delivery and high saving in storage costs are a result of this.
- useit™ Superpad S/G can be delivered in discs, stripes and triangle.

JÖST GmbH

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Internet: www.Jaest-abrasives.de

German Patent E 39 03 204.3

Draft 3mm

Technical Bulletin – Interior – 13

LG Hausys Acrylic Foam Tape AF1 Series

Material Safety Data Sheet

This material safety data sheet (MSDS) is provided as a courtesy in response to a customer request. Use or processing of the product not in accordance with the product's recommendations or not under ordinary conditions may affect the performance of the product and may present potential health and safety hazards. This MSDS may not comply with national legislation; it shall be used only as a source of information.

1. Identification of the Product/Preparation and the Company

Product Name	LG Hausys Acrylic Foam Tape AF1 Series
Producer/Supplier	LG Hausys Co.,Ltd./Ulsan Complex 388, Mangyang-ri Onyang-eup, Ulju-gun, Ulsan-City, 689-901 Korea
Phone number	+82-52-231-4307
Telefax	+82-52-231-4383
Emergency Phone	+82-52-231-4307
Issue Date	07/08/2009
Product Use	Bonding

2. Composition on Ingredients

Acrylate Polymer CAS No: trade secret, 70-90wt%
Additives CAS No: trade secret, 10-30wt%

3. Hazards Identification

Physical Form: Solid Tape
Odor, Color: White/Gray, Slight Acrylate Odor
Immediate health, physical, and environmental hazards:
The environmental properties of this product present a low environmental hazard. This product, when used under reasonable conditions and in accordance with the LG Hausys directions for use, should not present a health hazard. However, use or processing of the product in a manner not in accordance with the product's directions for use may affect the performance of the product and may present potential and safety hazards.
Skin Contact: No health effects are expected.
Eye Contact: No health effects are expected.
Inhalation: This product may have a characteristic odor; however, no adverse health effects are anticipated.
Ingestion: No health effects are expected.

4. First Aid Measures

The following first aid recommendations are based on an assumption that appropriate personal and industrial hygiene practices are followed.
Eye Contact: Need for first aid is not anticipated.
Skin Contact: Wash area with soap and water. If signs/symptoms develop, get medical attention.
Inhalation: Need for first aid is not anticipated.
Ingestion: Need for first aid is not anticipated.

Draft 3mm

Technical Bulletin – Interior – 13

LG Hausys Acrylic Foam Tape AF1 Series

5. Fire Fighting Measures

Suitable extinguishing media: Use fire extinguishers with extinguishing agents (e.g., dry powder, carbon dioxide, water spray)
Special protective equipment for fire fighters: Special fire fighting procedures: wear full protective equipment and a self-contained breathing apparatus
Unusual fire and explosion hazards: no unusual fire or explosion hazards are anticipated.

6. Accidental Release Measures

No applicable.

7. Handling and Storage

Handling
This product is considered to be an article which does not release or otherwise result in exposure to a hazardous chemical under normal use conditions.

Storage

If possible, store in a dry place.

8. Exposure controls/personal protection

- **Engineering controls**
  Not applicable
  Technical measures/Precautions
  Not applicable
  Eye/Face Protection
  Not applicable
  Skin and hand protection
  Gloves not normally required.
  Avoid prolonged or repeated skin contact.

Respiratory Protection
Under normal use conditions, airborne exposure are not expected to be significant enough to require respiratory protection
Prevention of Swallowing
Not applicable
Exposure Guidelines
None Established

Draft 3mm

Technical Bulletin – Interior – 13

LG Hausys Acrylic Foam Tape AF1 Series

9. Physical and chemical Properties

Physical Form	Solid Tape
Odor, Color	White/Gray, Slight Acrylate Odor
Ignition temperature	No data available
Flash point	No data available
Flammable Limits – LEL	No data available
Flammable Limits – UEL	No data available
Boiling Point/Range	No data available
Density	0.75-1.05g/cm3
Vapor Density	Not applicable
Vapor Pressure	Not applicable
pH-value	Not applicable
Melting/Freezing Temperature	Not applicable
Assessment of Water Solubility	Not applicable
Evaporation rate	Not applicable
Volatile Organic Compounds	Not applicable
Percent volatile	Not applicable
VOC less H2O & Exempt solvents	Not applicable
Viscosity	Not applicable

10. Stability and reactivity

Stability: Stable
Materials and conditions to avoid: strong acids and strong bases
Hazardous Polymerization: Hazardous polymerization will not occur.
Hazardous Decomposition: Under recommended usage conditions, hazards decomposition products are not expected. Hazardous decomposition products may occur as a result of oxidation, heating, or reaction with another material.

11. Toxicological Information

Please contact the address listed on the first page of the MSDS for toxicological information on this material and/or its components

12. Ecological Information

Ecotoxicological information
Not applicable
Chemical fate information
Not applicable

13. Disposal considerations

Waste disposal method: Reclaim if possible. If product can't be reclaimed, dispose of waste product in a sanitary landfill. Alternatively, incinerate the waste product in an industrial, commercial, or municipal incinerator. Since regulations vary, consult applicable regulations or authorities before disposal.

Draft 3mm

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LG Hausys Acrylic Foam Tape AF1 Series

14. Transport Information

Not regulated per Korea.
The shipper remains responsible for complying with all applicable laws and regulations, including proper transportation classification and packaging. LG Hausys' transportation classifications are based on product formulation, packaging, LG Hausys policies and LG Hausys' understanding of applicable current regulations. LG Hausys does not guarantee the accuracy of this classification information. This information applies only to transportation classification and not the packaging, labeling, or marking requirement. The original LG Hausys package is certified for Korea ground shipment only. If you are shipping by air or ocean, the package may not meet applicable regulatory requirements.

15. Regulatory Information

Domestic: Not applicable
Abroad: 311/312 Hazard Categories:
Fire Hazard – No, Pressure Hazard – No, Reactivity Hazard – No, Immediate Hazard – No, Delayed Hazard – No.

16. Other Information

AF1 Series is a registered trademark.

The Material Safety Data Sheet (MSDS) is believed to be correct as of the date issued. LG Hausys makes no warranties, expressed or implied, including, but not limited to, any implied warranty of merchantability or fitness for a particular purpose or course of performance or usage of use trade. User is responsible for determining whether the LG Hausys' product is fit for a particular purpose and suitable for user's method of use or application. Given the variety of factors that can affect the use and application of a LG Hausys' product, some of which are uniquely within the user's knowledge and control, it is essential that user evaluate the LG Hausys' product to determine whether it is fit for a particular purpose and suitable for user's method of use or application.

Disclaimer

The information provided in this specific technical bulletin corresponds to our best knowledge on the subject at the date of its publication. This information may be subject to revision as new knowledge and experience becomes available. The data provided fall within the normal range of product properties and relates only to specific material designated. These data may not be valid for such material in combination with other materials or in any process, unless expressly indicated otherwise. It is offered exclusively to provide possible suggestions for your own experiments and needs approval from LG Hausys.
This bulletin is not intended to replace for any testing you may need to conduct to determine for yourself the suitability of our products for your particular purpose. Since LG Hausys cannot anticipate all variations in actual end-use conditions, LG Hausys makes no warranties and assumes no liability in connections with any use of this information. Nothing in this publication is to be considered as a license to operate under or a recommendation to infringe any patent right.

LG Hausys

www.himacs.com

HI-MACS®

Sparkle Fabrication

Technical Bulletin - Sparkle Collection

Acrylic Solid Surface

Contents of Technical Bulletin - Sparkle

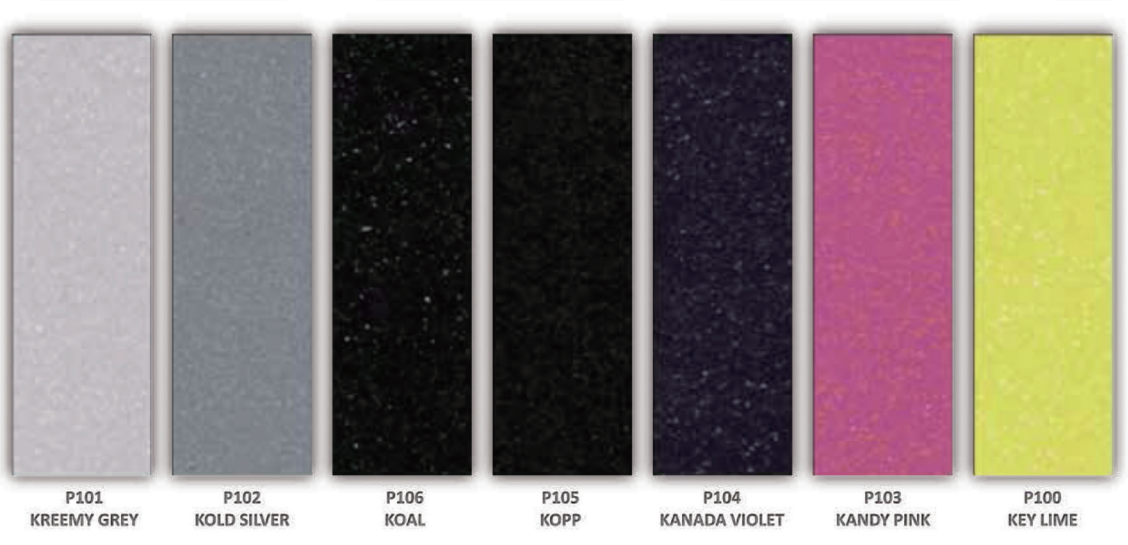
Material Preparation

Technical Bulletin - Sparkle

Sparkle – New Color Family 2014

This bulletin summarizes specific characteristics and properties of HI-MACS® Sparkle material which have to be taken into consideration in fabricating or installing these HI-MACS® products.
This Technical Bulletin gives a basis to ensure the correct use of this high performance material and to meet customers' and end-consumers' expectations in building an additional cornerstone for our best HI-MACS® Usage

Sparkle Colors:



Material preparation:

In fabricating sparkle colors of HI-MACS®, there is almost no difference to the HI-MACS® Granite products in terms of fabricating and installing. There is no difference in the smell of the new product during the fabrication process either. The acrylic based material has a slightly altered formulation but it is composed of the same ingredients.

In order to achieve out the sparkle effect, additional pigment, Mica has been added. Mica is a special effective stone that is milled and grinded into small particles, which also is used for some glitter effect in lipsticks. As usual, in HI-MACS® there are no toxic ingredients in the composition which could be in anyway harmful in health/

Material Preparation

Technical Bulletin - Sparkle

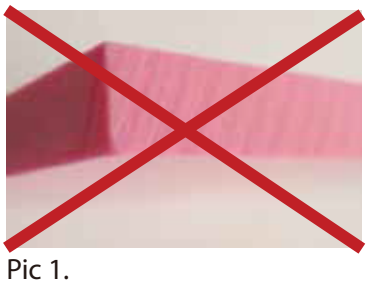
– Always handle the material with care to avoid any additional uncontrolled scratching from the top or the back of the sheet.

Color Family	Thickness	Color Name	Color Code	Adhesive	Color Code	Disclaimer
Sparkle	12mm	Key Lime	P100	Key Lime	H110	O
		Kreemy Grey	P101	Kreemy Grey	H112	
		Kold Silver	P102	Kold Silver	H111	
		Kandy Pink	P103	Kandy Pink	T014	O
		Kanada Violet	P104	Blue	H010	O
		Kopp	P105	Mocha	H037	O
		Koal	P106	Merapi	H042	O

– In cutting Sparkle HI-MACS® material, always use a new and sharp saw blade or trim off with a CNC router to the size required.

– Ensure the cutting machine has to properly bee adjusted and the machine is turning correctly and absolutely straight.

– For bonding, an absolute straight and clean cut is mandatory.



Pic 1.

Pic 2.

– If marks of the saw blade or cutter of the trimmer are visible, ensure to re-sand the edges by using 180 or 220 (240) grit sandpaper.

– Ensure not to sand the edge "round" to avoid a bad result of the seam afterwards.

– If chips broken out in cutting, change a saw blade or trim off with an electrical planer or spindle molder to smooth the surface without any defect.

– Only use the recommended adhesive.

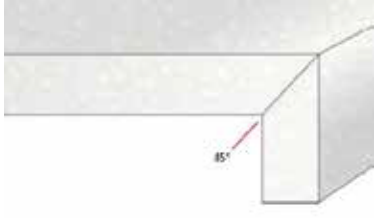
– Process the bonding as recommended

Edge Treatment & Bonding

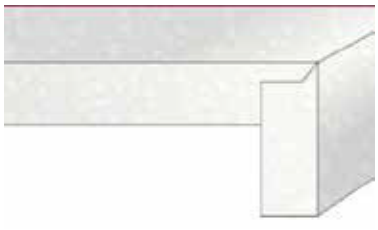
Technical Bulletin - Sparkle

Edge Treatment:

As the sparkle effect is only visible in the surface, the edge treatment should be recommended as follows:



Pic 3.

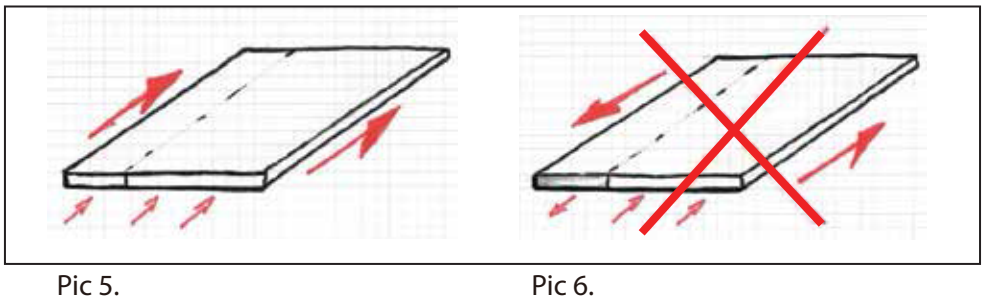


Pic 4.

– For the color family SPARKLE, in edge treatment, either 45° angle as shown in Pic 3 or a profile with rebate and angle as shown in Pic4 are recommended.

Bonding surface to surface:

Because the sparkle ingredients have a natural flow during the manufacturing process, the pigments will fall into a specific direction. Therefore, in bonding two sheets together, it is ensured to bond the pieces into one direction, but never in opposite direction – see pic.5 & pic.6. Please do not turn around a second sheet by 180°. This will eventually avoid a certain color difference effect that you could only see after the sanding process.



Pic 5.

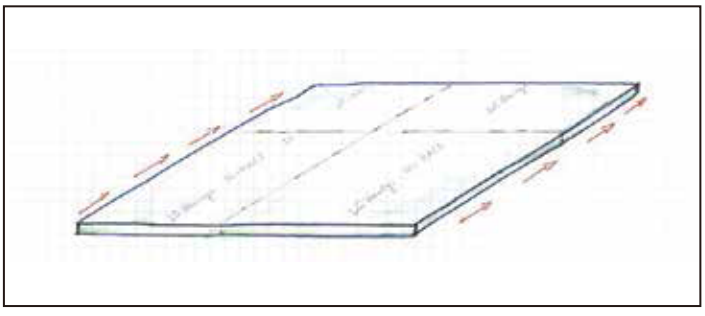
Pic 6.

Always follow the continuous production flow by ensuring the printing on the back side of the sheets (pic.5&7) always follows one direction – never going in opposite directions (pic.6).

On an application such as an L- or U- shaped counter top or a big conference table always ensure the underside printing is going in one direction

Color influences / Artificial light / Thermoforming

Technical Bulletin - Sparkle



Pic 7.

Color influences:

Dark and heavily pigmented colors of HI-MACS® will show dust, dirt and ordinary wear and tear more readily than light colors or colors with a structured texture. Dark and heavy pigmented colors are more delicate (P100, P103, P104, P105 and P106) and are best used for decorative applications. When used in heavy-frequent-use installations, such as kitchen countertops, it is very difficult for an end-consumer to maintain the finish of the product to his expected satisfaction.

Always inform a customer of such kind of potential problems that could arise later on.

Artificial light:

Artificial light might change the color slightly into different ranges of the light spectra. The material translucency of HI-MACS® will apparently absorb room colors and may change the material color look by intensive room color pigments.

Thermoforming:

Property tests have shown that the best radius the SPARKLE color family can perform to is no less than:

R = 50mm.

Darker colors (P103, P104 , P105 and P106) perform best with using a radius of no less than:

R = 85mm.

Color influences / Artificial light / Thermoforming

Technical Bulletin - Sparkle

Using anything less than these radius - as recommended above- can cause a whitening effect to become visible.

Color Name	Color Code	Thermoforming 2D Radius	Heat Temperature	Heating Time (Minute)	Heating Device
Key Lime	P100	50	165℃	15~20	Contact Heat
Kreemy Grey	P101	50	165℃	15~20	Contact Heat
Kold Silver	P102	50	165℃	15~20	Contact Heat
Kandy Pink	P103	85	165℃	15~20	Contact Heat
Kanada Violet	P104	85	165℃	15~20	Contact Heat
Kopp	P105	85	165℃	15~20	Contact Heat
Koal	P106	85	165℃	15~20	Contact Heat

Disclaimer

The information provided in this specific technical bulletin corresponds to our best knowledge on the subject at the date of its publication. This information may be subject to revision as new knowledge and experience becomes available. The data provided fall within the normal range of product properties and relates only to specific material designated. These data may not be valid for such material in combination with other materials or in any process, unless expressly indicated otherwise. It is offered exclusively to provide possible suggestions for your own experiments and needs approval from LG Hausys.
This bulletin is not intended to replace for any testing you may need to conduct to determine for yourself the suitability of our products for your particular purpose. Since LG Hausys cannot anticipate all variations in actual end-use conditions, LG Hausys makes no warranties and assumes no liability in connections with any use of this information. Nothing in this publication is to be considered as a license to operate under or a recommendation to infringe any patent right.

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HI-MACS®

Marmo Fabrication

Technical Bulletin - Marmo

Acrylic Solid Surface

Contents of Technical Bulletin - Marmo

Scope & Features of Marmo

Technical Bulletin - Marmo

1. Scope

1) This standard applies to the installation work involving LG Hausys Marmo product, which is used as interior finishing materials. The company shall not be liable for any problem that may occur due to the characteristics of the marble pattern of the Marmo materials installed based on standards other than this one.
2) The fabricator/installer shall submit this standard and samples to the customer in advance for discussions with the person in charge and shall seek approval after discussing the characteristics of the marble pattern of the Marmo materials.

2. Features of Marmo Product

HI-MACS® is an acrylic solid surface whose main composition is PMMA (Poly Methyl Methacrylate), MMA (Methyl Methacrylate), and AL (OH). The HI-MACS® Marmo collection uses same raw materials as the main material, same as HI-MACS®, a product having materialized patterns and designs that are almost the same as those of natural stone and displaying unspecified continuous colors.

Fabrication Guide for the Marmo Collection

Technical Bulletin - Marmo

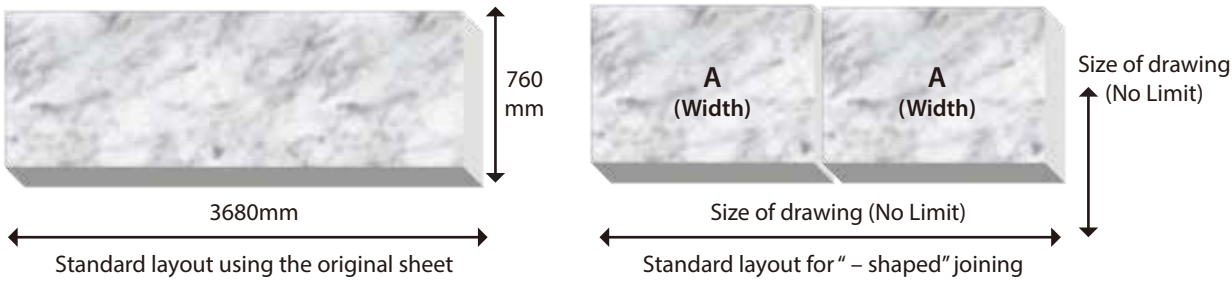
3. Fabrication Guide for the Marmo Collection

3.1 Cutting and Sanding HI-MACS®

Please refer to the HI-MACS® Fabrication Guide, which also applies to the HI-MACS® Marmo product.

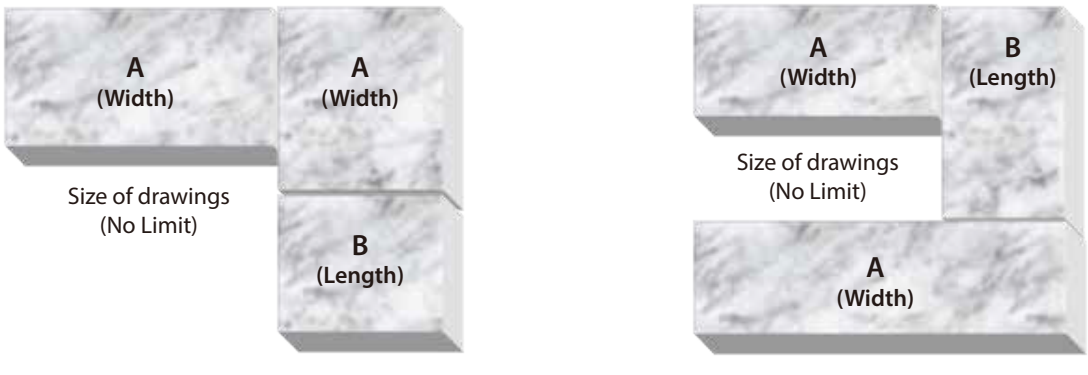
3.2 Layout of materials

'-' Shape layout



*If the length of the drawings exceeds that of the original sheet, or in case work is separately performed pursuant to the specifications of the drawings, make the pattern layout of the joining surface the same as that shown in the figure.

'ㄱ','ㄷ' Shape layout



Be sure to explain to the user that the Marmo materials may differ depending on the layout directions due to the characteristics of patterns.

Fabrication Guide for the Marmo Collection

Technical Bulletin - Marmo

3.3 Apron fabrication standard

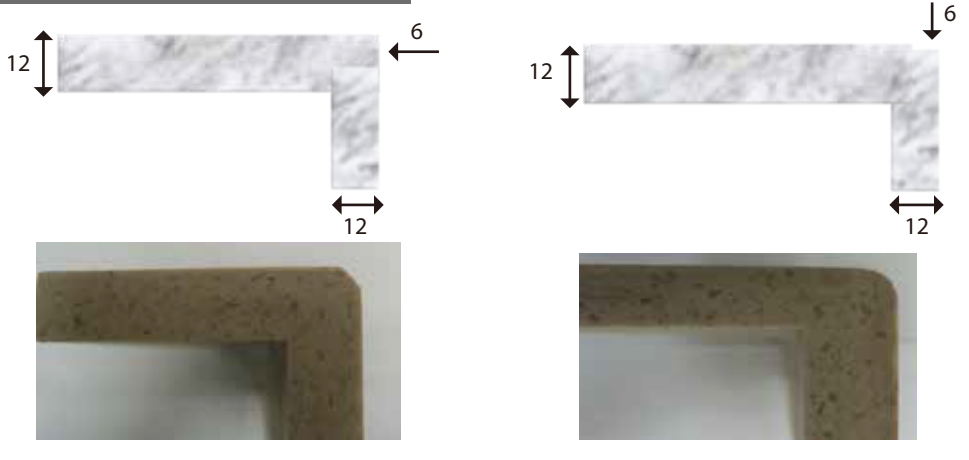
(1) Due to the characteristics of pattern materialization on HI-MACS® Marmo product, the Apron must be fabricated using the standard method designated in this standard. The company shall not be liable for any difference in patterns of the Apron if it is made using the general method rather than based on this standard.

Apron fabrication standard

** Join the 12mm+12mm thick sheet to the main upper sheet (12mm) as shown in the figure.

(2) Using an end mill, make 6mm grooves on the thick surface of the main upper sheet or the Apron; join the Apron using the grooves according to the specifications of the drawings.

Apron fabrication standard 2



*Make grooves on the boards as shown in the figure; make the Apron through 3mm chamfering or 5R Router finishing.

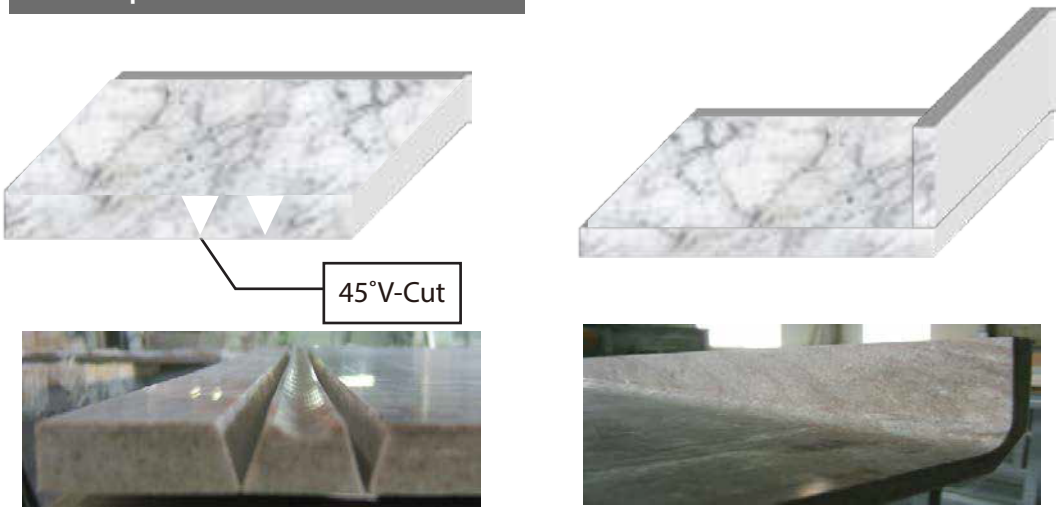
Fabrication Guide for the Marmo Collection

Technical Bulletin - Marmo

3.4 Back splash fabrication standard

(1) Make a back splash made of the Marmo materials in the same manner as that for the Apron using the V-grooving machine or 6mm grooving method.

Back splash fabrication standard 1



* Make a back splash through V-cutting as shown in the figure.

(2) Make grooves on the back splash according to the specifications of the drawings using the same method as that for the grooving of the Apron.

Back splash fabrication standard 2

* Make a back splash through 12mm or 6mm grooving work as shown in the figure.

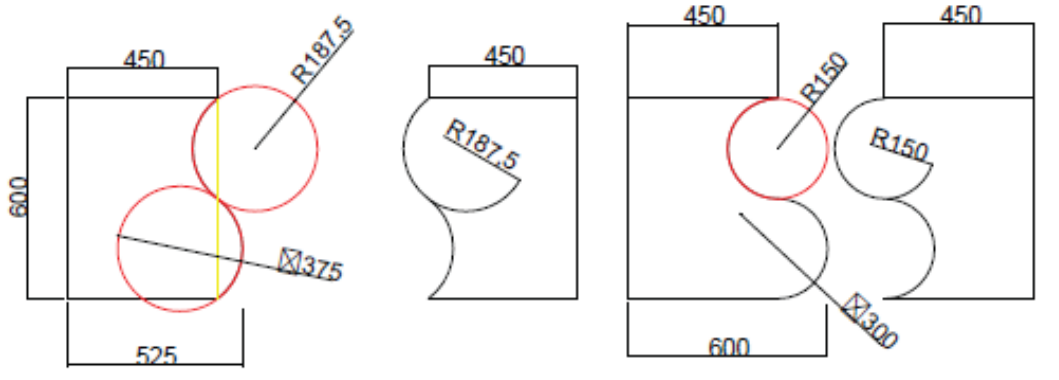
Fabrication Guide for the Marmo Collection

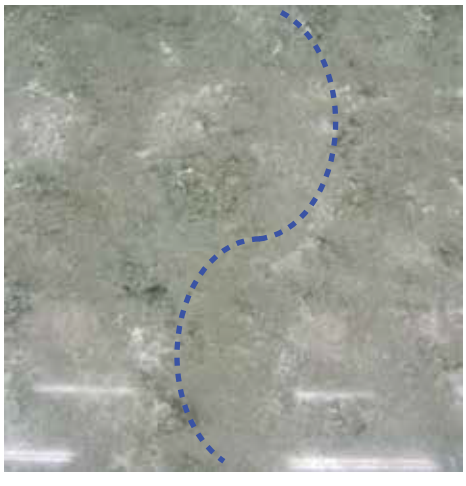
Technical Bulletin - Marmo

3.5 'S-shaped' Joining fabrication

150R, 187.5R fabrications

Cut the Marmo material 'S-shaped' using a template or NC machine and join the surfaces in the same manner as that shown below.





※ 'S-shaped' fabrication is recommended through several fabrication tests in Korea. However, joining line may show from case by case.

Fabrication Guide for the Marmo Collection

Technical Bulletin - Marmo

3.6 Fabricating countertops and island countertops made of the Marmo materials

Before fabricating the countertop upper sheet and the island countertop upper sheet, cut both ends of the materials by approximately 15mm considering the characteristics of the pattern materialization of the Marmo materials.

(1) Cut off 15mm from both ends based on a width of 760 for full sheet.

(2) Join the Apron using the standard Apron fabrication methods. (Use 15mm remaining from cutting the original sheet for Apron.)

(3) Sand the surface and visually check to verify the quality.

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Fabrication Guidelines

Technical Bulletin – Exterior 2016

Acrylic Solid Surface

Contents of Technical Bulletin - Exterior

Exterior 01.

Facade Application

Facade Application

Technical Bulletin – Exterior – 01

It is HI-MACS® unique strength of material performance to become established in the world of facade application. HI-MACS® is ETA (European Technical Approval) certified*.
The exterior use of defined unique and special announced HI-MACS® materials is applicable to the European standards and lawful European regulations of Technical approvals.
The material performance and its material characteristics have been approved by professional and independent institutes in cooperation with the highest building authority in Germany.
Facade Application

Many building relevant material performances have been tested and evaluated with very positive results.

The facade panel sizes can easily be adjusted to the main and relevant building sizes and designs.
But the material characteristic of dilatation has to be taken into consideration always and to be respected when designing the cover of the building.

The aesthetic individual panel designs suggest fixing with a non-visible fixing system. In this particular case LG Hausys Europe GmbH, Lancy Branch has decided using an undercut anchor system, which allows dealing even with large panels.

When choosing HI-MACS® for a facade application LG Hausys recommends to use tested and certified product elements only. From the fixing items to the wall up to the fittings of the HI-MACS® facade panels using qualified and approved products only will guarantee the best quality and its best material performance to a successful facade application. Warranty relates to perfect Quality.

Based on the research and test results at current time LG Hausys can announce from its HI-MACS® color range that 14 colours will perform in colour difference of ΔE3 to ΔE4 by 5 years of external use.

*Fixed with Keil inserts and a BWM structure, HI-MACS® facade in S728 - Alpine White successfully passed the ETA tests.

ΔE3

Colour Code	Colour Name	
S02	Almond	
S09	Cream	
S28/S728	Alpine White	
G34	Arctic Granite	
G38	Sea Oat Quartz	
G48	Beach Sand	

ΔE4

Colour Code	Colour Name	
G02	Grey Sand	
G04	White Quartz	
G05	White Granite	
G30	Ivory Quartz	
S302	Opal	
S033	Nordic White	
S29	Ivory White	
S034	Diamond White	

Facade Application

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The available facade panel size can be used as it is delivered and covers three widths:

- 760mm x 3680mm x 12mm
- 910mm x 3680mm x 12mm
- 1360mm x 3680mm x 12mm

Any smaller size can be made from those sheet sizes to get the best size with no or with very low cut offs or lefts.

The following HI-MACS® panels comprise advanced performance specifically for facade usage:

Colour		On stock	On order
S728 CE MED Alpine White 02		•	
S705 CE MED Grey			•
S706 CE MED Arctic White			•
S729 CE MED Ivory White			•
S801 CE MED Nougat Cream			•

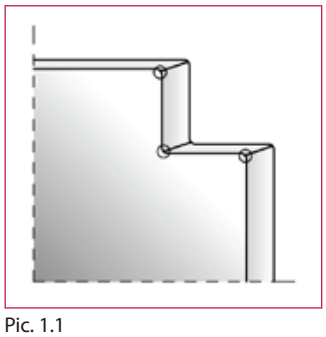
1.) Cut Offs

a. Cuts to size can be done via CNC router, table circular saw or wall panel saw, beam saws.

b. For hand saw machines it is **a must to re-sand** the whole edge and to be smoothen afterwards.

c. Cut outs in panels are only necessary to do with routers only.

d. Never leave any sharp corner neither any sharp edge at anytime and anywhere on the HI-MACS® facade panel.



Pic. 1.1

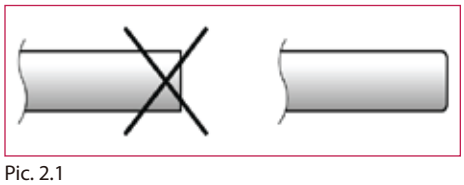
Facade Application

Technical Bulletin – Exterior – 01

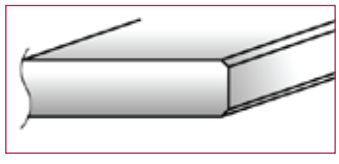
2.) Edges

a. All edges supposed to have a radius of minimum R=1,5mm.

b. Do not leave any sharp edges under all circumstances if later visible or not.



Pic. 2.1



Pic. 2.2

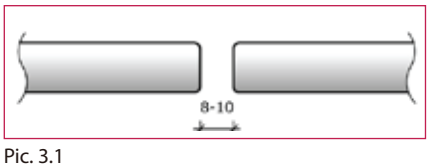
3.) Seam Design

a. Seams between different panels of HI-MACS® can be structured or designed in different ways.

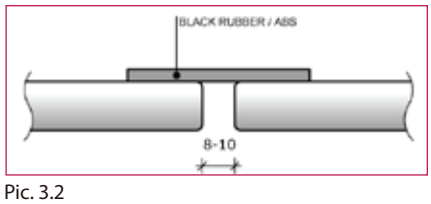
b. To allow optimal dilatation of each panel we strongly recommend a shadow line of 8 to 10 mm between each single facade panel.

c. But also other seam design can be chosen.

Open seam with or without backside protection / profile:



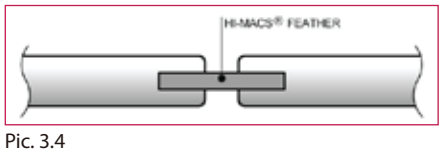
Pic. 3.1



Pic. 3.2

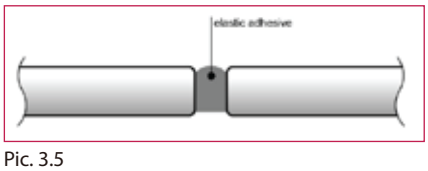
Seam overlapping direct trimmed to HI-MACS® facade panel or with HI-MACS® feather:

Pic. 3.3



Pic. 3.4

Closed seam with permanent elastic and weather resistant adhesive:

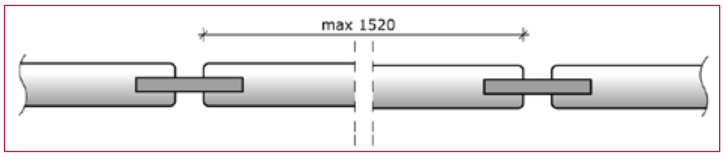


Pic. 3.5

Facade Application

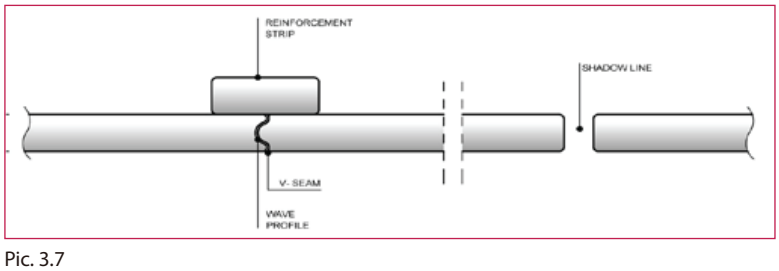
Technical Bulletin – Exterior – 01

HI-MACS® facade panel size expansion from 760 mm up to max. 1520 mm and with feather seam for panel left and right:



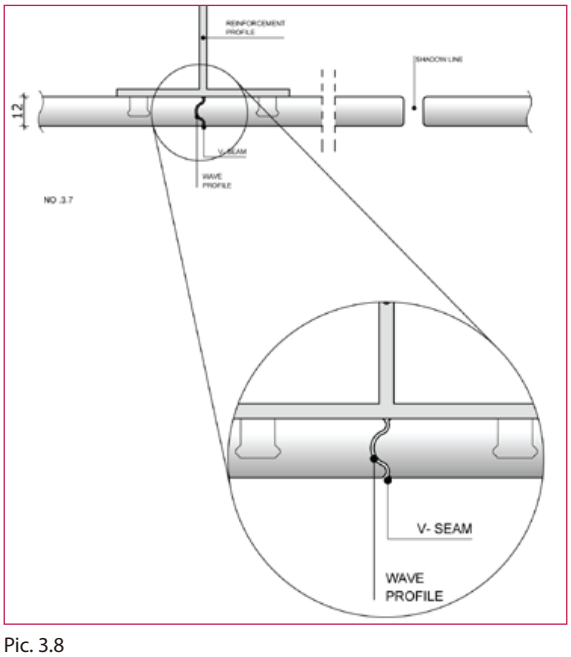
Pic. 3.6

HI-MACS® double panel re-enforcement support strip in HI-MACS®



Pic. 3.7

HI-MACS® double panel re-enforcement support strip with Aluminium T-profile:



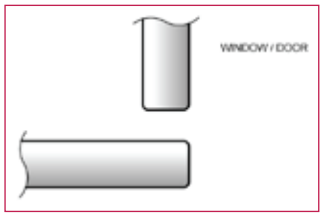
Pic. 3.8

Facade Application

Technical Bulletin – Exterior – 01

4.) Window / Door surrounding

a. The seams of the surroundings of the window or door should not be visible from the front but only from the inside as shown in drawing no. 4.1.

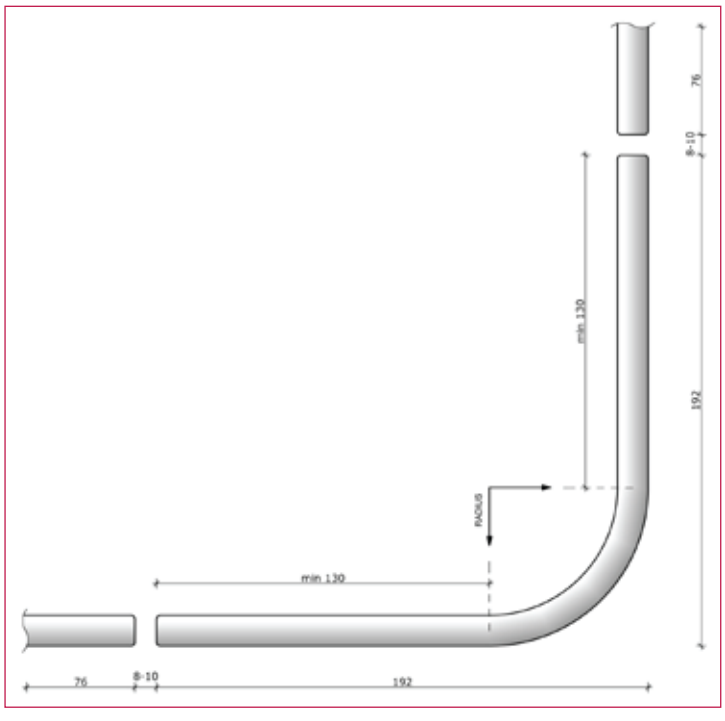


Pic. 4.1

5.) External thermoformed corner

a. To ensure to be able to place left and right clasps in the corner section a minimum size of approximate 130mm after the radius should be available.

b. The clasps supposed to be placed a minimum of 100mm from the edge. shown in drawing no. 5.1.

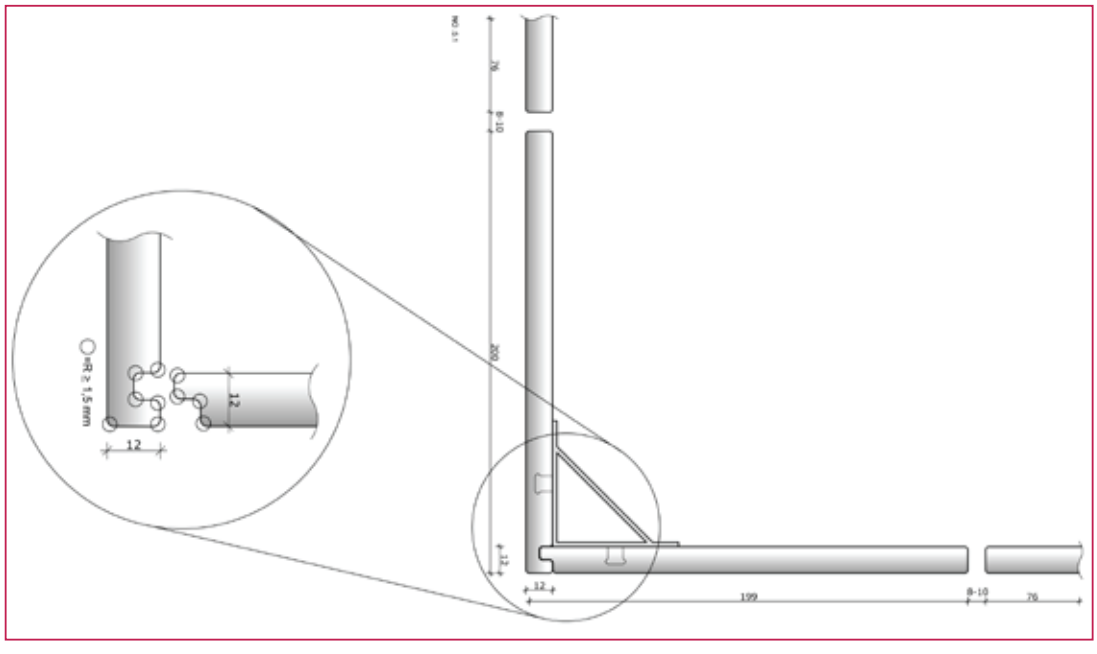


Pic. 5.1

Facade Application

Technical Bulletin – Exterior – 01

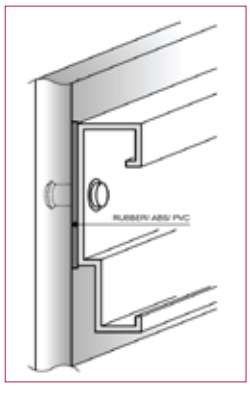
6.) External corner



Pic. 6.1

7.) Others

a. Any metal profiles connected to a HI-MACS® facade penal must have a rubber or plastic layer underneath for protection.



Pic. 7.1

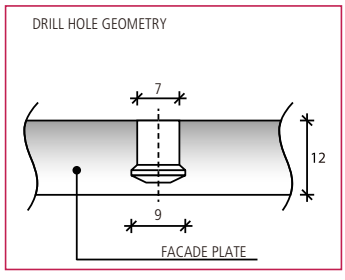
Facade Application

Technical Bulletin – Exterior – 01

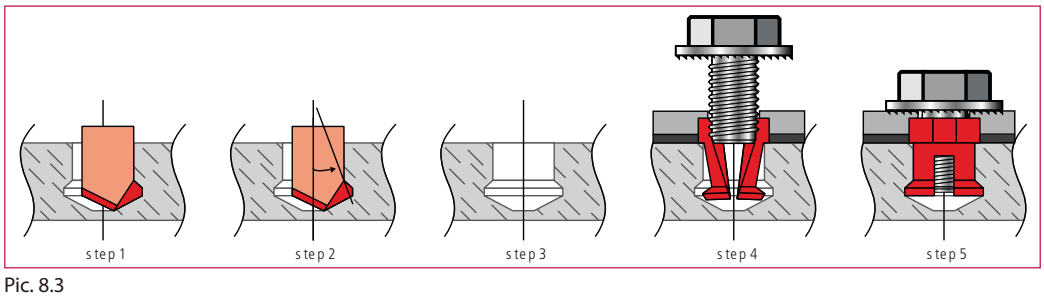
8.) Invisible fixing

LG Hausys recommends fixing HI-MACS® facade panels with Keil undercut anchors only whilst those are approved system and has the ETA-Certification applied for.

Pic. 8.1



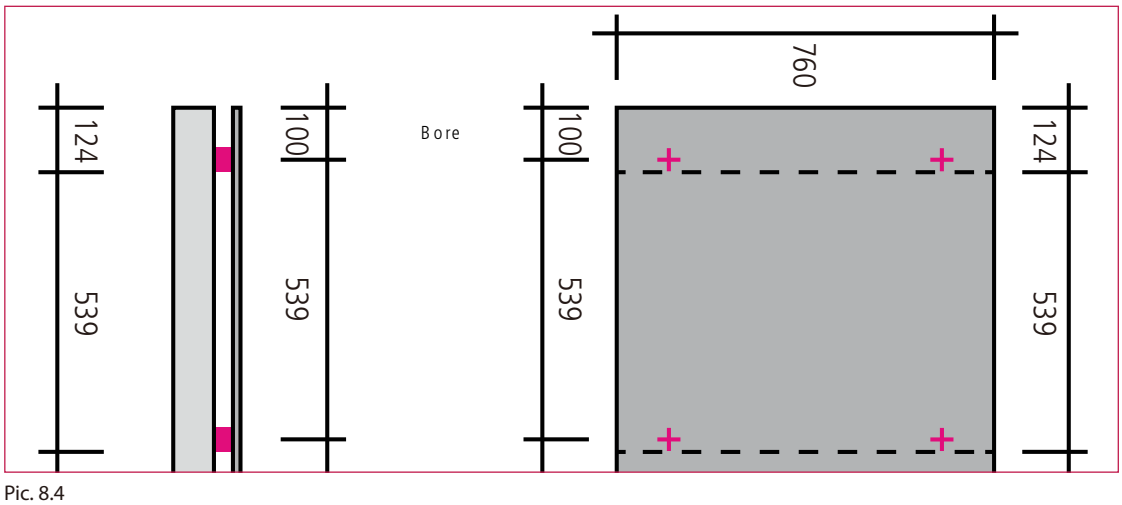
Pic. 8.2



Pic. 8.3

Based on a sheet size of 760mm width the anchors have to be placed 100mm away from the edge and with an axial distance of approximate 560mm.

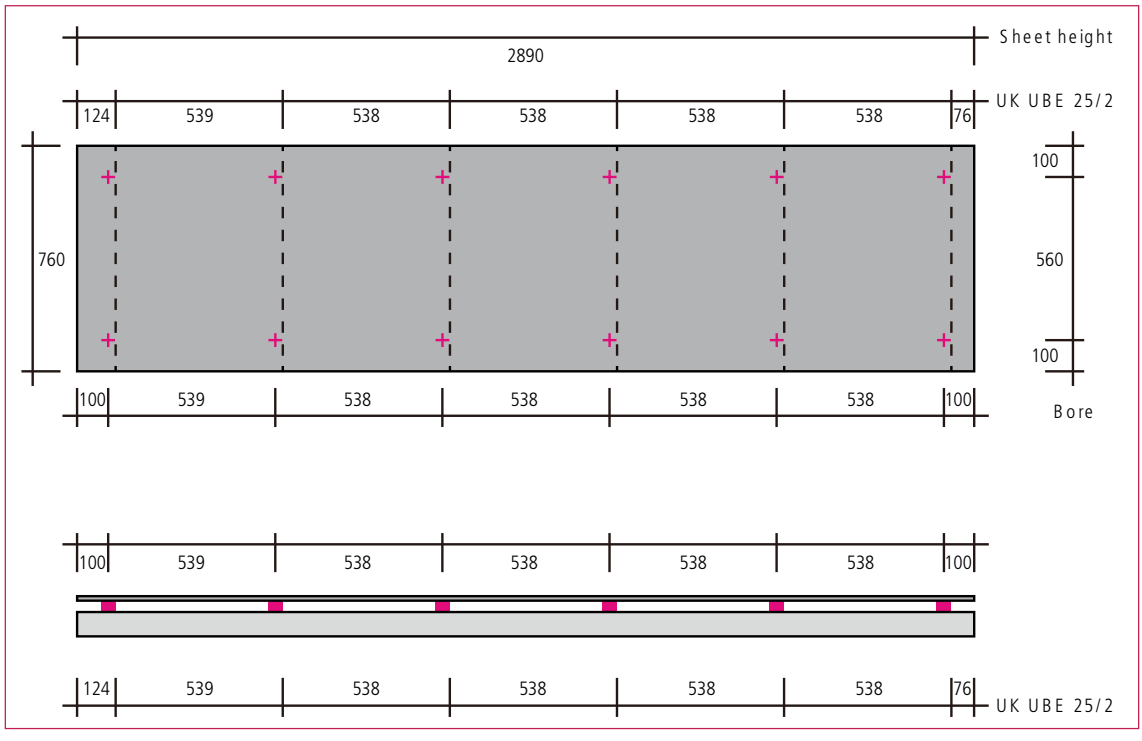
Sample I



Pic. 8.4

Sample II

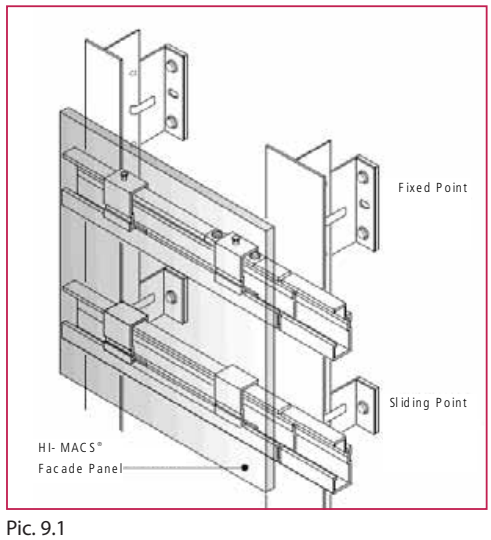
LG Hausys recommends following a training course by KEIL to get the right technique for the correct installation of those anchors. In case of a deficient installation, no warranty will be granted.



Pic. 8.5

9.) Sub-construction system

LG Hausys strongly recommends using only high quality and approved fixing systems, like BWM products.
The HI-MACS® facade panels have to be installed with a minimum of 20 mm air gap behind the panels to ensure that air will circulate from the backside of the panel. Insulation sheets have to be placed between the aluminium profiles of the sub-construction.
These profiles are placed according to the architect's advice, after calculation of the building's requirements.

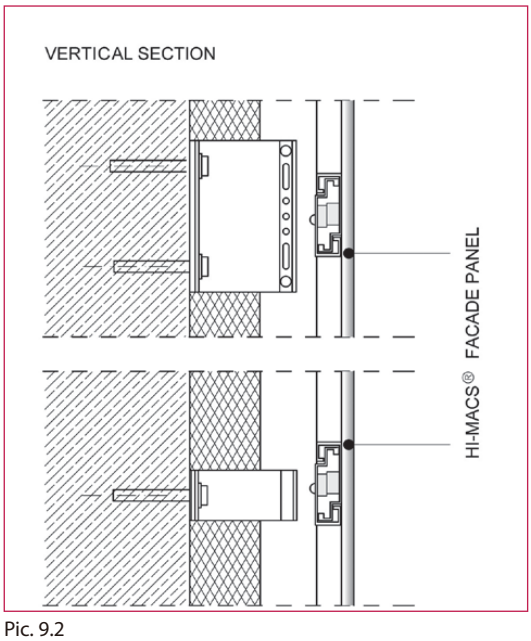


Pic. 9.1

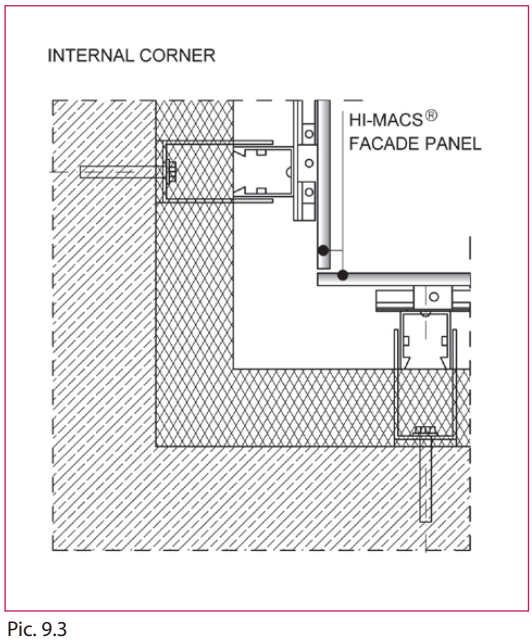
Facade Application

Technical Bulletin – Exterior – 01

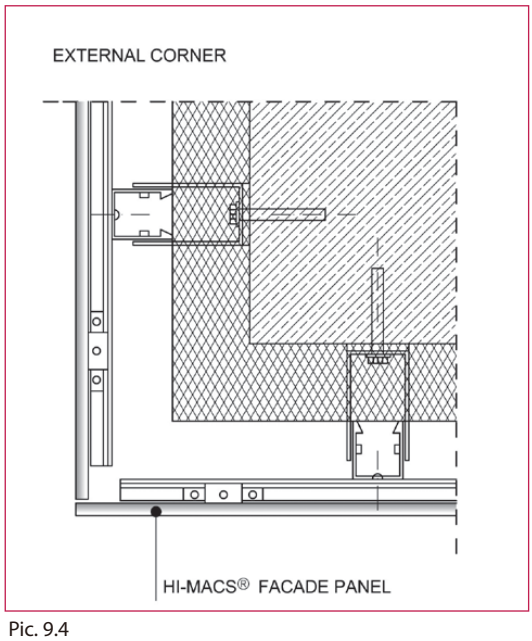
a. Construction details



Pic. 9.2



Pic. 9.3



Pic. 9.4

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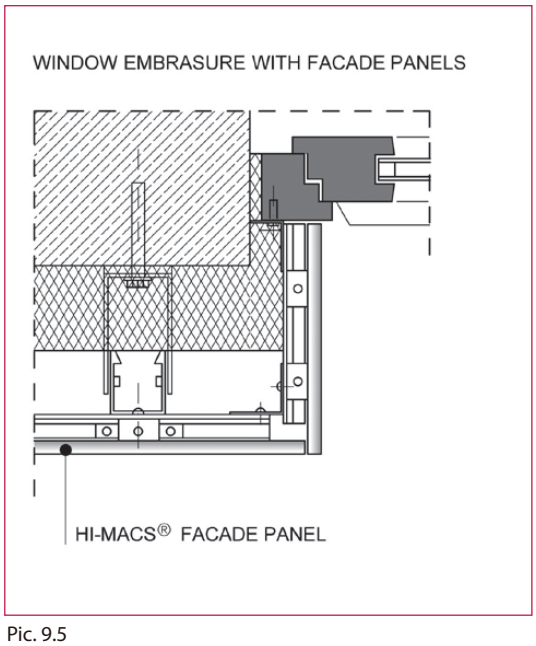
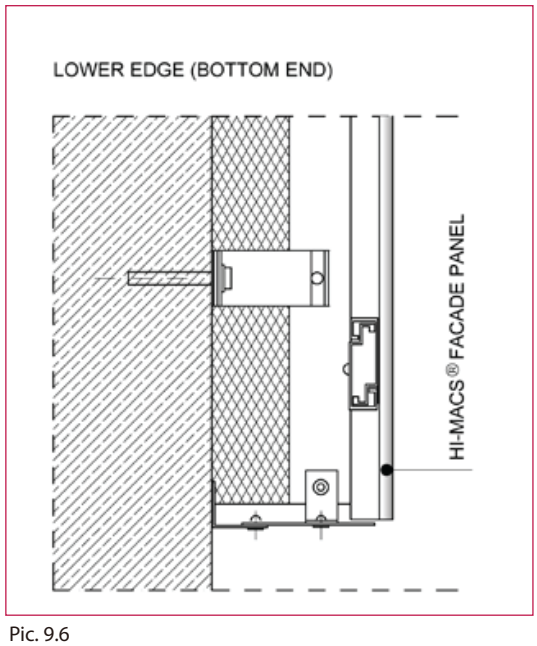
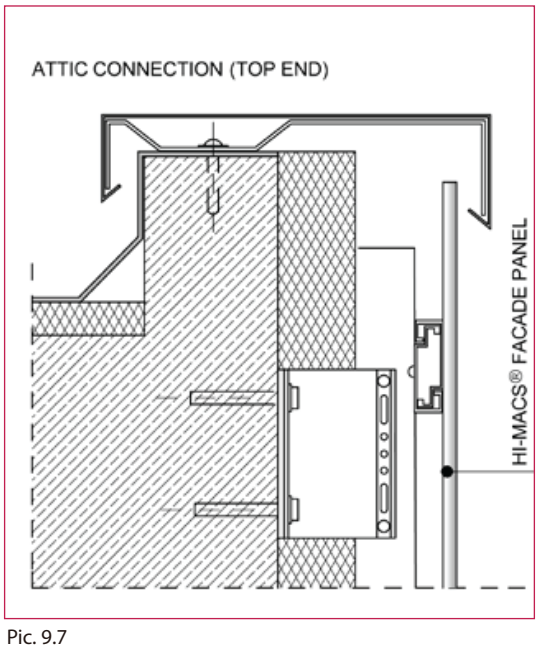


Pic. 9.5



Pic. 9.6



Pic. 9.7

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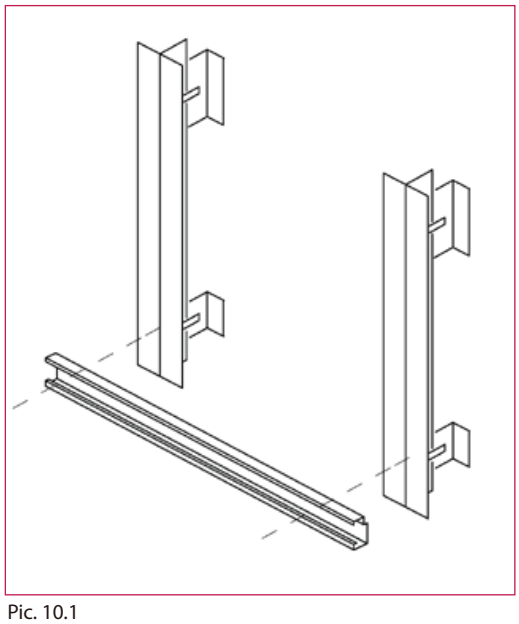
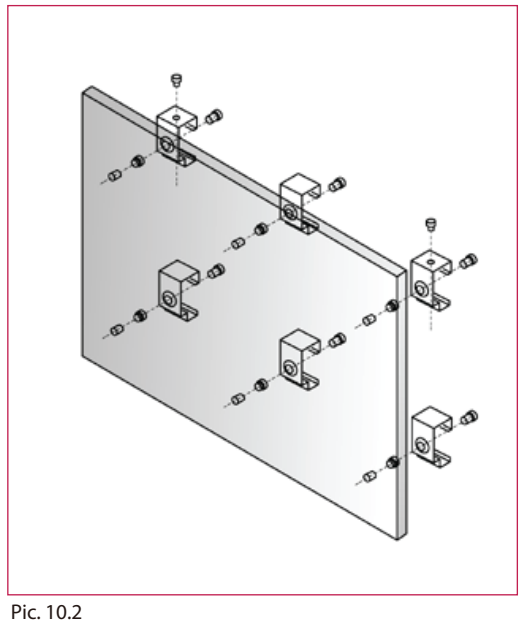
10.) Assembly and Installation steps

Step 1



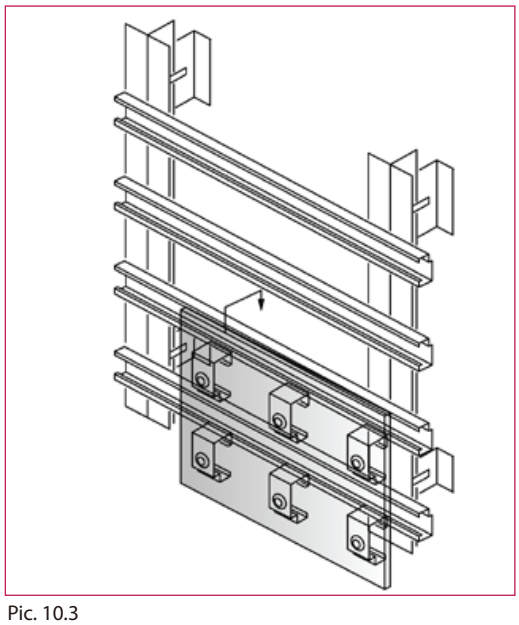
Pic. 10.1

Step 2



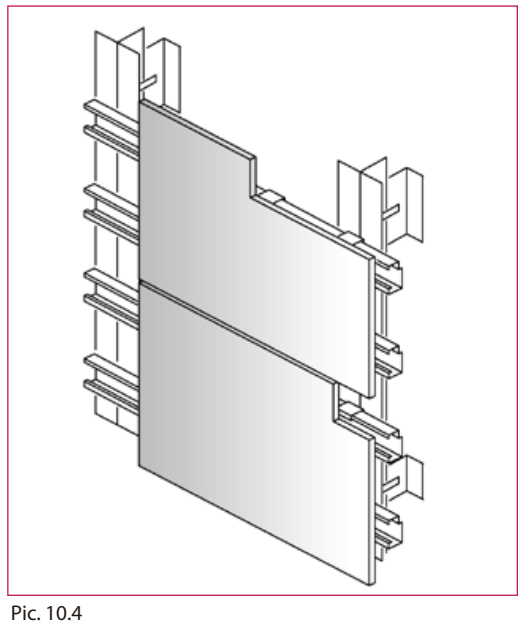
Pic. 10.2

Step 3



Pic. 10.3

Step 4



Pic. 10.4

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11.) Technical Specifications

General HI-MACS® Specifications		Result	Unit	Test Method
flexural E-modulus	Ef	8900	MPa	DIN EN ISO 178
flexural strength	σ fm	76,9	MPa	DIN EN ISO 178
ultimate elongation	Є fm	1,01	%	DIN EN ISO 178
resistance		$> 1 \times 10^{12}$	Ω	EN 61340-5-1
				DIN IEC 61340-4-1
coefficient of diffusion resistance	μ	1807		DIN EN ISO 12572
density		1,71	g / cm^3	ISO 1183
heat conductance	λ10tr	0,636	W / mK	DIN EN 12664
resistance to thermal insulation	R	0,048	m^2 K / W	DIN EN 12664
thermal expansion coefficient	α	0,048	mm / mK	prEN 14581
linear expansion coefficient		max. $30x10^{6}$	m /°C	
tensile strength	σ fm	32,7	MPa	DIN EN 527
water absorption		< 0,1	%	DIN EN 438 -part12
SBI fire performance		B - d0 - s1		DIN 13501

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HI-MACS® FR / S728 Specifications	Result	Unit
sheet thickness	12	mm
dead load	17,5	kg/m^2
depth of fixation of Keil undercut anchor	8,5	mm
allowable bending stress	55	N/mm^2
flexural E-modulus	8500	N/mm^2
thermal expansion coefficient	$30x10^{-6}$	m/°C
allowable center traction per anchor	500	N
allowable center cross traction per anchor	800	N
minimum distance to edge of anchor	100	mm
minimum axial distance of anchor	100	mm

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12.) General Technical Specification Data Sheet

Specification	Unit	Result		Test methods
		Solids	Granite	
Flexural-E-modulus	MPa	8900	7730	DIN EN ISO 178
Flexural strength	MPa	70.1	64.3	ASTM D638
Breaking elongation	%	1	1.1	DIN EN ISO 178
Tensile strength	MPa	69.5	56.3	DIN EN ISO 527
Density	g/cm³ kg/m³	1.75 1750	1.65 1650	ISO 1183 ISO 1183
Ball indentation hardness	N/mm²	257	239	DIN EN ISO 2039-1
Mohs hardness		2 to 3	2 to 3	EN 101
Pencil hardness		>9H	>9H	ISO 15184
Water absorption weight strength/thickness		 <0,1% <0,1%	 <0,1% <0,1%	DIN EN 438 Part 12
Impact resistance impactor drop ball test (fall height)	 N mm	 ≥25 ≥1500	 ≥25 ≥1500	 E DIN EN 438, 02/02 Part 2/20 E DIN EN 438, 02/02 Part 2/21
Slip resistance		>0,32 – 0,9		GMG100 (replaces R9)
Slip resistance		angle of acceptance of more than 10° to 19° = R10		DIN 51130
Climate change resistance	°C	≥0,05	≥0,05	AMK
Dry heat (pan base)	°C	≥100 (7C)		DIN 68 861, Part 7, 04-'85
Damp heat (pan base)	°C	≥100 (7C)		DIN 68 861, Part 8, 04-'85
Temperature change resistance	°C	no change		UNI 9429
Resistance to cigarette burns		6C	6B	DIN 68 861, Part 6, 11-'82
Scratch resistance		4D	4B	DIN 68 861, Part 4, 11-'81
Electrostatics Conductivity	 >1x10¹² Ω	 insulating non-conductive		DIN IEC 1340-4-1, 04-'92 EN 61340-5-1
Thermal conductivity	W/mK	0.636	0.55	DIN EN 12664
Thermal resistance	m²K/W	0.038	0.045	DIN EN 12664
Thermal expansion co-efficient	mm/mK m/m/°C	0.048 30.0 x 10 $^{-6}$	0.055	DIN EN 14581
Water vapour permeability - diffusion resistance factor	μ	18607	16150	DIN EN ISO 12572
Dimensional change by change in relative humidity length thickness mass	 % % %	 -0.03 0.06 0.05	 -0.02 0.03 0.05	DIN EN 318, edit. 5, 1998
Resistance to boiling water increase in weight increase in thickness	 % %	 <0,1 <0,1	 >0,1 <0,1	E DIN EN 438, 02/02 Part 2/12
Light fastness (Xenon)	scale 0 – 10	better than 6	better than 6	DIN 53 387, 04-'89
Food tolerance		suitable for all colours		LMBG § 31
Hygiene		suitable	suitable	LGA Hygiene Certificate
Fire protection classification Flame-retardant properties MPA/NRW HI-MACS® MPA/NRW (BAM) 12 mm (BAM) 9 mm + back-up (Bodycote/Warrington) 12 mm	 	B1 non-dripping material B1 for all colours* B1 for all colours* B-s1 , d0 for all HI-MACS® colours* complies with BS 476 class 0		DIN 4102-1 DIN 5510 DIN 4102-1 BS EN ISO 11925-2 : 2002 BS EN 13823: 2002

* (not currently applicable to Marmo, Eden, Galaxy, Lucent, Volcanics and Sparkle)

HI-MACS® is extremely repellent to dirt and exceptionally hard-wearing, so that you can enjoy many years of pleasure with the outstanding quality of your new product.

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Recommended brands for Solid Surface fabrication tools & equipment.

POWER TOOLS

FESTOOL : www.festool.com

BOSCH : www.Boschtools.com

MAKITA : www.makitatools.com

BLACK & DECKER : www.blackanddecker.com

ALBIN KRAUS : www.albinkraus.at/english.html

AIR TOOLS

DYNA BRADE : www.dynabrade.com

FESTOOL : www.festool.com

SAW BLADES & BITS

LEITZ : www.leitzindia.com

ALBIN KRAUS : www.albinkraus.at

TITMAN : www.titman.co.uk

DIAMOND BLADES & CUTTERS

HERCO : www.3d-diamond.com

LEITZ : www.leitzindia.com

V-GROOVING MACHINE

STAR V : www.starvmachinery.com

CLEANING AGENT FOR SHEET SEAMING

ACETONE : Avalable in local Market no need website

CNC ROUTERS MANUFACTURERS

BIESSE : www.biesse.com

SCM : www.scmgroup.com

MORBIDELLI : gabbett.com/morbidelli-nc-cnc/

SAW MANUFACTURERS

ALTENDORF : www.altendorf.de

ROBLAND : www.robland.com

MARTIN : www.martin.info

DUST COLLECTION MANUFACTURERS

FESTOOL : www.festool.com

EUROVAC : www.eurovac.com

NEDERMAN : www.nederman.com

VACCUM PRESS & THERMOFORMING

ELKOM : www.elkom.de

ABRASIVES

TITAN 2 RANGE : www.festool.com

3M Micro finishing system : www.3m.com

ABRANET / ABRALON / MIRLON : www.mirka.com

SIAFAST-BLUE LINE : www.sia.com

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