



SMILE PLASTICS

HANDLING  
INSTRUCTIONS

# HANDLING INSTRUCTIONS

These guidelines set out our recommendations for storing, caring for and working with our materials. They are not exhaustive and we are continually testing new possibilities with our materials. Please send us your recommendations so we can expand our knowledge of the workability of our materials, so we can share with our community.

Our sheets of plastic share many of the characteristics of other plastics and composite wood-based boards like MDF. They can be worked with most woodworking, plastics and metal tools, providing they are kept sharp. The biggest problem is frictional heat, which causes the plastic (especially swarf) to melt.

When cutting / working the material, try to use the fastest possible machine speeds without causing the plastic to melt through a heat build-up. Sharp blades, fast speeds and slower feeds should result in a neat, clean cut. We recommend experimenting on site to get the best results with your equipment and if you are unsure please do not hesitate to [ask us](#).

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# CAUTION

Plastics are flammable and can give off toxic fumes when burned. They also may deform with strong heat. As with any plastic-based material, do not use Smile Plastics products close to a heat source or in any area where there is a high fire risk.

Our materials are not suitable for cladding the exterior of buildings.

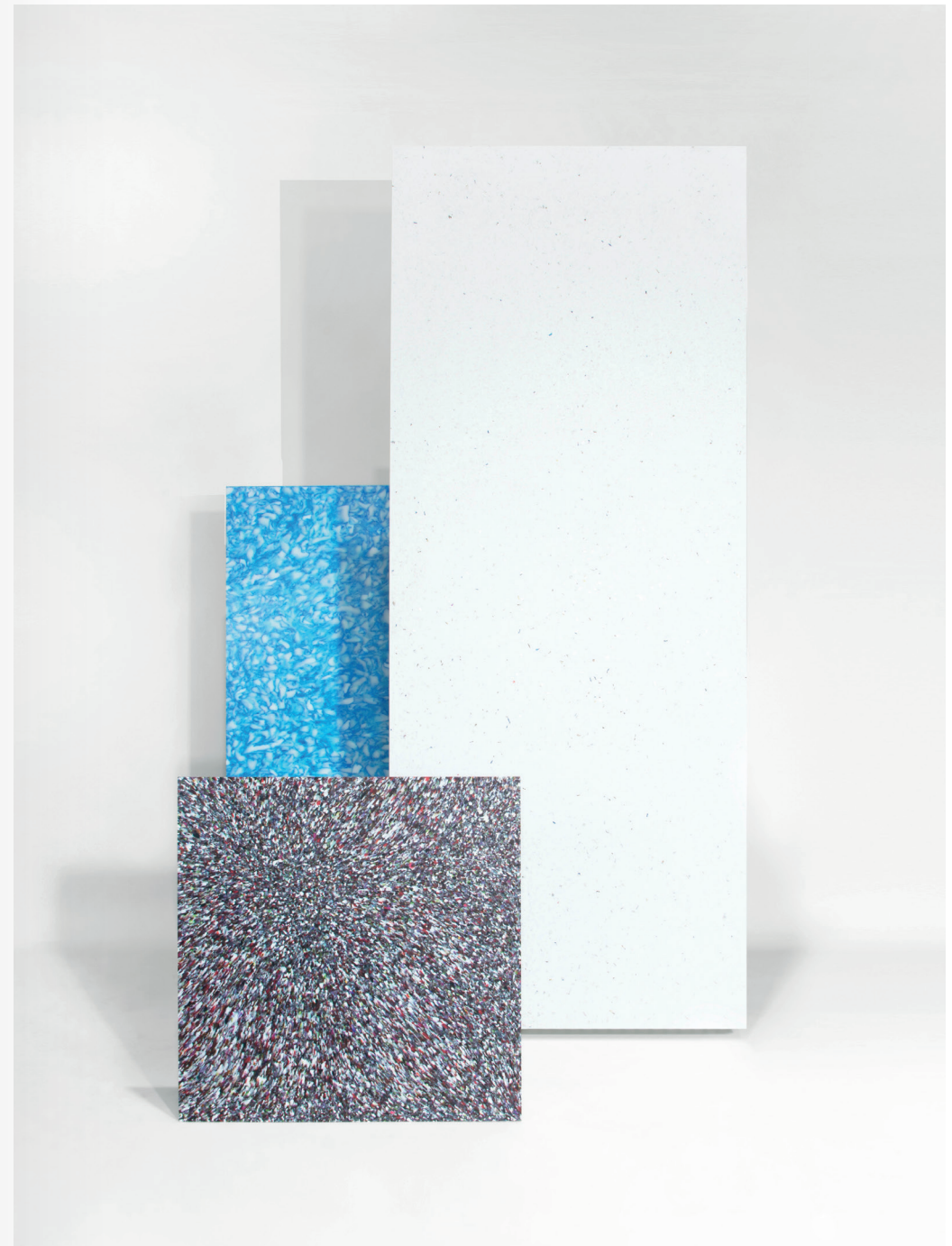
Do not use as a structural material.

Clean product prior to use (see guideline page maintenance).

When cutting, use appropriate protective equipment including eye protection and face mask.

Review our indicative **data sheets** prior to use.

↓ Kaleido, Alba and Blue Dapple



# STORAGE

If possible, store your plastic sheets on a fully supported and level plane to avoid any warping. If this proves impossible, store them as close to upright as you can (with the long edge on the floor) and prop them against a wall with nothing else leaning on them.

The sheets will bend if improperly stacked. If bending occurs, then stacking them “in the opposite direction” will normally return bent sheets to their original shape.

The material will scratch if handled roughly, so care should be taken when they are being moved and stacked, especially when being laid flat on the floor or a work surface. We recommend laying a sheet of cardboard between stacked sheets, or on top of surfaces being worked on, to help prevent marks.

Also, ensure that the material is stored and worked on in a clean environment, as sharp pieces of metal or grit are likely to mark the surface of the material.

# FULL SHEET WEIGHTS

2000 x 1000mm dimensions

| Sheet Thickness | rHDPE (Dapple) | rHIPS (Alba and Heron) | rPET (Other Classics) |
|-----------------|----------------|------------------------|-----------------------|
| 5mm             | Not available  | 15kg                   | 18kg                  |
| 12mm            | 29kg           | 30kg                   | 35kg                  |
| 20mm            | 48kg           | 50kg                   | 58.7kg                |

3000 x 1200mm dimensions

| Sheet Thickness | rHDPE (Dapple) | rHIPS (Alba and Heron) | rPET (Other Classics) |
|-----------------|----------------|------------------------|-----------------------|
| 5mm             | Not available  | 19kg                   | 23kg                  |
| 12mm            | 41kg           | 48kg                   | 56kg                  |
| 20mm            | 69kg           | 80kg                   | 94kg                  |

\*Approximate weights

# HANDLING INSTRUCTIONS



# MAINTENANCE

Smile Plastics sheets require little maintenance. Surface dirt can easily be removed using a mild detergent and warm water, but the material is relatively soft so abrasive cleaners should be used with caution.

The rHIPS and rPET panels are sensitive to organic solvents, especially nail varnish remover, paint stripper, etc. and some cleaning detergents like industrial catering spray.

The rHIPS material may begin to yellow slightly in strong sunlight but this surface effect can be treated with conventional bathroom cleaners or light sanding.

Scratches on rPET and rHIPS can be sanded out using appropriate grades of paper and scotch pads. rHDPE can be refinished using flames or scotch pads. Avoid using squeegees or dry cloths on the materials as they may create scratches by dragging debris across the surface.

Alba (rHIPS) has paper and metallic foil on the surface and this can become dislodged when rubbing the surface harshly or using abrasives.

↓ Dapple full sheet, 2000 × 1000mm



# MAINTENANCE

If your Smile Plastics material requires a more intensive clean, try the following fixes in order:

1. Use a neat detergent on a cloth, making sure that it is a detergent compatible with the plastic which will not damage it.
2. If this fails use a solvent, such as methylated spirit, but do not leave the solvent on the surface and make sure you are in a well-ventilated area.
3. If these steps do not work use a scouring powder on a cloth, or failing that use a fine grade scotch pad or sandpaper, using increasingly finer grades up to 2000.



↓ Alba full sheet, 2000 × 1000mm



# HANDLING INSTRUCTIONS



# RESISTANCE

## Heat

Smile Plastics sheets must not be exposed to excessive heat as this will melt and eventually burn the material. They will withstand hot water, but prolonged application of boiling water will soften the sheet and cause it to lose rigidity. On a supported horizontal surface this may not be important but unsupported, it will suffer a rapid decrease of physical properties between 95°C and 200°C.

We would advise against using our materials anywhere they would come into regular contact with high heat, for example a kitchen counter around a hob or oven.

Thermal expansion of some sheets can be 2mm per meter over a 10 degrees Celcius change.

**NOTE: PLASTICS ARE FLAMMABLE AND CAN GIVE OFF TOXIC FUMES WHEN BURNED. DO NOT USE SMILE PLASTICS PRODUCTS CLOSE TO A NAKED FLAME OR WHERE THERE IS A HIGH RISK OF FIRE.**

## Solvents

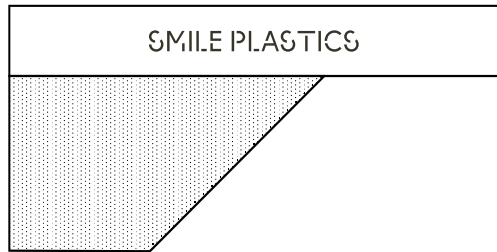
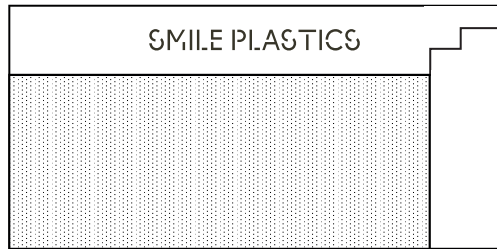
Organic solvents, like acetone, may cause the rHDPE to swell and should be used with caution. Organic solvents **MUST NOT** be used with the rHIPS or rPET materials.

## Sunlight

Sunlight will affect the rHIPS sheets in two ways. Firstly, the colours may fade or yellow and secondly, the material itself will eventually become degraded and will start to lose physical properties. UV radiation will affect all our materials slightly, although it is the most obvious on Alba (rHIPS).

On rHIPS and rPET, a hard oil with UV resistance (e.g. Osmo Oil) can be applied to the surface to add more resistance to UV damage.

# SUPPORTING SHEETS



If you are planning to use the sheets for tables or work surfaces, ensure you have sufficient supporting structure so the material does not buckle or warp over time. This is particularly important when using 5mm or 12mm sheets, or the rHDPE material of any thickness.

We would recommend using our 20mm sheets for any tabletop or work surface and support it with a good substructure. If you are creating a tabletop that is going to receive a lot of use, we would recommend using the structures shown on the following pages.

Fig.1

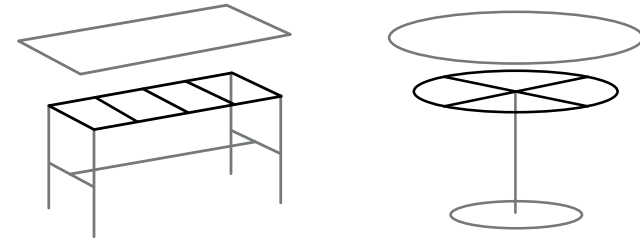
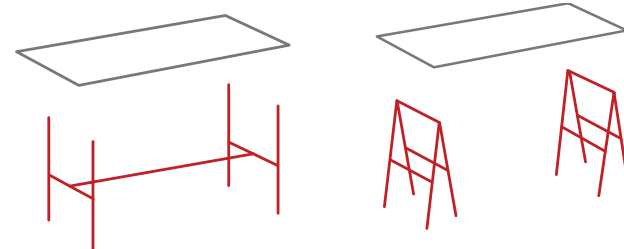


Fig.2



If you are using our materials without a solid substructure, we would recommend having regular supporting beams underneath, so there are no unsupported spans of material. (Fig.1)

We would strongly advise against using table styles where the top is only supported at the four corners or trestle-style legs without any cross beams. (Fig.2)

# JOINING CORNERS AND LENGTHS

Smile Plastics materials can be used to fabricate a variety of structures and items, and the corner joining method needed may vary with the application.

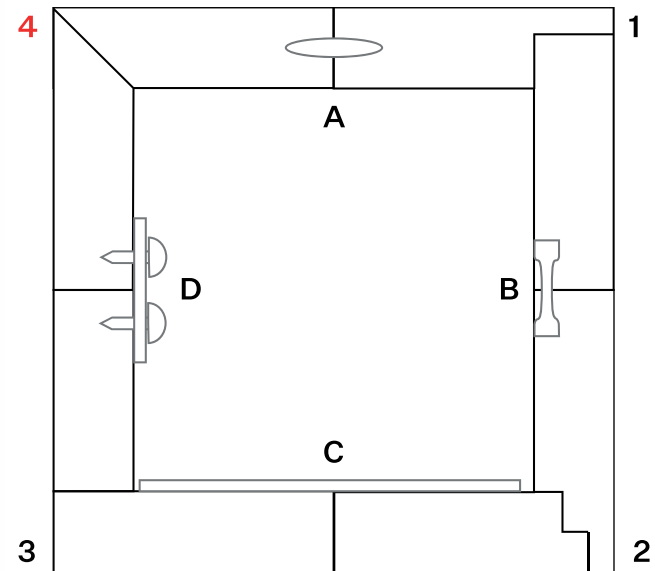
Most carpentry joints will work with our materials, but a few we recommend:

**1** Lap joint: if a fillet or chamfer is needed on the corner this is a good option.

**2** Stepped joint: this maximises the surface that the adhesive would be applied to and gives the illusion of an invisible joint.

**3** Butt joint: the simplest joint if the corner does not need to be too strong.

**4** Mitred joint: we **do not** recommend this type of joint with any of our materials. Please get in touch to discuss alternative options.



Smile Plastics materials can be joined to create longer runs easily and relatively seamlessly. The visual break in pattern will be more obvious with larger scale patterns like Dapple than with plainer material like Grey Mist.

Most carpentry joints will work with our materials, but a few we recommend:

**A** Biscuit joint: using conventional biscuits and a screw in place. A method to create reversible, glueless joins.

**B** Tension bolt: using kitchen worktop tension bolts in pockets on the underside of the sheet.

**C** Fixing to a back plate: using a full sheet backing plate that the material is fixed to with adhesives.

**D** Screw plate: using a smaller metal plate to bridge the join on the underside.

# JOINING

## Fastenings

Most types of physical fastenings can be used including screws, clips, rivets and bolts - especially those recommended for MDF boards. The flexibility of the rHDPE material can be exploited by incorporating snap-fit fastenings. When screwing, try to find screws designed for plastics. We recommend using a coarse threaded stainless steel screw. Do not use impact drivers where possible as they can over-stress and split the plastic. Drilled pilot holes should be slightly larger than usually needed, to allow for thermal contraction and expansion and use washers to distribute the load better.

## Welding

The sheets can be edge welded using plastics heat-welding methods. This involves a hot air gun and a 'welding' rod made from the same material. This is recommended for the rHDPE materials which can be difficult to join with traditional adhesives. Only use this method if you are an experienced plastics welder.

## Sealing

Silicone sealants can be used on the rPET and rHIPS materials, although some surface preparation may be necessary to create a good seal. Silicone sealants DO NOT work well on rHDPE material, where a seal is needed we recommend using plastic welding to 'melt' the sheets together.

## Adhesives

Different adhesives will work for different plastic types:

### rHIPS and rPET

Most adhesive manufacturers offer products for polystyrene which are suitable for the rHIPS range. A two-part epoxy should work but check your specific product first. If you want to glue the edges, some 'solvent glues/gels' such as Tensol will work. Gels will fill some voids and an oil or powder pigment can be added to make a colour matched seam. Permabond® create a range of adhesives suitable for different plastic types.

### rHDPE

Because of their surface properties, rHDPE boards are difficult to glue using conventional spreading adhesives. We have had success gluing our Dapple materials with Permabond® 2-Part Structural Adhesive TA4610 which does not require pre-treatment of the surfaces. You might consider treating the gluing faces of the plastic with a high temperature flame before using a two-part epoxy. Only try this method if you are an experienced plastics fabricator.

If you do use solvent glues, or other adhesives, do not let the glue sit on the finished surface as it can damage and melt the surface of the material. For any seam bonding we recommend using masking tape to mask off the face of the panel to prevent surface damage.



↑ Example of a half lap joint. Image courtesy of Societe Generale

## DRILLING

Holes up to 25mm in diameter can be made with standard tools and trepanning tools should be used for larger holes. Drills should be kept sharp, and the drill is regularly withdrawn to ensure that melting is not taking place at the point (the 'woodpecker' method). A point angle of at least  $100^\circ$  should be used. Special drills for plastics are available with fast helices and polished flutes. Cooling should be by air blast as a minimum, with water or emulsions being preferable. Oil-based coolants should be avoided. Liquids should be washed off with water after machining. Clamp the material securely when drilling using a soft-face jawed clamp.

We do not recommend screwing directly into the material without first making a pilot hole.



# CUTTING

## Sawing

Most saws can be used to cut Smile Plastics boards, though fine teeth are preferred. We recommend using a wavy set or skip tooth saw to minimise friction from the face of the blade and ensure that swarf is rapidly removed.

**Circular saws** on a rail and **table saws** are effective at cutting clean straight lines through the material and will tend to give you the cleanest cut. TCT blades are preferred. The kerf width should be greater than the blade, with deep gullets which helps reduce friction and remove swarf speedily. Perforated blades are more effective at reducing heat build-up than solid blades. We recommend between 8 -10,000 RPM for a circular saw.

**Reciprocating blade saws** (e.g. jig saws) can generate heat and attention should be given to swarf removal and blade cooling, especially with the rHIPS plastic. A cutting fluid will help make a good cut.

**Feed rates** should be slow and consistent enough to give a good cut, but fast enough to avoid frictional rubbing at the cutting edge. It is difficult to achieve fine finishes with

↓ Wall saw



sawing and further hand finishing is often recommended. We recommend securing the material when cutting it to prevent vibrational movement. Make sure you're using clamps that have soft/rubberised jaws to prevent any marking on the sheet.

You may find that passing the blade several times through the sheet at incremental depths is more effective at reducing heat build-up than doing one deep pass. You could also use a vacuum or compressed air jet to remove heat and swarf at the cutting edge to prevent the swarf melting.

**We now offer a cutting service. Please contact us to discuss your requirements.**

# CUTTING

## Water Cutting

Smile Plastics materials can be water cut. Make sure to protect the sheet from grit in the jet and the rough cutting bed to avoid surface / damage.

## Milling and Routing (e.g. CNC machining)

Milling machines and woodworking routers can be successfully used on the panels. Sharp tools and a relatively slow feed rate give the best results. To prevent chatter, care should be taken to ensure that the material is securely clamped using broad, soft-faced jaws. Use a template to guide the router / sheet and if possible cool the bit with compressed air when routing.

For CNC cutting, we recommend using a sharp single flute upward cutter ideally with a polished face suitable for plastics. CNC machines cope with feed rates and speeds differently. We have generally found that faster spindle speed to feed rates work better for removing medium-sized chips in rPET materials, whilst a slower speed to feed rate is better for removing rHIPS plastics. We have had success using 3 passes per 10mm cutting depth.

## Laser Cutting

We do NOT recommend laser cutting our Classics material, particularly Alba. If you do, make sure you cut the panels in a well-ventilated environment with good extraction as the materials may give off noxious gasses when melted at higher temperatures. Laser etching can work the rPET materials.



↑ Decorative routed finish on display trays

# MOULDING

You can heat and form the material using basic sheet moulding processes. Smile Plastics material will soften on heating allowing them to be formed normally between the two halves of a matched mould.

Sheets of up to 20mm can be formed this way and drawing down to about 3mm is possible. Thin material up to 6mm can be vacuum formed using conventional techniques. Most sheets are soft and easily bendable at 110°C. Flexible silicone heated mats can be used at specific areas on the sheets to make arcs and folds, and we would recommend forming around a jig. Generally, the moulding process works best when you raise the temperature of the material slowly and consistently throughout the sheet to 90-110°C before applying pressure. You may want to take your sheets to a specialist plastics moulder.

Plastics will give off toxic fumes when burned or brought up to high temperatures. Only mould if you have expertise in this area and good ventilation.

Please note that perfect cylinders are very difficult to create by thermoforming our materials. We would recommend using stacked rings to create cylinders where possible, or taking the material to a specialist.

Thicker materials may not show intricate detail when thermoforming.



↑ Heat formed moulding by Alexander Schul



# EDGE FINISHING

Chamfered and straight edges can be made using table saws and rail saws. Curved edges or fillets can also be created using a router. Ensure you use sharp tools to minimise heat build up and to give you a clean edge.

The edge finish created by different cutting methods can vary. CNC cutting using the recommended bit can leave a finished and ready-to-use edge, whereas a table saw with too fast a speed can leave a very rough edge with melted swarf stuck to the surface. If a cut surface is very rough, we recommend using a very sharp blade to scrape / cut away any burrs or melted plastic. Follow up by sanding and polishing to create a smooth finished surface.

We would recommend using a hand deburring tool to remove sharp edges cleanly and easily. We use a Swiss+Burr hand deburrer, as pictured. The tool creates a soft, rolled edge.

If you are ordering cut pieces from us we do offer edge finishing and polishing on any cut pieces. **Please contact us** to discuss your requirements.



↑ Hand deburring to create a soft, rolled edge

# SURFACE FINISHING

Smile Plastics materials are supplied with a semi-matt pressed finish except Dapple which has a planed, satin finish. Scratches and marks can be carefully sanded out using gentle pressure and a fine grade of sandpaper or scotch brite pads. Fine scotch brite pads are particularly effective for light surface marking.

## Sanding

Dual-action random orbital sanders are recommended, using medium pressure and fine grits. We do not recommend belt sanders as they are more likely to melt the surface. When sanding, ensure you do not stay too long in any one spot as the surface will heat up and may melt. Scotch pad style sandpaper will produce the best finishes.

## Flame Finishing

Our materials can be flame finished using a high temperature gas torch with a fine head. Keep it approximately 3-7cm away from the surface and on the smallest flame. Ensure the flame moves constantly and does not stay too long in any one place, as this may result in burning or surface defects. Do this in a well-ventilated area and take appropriate health and safety precautions. Special care must be taken when flame polishing rHIPS, as it will burn easily. Only try this method out if you are an experienced plastics fabricator.

↓ Hand Polished Edge



## Polishing

Use a buffing mop / wheel with a plastics polishing compound to buff the surface to shine. The HIPS and PET materials will also take a shine with car polishing compounds.



# SURFACE FINISHING AND BUY BACK

## Cutting and Finishing Service

We offer a cutting and finishing service on all our materials, including semi-finished and finished parts. We take your design, help you develop it and then bring it to life.

You can choose from a large selection of edge finishes and details. If you need help, please contact our **Customer Service team**.

## Buy Back

If you decide you no longer have use for your Smile Plastics material you can choose to recycle them through the normal recycling channels. Alternatively, we can also take back your offcuts, plus any end-of-life Smile Plastics materials. We re-work them into new panels, closing the loop and ensuring the plastics can brighten someone else's day in the future. A true full circle life cycle!



↑ Applying an FR treatment to a full sheet of Alba

# MATERIALS REIMAGINED



Certificate Number 19268  
ISO 9001, ISO 14001