FABRICATION

PRODUCT GUIDE

GRP AUSTRALIA

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Summary

Glass reinforced plastics (GRP) is a composite material or fibre-reinforced polymer made of a resin (plastic) reinforced by fibres made of glass. The product can also contain **fire retardants** and **colour pigments**. The product is not classified as Hazardous according to the criteria of the NOHSC Australia. This guide presents some of the **fabrication techniques** that are used when working with Glass reinforced polymer (GRP). The content of this guide is general in nature.

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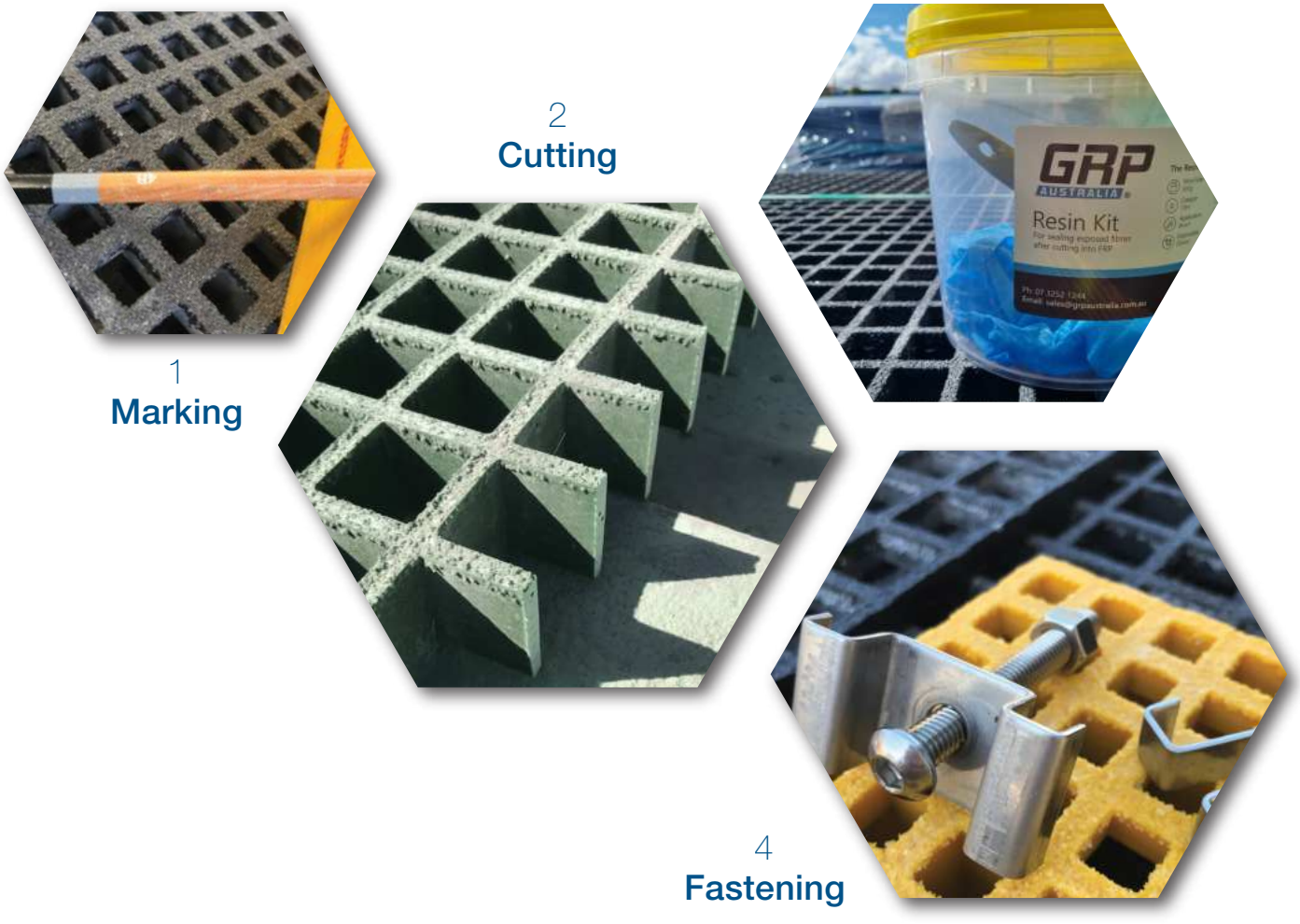
Fabrication Steps



Suggested Hand Tools

GRP pultruded sections and grating can be cut with using common wood working tools. It is recommended that all disks, blades and bits are Diamond coated as GRP is very abrasive and will wear normal tools very quickly. The following is a list of suggested hand tools used for GRP fabrication:

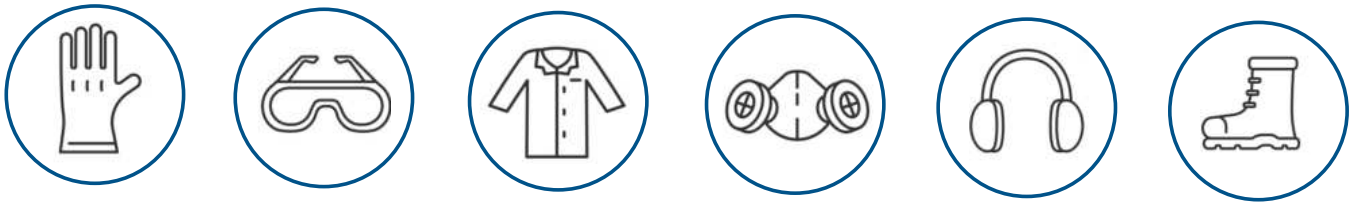
- **Jig Saw**
- **Hand Grinder**
- **Drill**
- **Impact Driver**
- **Circular Saw**
- **Reciprocating Saw**

PPE Requirements

Cutting, drilling or machining GRP produces a dust that can cause irritation to the eyes, skin, nose and throat. Workers should take steps to reduce their exposure to the dust by using suitable personal protective gear and working in well ventilated areas. Use dust extraction in poorly ventilated areas. It is recommended that the following PPE be worn:

- **Gloves, long sleeve shirt with closed collar and long pants.**
- **Particulate respirator which complies with AS/NZ 1716:2012.**
- **Eye protection (safety glasses).**
- **Hearing protection when/if required.**
- **Protective footwear (safety toe)**

Use personal protection equipment to minimize skin, respiratory and eye exposure to dust and fumes when cutting or grinding product. Wash all exposed skin areas thoroughly after cutting or grinding. Any clothing worn while working with fiberglass should be laundered separately from other clothing items. You should also rinse the washing machine before washing other types of clothing.



Protective **Gloves** | Protective **Eye wear** | Long sleeve **Shirt** | Particulate **Respirator** | Hearing **Protection** | Protective **Footwear**

Recommended Fabrication Practices

1. Follow common safety practices as previously outlined.
2. Use appropriate machines and speeds for each operation.
3. Avoid using excessive pressure whilst using power tools - too much force will cause the blade or drill bit to deteriorate.
4. Machines and tools should be cleaned on a regular basis.
5. Mechanical fasteners and a quality adhesive bond will provide the best outcome for part connections. Always prepare the surface before using an adhesive.

Cutting or Sawing

When performing any cutting operation, use light, evenly applied pressure. Excessive pressure tends to clog the blade with dust particles, and this will shorten the life of the blade. Cutting speed is very important. Cutting too fast will fray the edge of the material and may cause it to turn black.

Straight Cuts and Ripping

For small-volume work, a hand-held circular saw is good for on-site fabrication. A table saw is recommended for volume ripping and will provide a more accurate cut when equipped with the proper blade. A diamond-coated blade will produce the best results and helps ensure longer blade life. A radial-arm saw is good for large or thick sections. For small cuts and curves a jigsaw can be used with diamond coated blade.

Circular or Curved Cuts

For best results, GRP Australia suggests the use of a saber saw or band saw for low-volume cutting. In this case, a Diamond-coated blade will increase production and extend possible use. A hand router can also be used but is likely to remove considerably more stock. When done properly, all suggested tools can produce the desired outcome. When using jig saws or reciprocating saws, carbide grit blades are recommended.

Drill and Hole Sawing

Any standard high-speed steel drill bit can be used, but it will require frequent sharpening. Alternatively diamond coated hole saws provide an excellent finish and are an ideal for cutting large diameter holes. Do not overheat the hole saw as it will diminish the life of the bit.

Note it is recommended that the drill speed should be equivalent to that used for drilling hardwood.

For large holes, a wood backup plate will reduce breakout on the back side of the hole.

Routing

If one has access to a industrial workshop and fabrication tools, a CNC router is typically best for performing highly repetitive routing operations. Generally speaking, most CNC routers are capable of being programmed electronically to reduce waste and achieve exact results. Routers can be used for include straight, angle and radius cuts. Regardless of whether the device is hand held or table based, router cuts tend to be smooth and even.

Avoid using excessive pressure when cutting, as the material is likely to overheat, soften and in some cases deteriorate. Most routing is done with diamond coated bits. However, these bits will perform best when routing large quantities. Wood bits can be used, but are expected to wear quickly and require frequent sharpening.

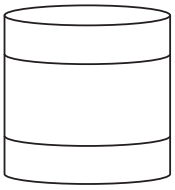
Grinding & Sanding

Although grinding is necessary for some operations (notching and touching up edges), it is generally not recommended. Due to dust build up the grinding wheel will need to be cleaned regularly. Any standard grinder may be used, although air-powered equipment is recommended. Grinding may be used on any thickness of material, but a medium or coarse grinding wheel will yield the best results.
Likewise, sanding works best when using a 40-80 open-grit paper on a high-speed wheel. Again, light pressure should be applied to prevent the part from burning. Excessive pressure may cause the resin to soften.

Sealing

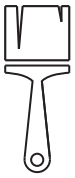
GRP Australia recommends using a resin and catalyst to seal any exposed fibres from the fabrication process. For an additional cost we can supply customers with a sealing kit to perfect the grating pre or post installation. The sealer should be applied with long, even brush strokes. Only one coat is required and can take up to 12 hours to dry. An alternative to the two pack resin kit is to use Polyurethane aerosol spray, such as the Rust-Oleum 2x Ultra Cover Stain Clear Spray Paint.

500mL Kit



500mL Resin

Catalyst



Application Brushes

Measuring Cup

Mixing Utensils

Painting GRP Pultruded Products

Prior to painting the FRP surface, the product must be cleaned appropriately. We recommend cleaning with thinners. If the surface is not prepped before hand, the fibreglass may not accept the paint or it will peel soon after application. Start by lightly sanding the FRP so that the top layer of gloss is removed. Wipe down and remove any dust with water. Cover any areas of the product you do not want painted with tape or drop sheets. Using a spray gun, apply an even amount of paint to the surface. Spray intermittent mists to promote a professional-looking finish free of runs, dips and sagging.

GRP Australia recommends using an Outdoor Acrylic Paint for domestic applications (non-harsh environments). For commercial applications, we recommend using a 2-Pack Polyurethane Base and Hardener.

Fastening

There are many ways to fasten GRP to itself and other materials. Before selecting an appropriate method of fastening, one should consider and explore all options available.

- **Screwed Connections**
  Self-drilling and self tapping screws work well in shear but for maximum strength for use in combination with adhesives.

- **Bolting**
  Recommend the use of large flat washers (3D) on both sides of the bolted connection to spread the bearing load. The strength of this connection will increase when an adhesive is applied to properly prepared mating surfaces.

- **Rivet Nuts**
  When jointing to hollow sections Rivet nuts become a viable option to consider.

- **Riveting**
  Rivets are available in many sizes, types and head styles. Options include nylon, aluminium, stainless steel, steel, copper, etc. The hole for the rivet must be drilled slightly larger than the rivet itself.

- **Adhesive/Bonded Connections**
  Adhesives can provide a very strong bond between two GRP shapes. For best results, the mating surfaces must be properly prepared, and the recommended type of adhesive must be used. Surfaces can be cleaned with a solvent, such as methylated spirits and wiped dry with a clean cloth prior to sanding. Once the surface has been sanded, remaining dust should be removed with dry rag. At this point in the process, a solvent with contaminate the bonding surfaces which will cause the adhesive to fail. Adhesive should also be applied in a controlled environment, as air temperature and humidity can adversely affect the cure. The use of clamps and/or weight alone will require you to allow time for the joint to cure before proceeding with fabrication or assembly. Otherwise, mechanical fasteners can be used to maintain pressure and in some cases allow you to move forward with fabrication.

For structural applications we recommend that bonded connectors be used in conjunction with a mechanical fastening system. This is done to the fact that failure of bonded surfaces can be sudden and without warning.

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