Training Manual

Installation guide, product datasheets, technical information, TREM cards and storage information
Contents

Information About the Installer’s Manual
Introduction to GRP roofing
Component Parts of a GRP Roof
Tools and Materials
Stages of Installing a GRP roof
Stage 1- Laying the Deck
Stage 2- GRP Edge Trims
Stage 3- Laminating
Stage 4- Topcoating and Finishing
Catalyst Addition
Material Quantity Estimation
Troubleshooting

Page No.
4
5
6
7
8
9
10 - 13
14 - 16
17
18
19
20-24
Overview
The GRP roofing Installation Manual contains practical guidance for installing a GRP roof. It is recommended for installers to attend a training course before attempting to lay a GRP roof. COSHH data for the GRP roofing system can be found at the back of this manual.

Product Description
GRP roofing system.

Standards Compliance
Part L Building Regulations Compliance (as of April 2006:)
For refurbished flat roofs GRP can be specified with a calculated 'U' value of 0.25W/m²K for (Calculated in accordance with BS EN ISO 6946)
For new build flat roofs GRP can be specified with a calculated 'U' value of 0.20W/m²K for (Calculated in accordance with BS EN ISO 6946)
What is GRP?
Glass Reinforced Polyester (GRP) is a composite material made from a polyester resin which is reinforced by Chopped Strand Mat (CSM) glass fibres to form a GRP laminate.

History of GRP
GRP was discovered in the late 1940's. It was quickly adopted during the 1950's and 60's for a wide number of applications where its corrosion proof properties, allied to its high strength and excellent appearance soon proved to be invaluable. Today, it has become the standard material for the construction of small craft, water tanks, processing vessels, building cladding panels and roof lights.

When used for roofing, GRP provides a completely weatherproof system without any of the problems associated with traditional roofing materials. Its unrivalled performance protects millions of square metres of roofs throughout the UK, to the extent that there are GRP roofs laid more than thirty years ago which are yet to show signs of deterioration.

While GRP roofing boasts qualities that make it the best roofing system money can buy, these qualities are dependant on how the roof is laid. A GRP roof will fail if it is laid incorrectly. The performance of the roof is therefore reliant on the installer’s ability to lay it.

Other Uses for GRP
The durability and lightweight qualities of GRP make it an ideal construction material for applications as diverse as lorry aerofoils and roofs, transport containers, micro-light body parts and automotive body panels. GRP is also used in hostile industrial settings for applications such as tanks and underground pipes. This is due to its ability to withstand high temperatures and its resistance to chemicals.

Unlike any other roofing material, GRP has properties that render it ideally suited to small craft construction. As well as being an inexpensive material, it is robust, flexible and will never corrode. A number of RNLI lifeboats are constructed completely from GRP. Lifeboats such as the Atlantic 75 are used in heavy weather for inshore rescue. GRP is also used throughout the automotive industry for after-sale body kits, body repair kits, kit cars, and body panels for production cars.

The GRP Roofing Market
GRP has been used for roofing applications for over fifty years. Technological advances in resin production and altering its material properties over the last thirty years have led to the manufacture of resins specially formulated for roofing. GRP roofing started to gain popularity in the mid-eighties and now accounts for between 1-2% of the UK’s roofing market covering millions of square metres of the UK’s roofs.

What is a GRP Roof?
The GRP roofing system is constructed from a single-ply GRP laminate applied in situ over 18mm OSB3 deck. The roof is finished with GRP edge trims and a coat of GRP topcoat.
This cross-section shows a breakdown of a typical GRP roofing installation and its component parts:

1. B230 edge trim
2. D260 edge trim
3. C100 edge trim
4. A200 edge trim
5. C1 universal external corner
6. 2400mm X 600mm X 18mm OSB3 decking
7. 450g/m² Chopped Strand Mat
8. GRP laminate (Roofing Resin reinforced by CSM)
9. Topcoat layer

Most GRP roofing installations are for simple domestic flat roofs like the one shown below. Roofs like these incorporate the four most commonly used trims: A200, B230, C100 & D260. The roof shown below has been finished in a pigmented green topcoat with a non-slip aggregate finish.

1. C100 Simulated lead flashing.
2. The edge of this roof was masked off before the aggregate finish was applied.
3. B260 raised edge trim - Used to direct the flow of water off the roof.
4. C1 preformed universal external corner.
5. C4 preformed universal internal corner.
6. A200 drip trim - Laid to facilitate water running off the roof.
7. A slight fall is engineered into the substrate to avoid standing water.
8. B260 raised edge trim.
9. D260 - laminated into the substrate, remains unattached behind the C100 flashing.
10. This roof is finished with a non-slip aggregate coating.
Tools
- Strong shovel
- Wrecking bar
- Claw hammer
- Circular saw/jig saw
- Mastic gun
- 4" grinder + stone blade for cutting trims
- Diamond blade for cutting chase into wall
- Sweeping brush shaft for rollers
- Sanding pads
- 40 grit paper
- Soft and stiff sweeping brush’s
- Ground sheet (in case of rain (must be visqueen))
- Compressed air or gas powered nail gun

GRP roofing materials
- Roofing Resin
- Topcoat
- GRP Edge trims
- Chopped Strand Mat
- Catalyst
- Acetone
- Mixing buckets
- Bandage
- Brushes
- 2.5" & 7" polyester rollers
- Consolidating rollers/ paddle roller
- Disposable gloves

This is available in any BS4800 colour, 16 colours ex-stock, grey pre-pigmented as standard.

This is available in 2 weights: 450g/m² for most roofs and 600 g/m² for applications where the roof will be subjected to heavy foot traffic (i.e. a walkway or balcony.)

Catalyst can be supplied in different strengths to compensate for seasonal variations in temperature.

Required for details

Other materials
- Finishing tissue
- 19mm X 38mm treated tile batten
- OSB3 decking board (2400 X 600 X 18mm T&G)
- 63mm paslode nails
- 13mm galv felt nails (for fixing trims)
- Clear silicone (for sealing flashings into wall only)
- Bottles of eyewash
- Disposable latex gloves
- Protective goggles

All nails should be galvanised and at least 60mm long and should be ring shank nails, screws or better.

Always have eyewash on site in case of an emergency.
The installation of a GRP roof can be divided into 4 stages:

1) Preparing and decking the roof (page 9)
   The old roof covering is removed if necessary and the roof is re-decked with OSB3 18mm tongue and groove boards.

2) Fixing the edge trims (pages 10-13)
   GRP edge trims are fixed to the perimeter of the roof and can be used to adapt the GRP laminate to almost any specification.

3) Laminating (pages 14-16)
   Joints between decking, gutters, GRP trims and protrusions e.g. rooflights are bandaged at this point. The entire roof is then laminated with a layer of GRP.

4) Topcoating and finishing (page 17)
   The roof is then topcoated, with the client’s specification of colour and finish.
Preparing the deck
If the substrate is unfit for overboarding onto directly then the surface will need to be removed. When laying decking, it is important to remember that the decking board will absorb moisture if in contact with water. Any moisture trapped within the roof will cause board movement and possibly joint failure. As with laying the laminate, ensure that conditions are dry before decking the roof. After removing the old decking, check that all roofing joists are sound and free from rot. Replace these as required. If possible, build a fall into the substrate so that the roof can drain completely and remain free from standing water.

Laying the deck
2400 X 600 X 18mm OSB3 tongue and groove boards are laid at 90° to the roof joists. The boards must be laid with the writing side uppermost. Not only does this give a better key for the laminate, it also allows the resin to flow into the board joint to effectively glue the boards together.

Start to lay the boards at the furthest edge from the drip. If the board is laid along a wall, an expansion gap of 25mm should be left. Align the end of the board with the fascia, laying the boards from end to end. Trim the last board in the row flush with the fascia. Using the off-cut (if greater than 400mm,) start to lay the next row of boards by fitting the tongue firmly into the groove of the row already laid. The boards are now staggered and bonded and will form a strong deck.

When two rows have been laid, the boards can be aligned to run straight, fixing them as you go. Continue to lay each row in turn using the off-cut from one row to start the next row. The last row is simply cut off in line with the fascia.

**IT IS ESSENTIAL THAT THE DECK IS LAID CORRECTLY. A POORLY LAID DECK MAY RESULT IN POROSITY IN THE LAMINATE.**

Fixing the deck to different substrates
Timber
When fixing the OSB3 board to timber joists, the preferred method is with a compressed air or gas powered nail gun. This is the most efficient way of fixing the decking; it also minimises damage to the ceiling below. A 63mm (or longer) galvanised ring shank nail should be used at 200mm centres, which equates to 4 nails across a 600mm board. The nails MUST be driven into a joist.

Some installers may wish to use screw guns. This is acceptable providing the screws have a minimum of 40mm penetration into the joist. The boards can also be nailed using a hammer. This is obviously time consuming and WILL lead to internal damage of the ceiling. All nails must be non-rusting (galvanised or sheradised).

Steel
Fixing to steel is easily achieved with the use of self-drilling/self-tapping screws of the appropriate length.

Strawboard
If the ‘Strawboard’ or ‘Stramit’ is in good condition (ie dry and intact) and you wish to fix through it in to the joist, a 125mm screw at 200mm centres along each joist is sufficient. The ‘Strawboard’ or ‘Stramit’ may have been fitted into a steel profile support. It is possible to use a self-drilling/ self-tapping screw into the steel for fixing the decking board.
The following pages include instructions for fixing the most common types of GRP edge trims. For a comprehensive list of trim applications see the Technical section of this manual.

Edge trims are manufactured in GRP. One side has a high adhesion finish (matt finish), the other side has a glossy finish, always bond to the matt finish.

All trims must be fixed with nails or staples to the decking board.

With the exception of the F300 Flat flashing and the D260 Angle fillet, the trims must be bonded in place using the Polyurethane Adhesive. Silicone sealant or general-purpose mastics are not suitable adhesives for the fixing of trims.

**Polyurethane Adhesive (PU)**

PU adhesive is applied with a skeleton gun to the batten around the perimeter of the roof. A 30mm bead at 300mm centres is sufficient to hold the trims in place. The trims should be 'rubbed' into place to ensure good bonding.

**Joining Trims**

Trims are either nailed to the decking boards using a 13mm galvanised clout nail or stapled in place with a gas powered or compressed air stapler. Hold the trim in place ensuring the face is vertical. Drive fixings in at each end, then the middle and then at 200mm centres thereafter.

**Most Common Trim Types and Application Instructions:**

<table>
<thead>
<tr>
<th>A170/A200/A250- Drip Trim</th>
</tr>
</thead>
<tbody>
<tr>
<td>The A type trim is a drip trim, fitted to the lowest edge of the roof usually where the rainwater flows into the gutter. Two support battens should be fixed to the perimeter of the roof to provide space for the gutter to fit behind the trim, with the outer batten attached 10mm lower than the inner batten to allow the trim to sit flush with the roof. Apply PU adhesive to the batten in 30mm beads at 300mm centres, rub the trim into place and nail to the decking. Do not nail through the front of the trim. If the pitch of the roof is only minimal, rainwater is likely to hold behind the trim. A planning machine can be used to take 2mm off the deck to allow the trim to lay flush with the board.</td>
</tr>
<tr>
<td>TRIM DETAILS: A170: This is designed for applications where it is not possible to use the larger A200. A200: This is the standard size drip trim. A250: This drip trim is ideally suited for use on warm roofs.</td>
</tr>
</tbody>
</table>

**A170/200/250 Application diagrams:**

NOTE: If the fall of the roof is only slight, the end of the decking board should be planed by 2mm before the battens are attached to allow the trim to sit flush with the rest of the roof.
B230/B260/B300- Raised Edge Trim

A single batten is fixed level with the top edge of the deck. Apply 30mm beads of PU adhesive to the batten every 300mm, rub the trim into place and nail through the top of the trim into the decking. Do not nail through the front of the trim. If a ladder is likely to be leant against a B type trim for regular access to the roof, the trim will need to be reinforced to avoid deformation. The trim can either be doubled up by slotting a section of extra trim within the section where the ladder will be used or it can be reinforced with an extra layer of GRP laminate and then tissue to maintain a smooth finish. Alternately, a wooden batten can be shaped and fitted into the ridge of the trim to ensure that it remains rigid.

TRIM DETAILS: B230: The smallest size of raised edge trim fitted to the edges of the roof to contain and direct the flow of water. B260: The standard size raised edge trim. B300: Larger raised edge trim for use on warm roofs.

C100/C100MT/C100L/C100LMT/C150/C150MT/C150L- Simulated Lead Flashing

The C trim is usually fitted into a bed joint of the brickwork or a 35/50mm (depending on the trim type) deep chase cut out with an angle grinder fitted with a mortar chase disc. Apply polyurethane adhesive to the back of the C trim every 300mm. Fit the trim into the slot and press firmly back to the wall to overlap the D trim. Apply a clear silicone sealant along the length of the trim into the slot to seal the trim in. A smooth finish can be obtained by wiping the sealant with a moistened finger.

TRIM DETAILS: C100: Standard simulated lead flashing with 100mm vertical face and 35mm wall penetration. Do not topcoat. C100MT: As C100 with self securing moisture trap. C100L (Long leg): As C100 with 50mm wall penetration. C100LMT (Long leg with Moisture Trap): As C100 with 50mm wall penetration and self securing moisture trap. C150: Simulated lead flashing with 150mm vertical face and 35mm wall penetration. Do not topcoat. C150MT (Moisture Trap): As C150 with an integral, self-securing moisture trap. C150L (Long leg): As C150 with 50mm wall penetration.
D260/D300 - Fillet Trim

The D trim is a fillet trim for use against abutting walls. It will also provide expansion and perimeter ventilation and is compatible with C2 and C3 universal corners. Place the D trim against the vertical face and push down diagonally into the corner until the trim fits snugly. Where the D trim needs to be joined it should be bonded with a strip polyurethane adhesive and bandaged together.

TRIM DETAILS: D260: Angle fillet trim with 135 and 70mm flanges. D300: Angle fillet trim with 175mm and 70mm flanges.

D260/D300 Application Diagrams

F300/600/900 - Flat Sheeting

The F trim is a flat flashing, mainly used at the intersection of a pitched roof and flat roof often found on dormers. The F trim should not be laminated over completely as it will crack. It is nailed or stapled to the deck and bent up the roof slope. In this situation, the F trim also acts as an expansion facility and must only be fixed to the deck along the bottom edge. There are many other applications for F trim including vertical details where laminating would be time consuming, under the feet of air conditioning units to enable re-roofing without disconnecting and use on some parapet wall details etc. The trim should be nailed to the deck around its edges and bandaged over any joins or nail penetrations. Any un laminated trim can be topcoated with the rest of the roof.

TRIM DETAILS: F300/600/900: Flat sheeting supplied in 300, 600 and 900mm widths in 20M rolls.

F300/600/900 Application Diagrams

G180

G180 is used to allow for expansion on large roofs (over 50m²) it also acts as an integral gutter to aid drainage. The decking should be cut to allow for an adequate gap in which to insert the trim and the flanges of the trim should be parallel with the decking. The trim should then be nailed to the decking. If the trim edges are bandaged water flow into the gutter will be reduced. The boards should be rebated to allow the trim to sit flush with the deck. The laminate should be applied over the trim.

TRIM DETAILS: G180: Flush installation expansion joint and gutter.
### G180 Application diagrams

![Diagram of G180 application](image)

- **Decking**
- **Joist**
- **G180**
- **GRP Layer and Bandage**
- **Trim nailed to substrate under laminate**
- **Joist**

### E280- Expansion Joint

E280 is used both to create expansion joints on large roofs (over 50m²) and create rolls on any ridge details. It is compatible with C5 closures. An adequate gap in the deck should be cut if necessary, the trim should then be nailed to each end of the decking at 300mm centres. The join over the nails should then be bandaged and the laminate can be applied over the trim. To bond these trims together, or to cap with C5 closures, apply a thin strip of PU adhesive to the inside edge of the overlapping trim and rub into place.

**TRIM DETAILS:**
- **G180:** Flush installation expansion joint and gutter.
- **E280:** Expansion joint and ridge roll for pitched roofs.

![Diagram of E280 application](image)

- **Decking**
- **E280**
- **GRP Layer and Bandage**
- **The trim is incorporated into the laminate.**
- **The join between the trim and the decking is bandaged.**

### C6 Closures

The C6 closure is used to close a run of E280 rolled joint trim. The closure should be overlapped by 50mm and sealed by a line of PU adhesive. Nail to deck, bandage around edges and apply topcoat layer over the top.
The AT195 Internal and External trim is used wherever the laminate needs to cover an area which continues perpendicular to another laminated surface. The AT195 Ext is supplied with a high-adhesion finish on its outer fascia and should be used for capping applications. The AT195 Int trim is supplied with a high adhesion finish on its outer fascia and should be used for internal corners. The trim should be nailed at both edges if possible. Always bandage over the join between where the nails penetrate the trim and the decking before applying the laminate. These trims are supplied in 3 metre lengths as standard.


FOR FURTHER TECHNICAL APPLICATION GUIDANCE PLEASE SEE THE TECHNICAL SECTION OF THIS MANUAL.

### Laminating the roof

#### Preparation

**Roofing resin**

Roofing resin is supplied in tins of 20kg (approximately 18.5 litres.) The mixing buckets are graduated in litres which will allow easy calculation of the amount of catalyst needed depending on the ambient temperature. To remove the lid from the tin a 4-6 inch nail is required to bend back the lugs.

It is very important to stir the resin before use, ensuring the styrene & wax that has settled at the bottom of the tin gets thoroughly mixed in. Prepare enough tins of resin to complete the day’s laminating at this stage, as mistakes such as using unmixed resin are difficult to rectify later. The resin to CSM ratio is 1.35kg of resin for every m² of glass.

It is good practice to mix a small quantity resin (1 or 2 litres) to start with to laminate the corners and bandage the trims. This will give the best indication of the curing time of the resin and confirm if the correct amount of catalyst has been added to the mix. Ideally, it is best to aim for a curing time of between 20 to 30 minutes. **FOR CATALYST ADDITION SEE THE CHART ON PAGE 18.** Once all the detail work has been laminated the resin can be mixed for the main body of the roof.

**Chopped strand mat**

Before the chopped strand mat is laid out, the deck must be clean and dry and all the trims fixed in place. The mat has a cut edge and a feathered edge. Always overlap the feathered edge on top of the cut edge.

The mat is usually best laid parallel to the drip trim. Start by rolling the mat out, overlapping the trim by at least 50mm but not over the edge of the trim. Leave the ends long at this stage. Roll out each 1m wide strip overlapping each time by at least 50mm right across the roof. The ends can be cut off with a Stanley knife into the corner of the trim to leave a straight and neat edge.

Overlap (never less than 50mm) or cut short pieces of mat and overlap them along the roof.

Decide on the best place to finish laminating the roof from. Roll the mat up to the furthest point from the ladder. Leave the rolls on the roof where they

---

**Techniques:** If a laminate of GRP requires a perfect finish, i.e. it is somewhere likely to be frequently overlooked such as a balcony, join lines between CSM rolls can be avoided by feathering the CSM. This is achieved by roughly ripping a small strip off the cut end of the CSM. When this is laid on top of another feathered roll, the join will be seamless.
Stage 3
Laminating

have been laid out to avoid any mix up if there is a deviation in size or angle from one length of mat to another.

Corners and Joints
Cut 200mm squares of mat for each corner and 200mm strips of bandage for each trim joint.

Laminating
Corners & bandaging
Lay a 200mm square piece of mat on the roof deck and ‘wet out’ on both sides with resin (see catalyst addition chart) using a 2½” polyester roller. Place the mat on to the face of the adjoining trims with the bottom edge on the radius of the trim. Fold around the corner and fold over the top of the trim down on to the deck. It will be easier to dress and feather if the mat is cut vertically from the top corner of the trim upwards. Using the 2½” roller, 2” paint brush and small consolidating roller, feather the corners in to place. Any joint in the trims should be bandaged using the same mix of resin, in a similar fashion to the corners (Figure 1.) If any boards are not completely engaged these joins should be bandaged, even a small gap may cause resin to leak through the boards which will lead to porosity in the laminate.

If any nails holding the trims are not going to be covered with laminate on the deck or corners they should be laminated with a small piece of mat.

The deck of the roof can be laminated before the corners and bandages have cured.

Laying the main laminate
YOU MUST FOLLOW THESE INSTRUCTIONS TO GAIN THE CORRECT RATIO OF RESIN TO GLASS.

Unroll 1m of previously cut mat along the lowest part of the roof and align so it can be unrolled across the roof without running off-line. Carefully roll the mat back.

To get a ratio of 3:1 one-third resin should be applied on the board and two thirds resin on the mat dip the 7” polyester roller into the bucket of catalysed base resin. Lift the roller out of the bucket and without letting the excess run off, drop 3 rollers full onto the board and coat 1 square metre. This will ensure that there is a ratio of one-third resin on the board.

Unroll the mat on to the resin coated board. In strips of 7” (1 roller width) wet out the mat by dropping 1 roller full in the middle of each 7” run, push the roller away to the end of the 1 metre run, then pull back over the full 1 metre (figure 4.)

Continue across the 1m² (approximately 6 runs) and then roll the roller over the whole area again to ensure good even coverage.

Wet out the next 1m² of board in the same way, remembering to use one third

Note:
- Avoid spillovers by masking off the roof properly, a fine spray is caused when using the consolidator roller, wind can carry this a considerable distance. It is important to ensure that this is considered before the resin is used on the roof. When resin has cured, there is no easy way of removing it from car paintwork without also removing the paint [see spillovers in the troubleshooting section.]
- Never attempt to lay a roof in wet weather or when wet weather is forecast.
- If it starts to rain while you are laying a roof, the roof must be covered and must not get wet, always keep a large visqueen sheet on site to cover the roof. The visqueen will not bond to the curing laminate
- If rain is forecast while laying boards, the boards can be temporarily sealed with a coating of catalysed base resin. Always ensure that as much of the roof is covered as possible, ensure that edges, or areas of possible water ingress are covered.
- If decking has become damp, do not attempt to lay laminate on top.
- Always ensure that the surface you are laying onto is completely dry and free from debris before you start. A wet surface can lead to delamination.
Techniques:

- A number of different finishes can be achieved using slate granules. They can either be sprinkled over the top of curing topcoat for the appearance of mineral felt. Alternatively, a fine sprinkling of granules can be rolled into the topcoated roof for a coloured non-slip finish.

Stage 3
Laminating

of the resin on the board and two thirds of resin on the mat. Roll out the mat over the next 1m² of wet out board and continue to roll out the resin as previously described.

Consolidating

Let the resin soak into the mat to break down the emulsion binder for 2 to 3 minutes. Using the paddle roller and applying a little pressure, roll back and forth along the 2 edges and the end of the wetted out mat, feathering them in as you go. Now roll the paddle roller over the whole of the wet out mat, ensuring the paddle roller makes at least 2 passes over the whole area. In colder weather the resin will be thicker and will take a little longer to wet out. When a laminate is correctly wetted out it should be transparent; there should be no white or opaque areas. Take care near the edge of the roof and in windy conditions as a fine spray will be emitted from the roller.

Make regular close inspections of the laminate as it is consolidated, checking for 'pin holes' and areas short of resin. Pinholes in the laminate will lead to porosity and water penetration.

On all overlaps of the mat, pay extra attention to the 'feathering in' as this will improve the overall appearance of the finished roof.

Preparation for topcoating

Taking care and paying attention at this stage will produce a roof of superb appearance. Using a sanding pad with a 40 grit sand paper, lightly sand the corners and trim bandages. Sand off any unsightly fibres, taking care not to sand too heavily on the corner itself as this may lead to holes appearing. Cut any excess cured mat protruding beyond the trim with a sharp Stanley knife.

Premium cost options:

When a client specifies a GRP roof there are a number of different options available for the weight, colour and finish of the roof. All of these should be charged at a premium.

- The GRP laminate can be specified in two weights: 450g/m² and 600g/m². 450g/m² is the standard weight for most installations and will withstand foot traffic. 600g/m² should be specified where the roof will be subject to regular heavy foot traffic such as a walkway or balcony. This would normally be specified with an aggregate non-slip finish.
- The roof can be finished in any BS4800 colour.
- The roof can be finished with a standard smooth or two choices of non-slip finish (see opposite page.)
Seal any abutments with walls using a clear silicone sealant. Fit any C100 simulated lead flashing before top coating and seal off with a clear silicone sealant.

Topcoating the roof
The Topcoat is a resin and should be treated in the same way as the base resin. It requires the addition of catalyst for it to cure.

Always try to apply the topcoat immediately after the laminate is semi-cured (can be walked on, no stickiness) If this is not possible then ensure topcoating is carried out within 24 hours to gain good bonding with the laminate. If the topcoating is left longer than 24 hours then wash down the laminate with acetone to gain a good cross-polymerisation of the topcoat to the laminate.

Remove the lid and stir the topcoat well before use. Ensure the styrene and wax at the bottom of the tin is fully mixed in. Pour out into the mixing buckets enough topcoat to cover the perimeter of the roof (including the edge trims.) Use a 2½ Polyester roller to coat the trims. A roller will get a better and more even finish than a paintbrush. Roll the topcoat along the face of the trim. Hold the roller at an angle to the bottom of the trim to cover half of the radius return on the front of the trim. To protect the fascia from topcoat, hold a piece of flashing trim against it as you topcoat the radius on the underside of the trim.

Calculate how much topcoat you will need to use to cover the main body of the roof. (See material estimator in the Commercial Manual.) Add the required amount of catalyst and stir well.

Using the 7” polyester roller, cover the remaining laminate with just enough topcoat for the fibre pattern to be visible. Do not coat the roof too thickly or the topcoat will crack. If a coloured topcoat is needed rather than the standard cool grey or dark admiralty grey, a colour pigment will need to be added to a clear topcoat. A 20 kg tin of topcoat requires 2 kg of colour pigment. It is essential to mix the pigment thoroughly into the topcoat to avoid patchiness and uneven colour.

Cleaning Tools and Equipment
Buckets can be re-used for many jobs. When each mix is finished with, coat the inside of the bucket. When the resin has cured after approximately 30 minutes it can be peeled out, leaving the bucket like new and ready for the next job. Paintbrushes can be dropped into a re-sealable container of acetone and left for the next job. Use only paintbrushes that have unpainted or uncoated handles, as the coatings will come off and contaminate the resin. Polyester rollers have sleeves that are removable. It is too time consuming to clean the roller sleeves. Unscrew the nut with pliers and drop the used sleeve into the bucket of used resin.

Either use disposable latex gloves when handling catalysts or resins or clean hands with hand cleaner. Do not clean hands with acetone. wipes are also a useful addition to your toolkit. As well as cleaning hands they are good for removing resin from windows and fascias.

Note: Avoid spillages by masking off the roof properly, a fine spray is caused when using the consolidator roller, wind can carry this a considerable distance. It is important to ensure that this is considered before the resin is used on the roof. When resin has cured, there is no easy way of removing it from car paintwork without also removing the paint (see the troubleshooting section.)
Catalyst Addition

There are a number of important rules of thumb to follow when deciding how much catalyst to add:

- Never use less than 1% even in the summer, just mix less resin at a time.
- Never use more than 4%, the gel time will not reduce any further beyond 4%.
- Never underestimate the effect of temperature. Resins will not cure at or below freezing and will always cure much quicker in direct sunlight.
- When topcoating late in the day, add more catalyst to allow for the lack of sunlight.
- In Winter use fast catalyst, in Summer use standard catalyst, in very hot conditions use LPT (Long Process Time) catalyst.
- Remember: Any catalysed resin left in the bucket will exotherm. Heat is generated as the resin cures, so it should be kept well away from other stored materials. Water can be poured over the resin to suppress the heat gain.
- Always mix the catalyst into the resin thoroughly before using the resin (i.e. a good couple of minutes for a 10 litre bucket.) Failure to do this can result in ‘streaking’ on the laminate, where streaks of uncured resin will remain visible and ultimately lead to a failure in the laminate.
- Fast cures can result in an inadequate bond.

### CATALYST USAGE CHART

<table>
<thead>
<tr>
<th>Deck/Resin temp</th>
<th>29-35°C</th>
<th>21-28°C</th>
<th>13-20°C</th>
<th>6-12°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage Catalyst</td>
<td>1% Catalyst</td>
<td>2% Catalyst</td>
<td>3% Catalyst</td>
<td>4% Catalyst</td>
</tr>
</tbody>
</table>

### Table of Percentages in Millilitres, Per Weight of Resin Used

<table>
<thead>
<tr>
<th>Amount of Resin</th>
<th>1 Kilo</th>
<th>2 Kilo</th>
<th>3 Kilo</th>
<th>4 Kilo</th>
<th>5 Kilo</th>
<th>6 Kilo</th>
<th>7 Kilo</th>
<th>8 Kilo</th>
<th>9 Kilo</th>
<th>10 Kilo</th>
<th>11 Kilo</th>
<th>12 Kilo</th>
<th>13 Kilo</th>
<th>14 Kilo</th>
<th>15 Kilo</th>
<th>16 Kilo</th>
<th>17 Kilo</th>
<th>18 Kilo</th>
<th>19 Kilo</th>
<th>20 Kilo</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 ml</td>
<td>20 ml</td>
<td>30 ml</td>
<td>40 ml</td>
<td>50 ml</td>
<td>60 ml</td>
<td>70 ml</td>
<td>80 ml</td>
<td>90 ml</td>
<td>100 ml</td>
<td>110 ml</td>
<td>120 ml</td>
<td>130 ml</td>
<td>140 ml</td>
<td>150 ml</td>
<td>160 ml</td>
<td>170 ml</td>
<td>180 ml</td>
<td>190 ml</td>
<td>200 ml</td>
<td></td>
</tr>
<tr>
<td>20 ml</td>
<td>40 ml</td>
<td>60 ml</td>
<td>80 ml</td>
<td>100 ml</td>
<td>120 ml</td>
<td>140 ml</td>
<td>160 ml</td>
<td>180 ml</td>
<td>200 ml</td>
<td>220 ml</td>
<td>240 ml</td>
<td>260 ml</td>
<td>280 ml</td>
<td>300 ml</td>
<td>320 ml</td>
<td>340 ml</td>
<td>360 ml</td>
<td>380 ml</td>
<td>400 ml</td>
<td></td>
</tr>
<tr>
<td>30 ml</td>
<td>60 ml</td>
<td>90 ml</td>
<td>120 ml</td>
<td>150 ml</td>
<td>180 ml</td>
<td>210 ml</td>
<td>240 ml</td>
<td>270 ml</td>
<td>300 ml</td>
<td>330 ml</td>
<td>360 ml</td>
<td>390 ml</td>
<td>420 ml</td>
<td>450 ml</td>
<td>480 ml</td>
<td>510 ml</td>
<td>540 ml</td>
<td>570 ml</td>
<td>600 ml</td>
<td></td>
</tr>
<tr>
<td>40 ml</td>
<td>80 ml</td>
<td>120 ml</td>
<td>160 ml</td>
<td>200 ml</td>
<td>240 ml</td>
<td>280 ml</td>
<td>320 ml</td>
<td>360 ml</td>
<td>400 ml</td>
<td>440 ml</td>
<td>480 ml</td>
<td>520 ml</td>
<td>560 ml</td>
<td>600 ml</td>
<td>640 ml</td>
<td>680 ml</td>
<td>720 ml</td>
<td>760 ml</td>
<td>800 ml</td>
<td></td>
</tr>
<tr>
<td>50 ml</td>
<td>100 ml</td>
<td>150 ml</td>
<td>200 ml</td>
<td>250 ml</td>
<td>300 ml</td>
<td>350 ml</td>
<td>400 ml</td>
<td>450 ml</td>
<td>500 ml</td>
<td>550 ml</td>
<td>600 ml</td>
<td>650 ml</td>
<td>700 ml</td>
<td>750 ml</td>
<td>800 ml</td>
<td>850 ml</td>
<td>900 ml</td>
<td>950 ml</td>
<td>1000 ml</td>
<td></td>
</tr>
</tbody>
</table>

Catalyst Addition

There are a number of important rules of thumb to follow when deciding how much catalyst to add:

- Never use less than 1% even in the summer, just mix less resin at a time.
- Never use more than 4%, the gel time will not reduce any further beyond 4%.
- Never underestimate the effect of temperature. Resins will not cure at or below freezing and will always cure much quicker in direct sunlight.
- When topcoating late in the day, add more catalyst to allow for the lack of sunlight.
- In Winter use fast catalyst, in Summer use standard catalyst, in very hot conditions use LPT (Long Process Time) catalyst.
- Remember: Any catalysed resin left in the bucket will exotherm. Heat is generated as the resin cures, so it should be kept well away from other stored materials. Water can be poured over the resin to suppress the heat gain.
- Always mix the catalyst into the resin thoroughly before using the resin (i.e. a good couple of minutes for a 10 litre bucket.) Failure to do this can result in ‘streaking’ on the laminate, where streaks of uncured resin will remain visible and ultimately lead to a failure in the laminate.
- Fast cures can result in an inadequate bond.
When estimating the amount of materials needed for a roof, there are a number of factors that should be taken into consideration. Firstly, calculate the total area of the roof in square metres and always allow an extra 10% for the main materials to account for wastage or unforeseen problems. The values given below are only an estimate and will depend on the detail of the roof surface. The quantities for decking board are based on an exact calculation of the area of coverage of each board, in practice, this should be considered a conservative estimate.

### Materials estimation chart

<table>
<thead>
<tr>
<th>Roof Size (M²)</th>
<th>Resin Required</th>
<th>Topcoat required</th>
<th>CSM required (Rolls of approx. 30kg)</th>
<th>Bandage required 1 roll = 60m</th>
<th>Decking boards (8’X2’)</th>
<th>Ancillaries required</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>kg 20 kg cans</td>
<td>kg 20 kg cans</td>
<td>kg Rolls (30kg)</td>
<td></td>
<td></td>
<td>Rollers C-rollers (may need diff. sizes) Brushes Acetone (Litres) Buckets Catalyst (5L @ 4% usage)</td>
</tr>
<tr>
<td>5</td>
<td>7.5 1/2</td>
<td>2.5 1/4</td>
<td>2.5 1/4</td>
<td>1 4 1 1 1 1</td>
<td>5 2 1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>15 1</td>
<td>5 1/4</td>
<td>5 1/4</td>
<td>1 7 1 1 2 5</td>
<td>2 1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>22.5 1 1/2</td>
<td>7.5 1/2</td>
<td>7.5 1/3</td>
<td>1 11 1 1 2 5</td>
<td>2 1</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>30 1 1/2</td>
<td>10 1/2</td>
<td>10 1/3</td>
<td>1 14 1 1 2 5</td>
<td>2 1</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>37.5 2</td>
<td>12.5 3/4</td>
<td>12.5 1/2</td>
<td>1 18 2 1 2 5</td>
<td>2 1</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>45 2 1/2</td>
<td>15 3/4</td>
<td>15 1/2</td>
<td>1 21 2 1 2 5</td>
<td>2 1</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>52.5 3</td>
<td>17.5 1</td>
<td>17.5 2/3</td>
<td>1 25 2 1 4 5</td>
<td>4 1</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>60 3</td>
<td>20 1</td>
<td>20 2/3</td>
<td>2 28 2 1 4 5</td>
<td>4 1</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>67.5 3 1/2</td>
<td>22.5 1 1/4</td>
<td>22.5 3/4</td>
<td>2 32 2 1 4 5</td>
<td>4 1</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>75 4</td>
<td>25 1 1/4</td>
<td>25 3/4</td>
<td>2 35 2 1 4 5</td>
<td>4 1</td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>82.5 4 1/2</td>
<td>27.5 1 1/2</td>
<td>27.5 1</td>
<td>2 39 3 1 4 5</td>
<td>4 1</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>90 4 1/2</td>
<td>30 1 1/2</td>
<td>30 1</td>
<td>2 42 3 1 4 5</td>
<td>4 1</td>
<td></td>
</tr>
<tr>
<td>65</td>
<td>97.5 5</td>
<td>32.5 1 3/4</td>
<td>32.5 1/4</td>
<td>2 46 3 1 6 5</td>
<td>6 1</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>105 5 1/2</td>
<td>35 1 3/4</td>
<td>35 1/4</td>
<td>2 49 3 1 6 5</td>
<td>6 1</td>
<td></td>
</tr>
<tr>
<td>75</td>
<td>112.5 6</td>
<td>37.5 2</td>
<td>37.5 1/3</td>
<td>3 53 3 1 6 5-10</td>
<td>6 1</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>120 6</td>
<td>40 2</td>
<td>40 1/3</td>
<td>3 56 4 1 6 5-10</td>
<td>6 2</td>
<td></td>
</tr>
<tr>
<td>85</td>
<td>127.5 6 1/2</td>
<td>42.5 2 1/4</td>
<td>42.5 1/2</td>
<td>3 60 4 1 6 5-10</td>
<td>6 2</td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>135 7</td>
<td>45 2 1/4</td>
<td>45 1 1/2</td>
<td>3 63 4 1 6 5-10</td>
<td>6 2</td>
<td></td>
</tr>
<tr>
<td>95</td>
<td>142.5 7 1/2</td>
<td>47.5 2 1/2</td>
<td>47.5 1/3</td>
<td>3 66 4 1 8 5-10</td>
<td>8 2</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>150 7 1/2</td>
<td>50 2 1/2</td>
<td>50 1 2/3</td>
<td>3 69 4 1 8 5-10</td>
<td>8 2</td>
<td></td>
</tr>
</tbody>
</table>

### Notes
- Before starting any roof always calculate the area of the roof and take into account the complexity of the job before choosing your materials.
- Always ensure that you plan ahead to have enough materials to complete the job.
- Always allow extra time and materials for any detail.
- Many of the ancillaries are dependant on the number of people working on the roof; increase them accordingly.
Repairing a GRP roof
If the roof surface becomes damaged by impact or has to be cut for any reason it can be easily repaired using the following procedure:

1. Clean off the damaged area with solvent and abrade the GRP surface with a hand grinder for a distance of 100mm from the damaged area or edge to be joined.
2. Cut the 450/600gm² glass to the correct size to cover the affected area and mix sufficient resin with catalyst as previously described.
3. Brush resin onto the area to be laminated at the rate of 1 kilo per square metre. Place the glass over the area, wet out the glass with resin at the rate of 0.5 kilos per square metre. Stipple well with the brush or use a paddle wheel roller for larger areas.
4. Ensure that the laminate is free from air and completely consolidated and allow to cure.
5. Mix the Topcoat with catalyst as previously described and apply with a brush at the rate of 0.5 kilos per square metre.
6. Allow to cure.

This procedure will ensure that the patch or joining piece applied will bond to the original laminate and form a weatherproof patch over the damaged or cut laminate.

Advice when using GRP during Winter months
• Always check the local weather forecast (See Commercial Manual for details on how to obtain an accurate forecast.)
• During the Winter, avoid topcoating a roof after 2-3pm unless it is a clear bright day and not too cold. The heat from the sun contributes a great deal towards the curing of the laminate during colder months. After the sun has set, it is unlikely that the topcoat will cure over night. If left uncured, the topcoat may cure with debris and leaves stuck to the surface, or with an undesirable finish if it rains.
• Ensure that the surface temperature of the boards is checked before laying the resin or topcoat.
• Ensure that the resin is warmed before use if the ambient temperature is below 10ºC.
• Always ensure that the resin remains indoors the night before it is used.
• Do not use resin or topcoat in temperatures below 5ºC.
• If it begins to rain, cover the roof with a visqueen sheet.
• If you are unable to laminate over a prepared deck, then coat the decking with catalysed resin and cover any exposed edges. This will seal the deck and prevent moisture uptake until the laminate can be applied. Always cover the edges of the roof and uncoated boards with a polyethylene sheet.
• Always ensure the deck or substrate to be laid onto is completely dry before laying the laminate. Sweep off any excess water and mop up the excess with dry cloths before allowing the roof to dry naturally. Wiping the surface with acetone can speed up this process.
• Do not start to lay a roof if a period of rain is forecast.

Advice when using GRP during Summer months
• Always check the local weather forecast (See Commercial Manual for details on how to get an accurate forecast online and useful telephone numbers.)
• Do not use roofing resin or topcoat in temperatures above 35ºC.
• Always mix smaller batches of resin then you normally would to give adequate time to apply it before it starts to catalyse.
• Always use LPT catalyst in hotter weather if the resin starts to cure too quickly.
• Always apply the laminate in the shortest runs possible across a roof. The shorter the length of laminate, the less likely it is that the resin will catalyse before it can be consolidated into the laminate.
• Use a temperature sensore to measure the surface temperature of the laminate before applying the topcoat. If topcoat is applied to surfaces above 50ºC, the wax component of the topcoat will melt and the topcoat will remain tacky to the touch, this will usually mean that any loose debris will stick to the roof and the colour of the topcoat will also be impaired.
• If possible, topcoat the roof out of direct sunlight or wait until later in the day before applying it, it may mean that the roof will take you longer but it will save you time spent returning to the roof to re-topcoat it at a later date.

Safe working practices
It is always the installer’s responsibility to ensure safe working practices for themselves and their employees and always pay attention to the risks for other members of the public that may be nearby at the time. The following notes are designed to help you ensure a safe working environment, but they are by no means comprehensive and any installers should always assess any potential risks when working on a contract and make sufficient means to address them. In addition to these notes, the installer should also be aware of the health and safety information that applies to most materials (see Health and Saf
### Troubleshooting Guide
Problems that Occur While Laying the Roof

#### 1) Failure of resin to cure/harden

**Description of problem**
Laminate is still wet and resin is uncured with no other symptoms.

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Remedial action</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Resin may have been inadequately mixed.</td>
<td>• Catalyse another batch of resin, ensuring that you use the correct catalyst. Always add extra catalyst (doubling up if necessary) and roll vigorously into the resin.</td>
</tr>
<tr>
<td>• Unsuitable catalyst may have been used (e.g. LPT or summer catalyst used in winter.)</td>
<td>• Larger laminates or laminates that have been left for a long time or contaminated by dirt, debris or water etc. will need replacing completely.</td>
</tr>
<tr>
<td>• Not enough catalyst may have been used for the temperature.</td>
<td>• Always check the ambient temperature before mixing batches of resin and consult the catalyst chart for guidance if unsure.</td>
</tr>
</tbody>
</table>

#### 2) Resin cures too fast

**Description of problem**
Resin cures before it can be properly applied and consolidated into the CSM.

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Remedial action</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Unsuitable catalyst may have been used (e.g. Winter catalyst used in Summer.)</td>
<td>• If the ambient temperature is very hot or there is a lot of direct sunlight, use LPT (Long Process Time) catalyst.</td>
</tr>
<tr>
<td>• Weather may be too hot for Summer catalyst.</td>
<td>• Reduce the size of the batches mixed.</td>
</tr>
<tr>
<td></td>
<td>• Always ensure that you are laying the shortest possible runs across a roof to give you adequate time to properly consolidate the laminate.</td>
</tr>
</tbody>
</table>

#### 3) It begins to rain while laminating/topcoating

**Description of problem**
Roof has not yet cured and it begins to rain.

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Remedial action</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>• STOP! Cover the roof with a non-woven polyethylene sheet and try to ensure that none of the laminate gets any moisture onto it.</td>
</tr>
<tr>
<td></td>
<td>• Always ensure that you check the local weather forecast before you start a roof.</td>
</tr>
<tr>
<td></td>
<td>• Always have enough polyethylene sheets with you to cover the roof.</td>
</tr>
<tr>
<td></td>
<td>Resin contaminated with water will not cure and require a re-skin (see below.)</td>
</tr>
</tbody>
</table>

#### 4) Water contamination (white staining of laminate)

**Description of problem**
Water contaminated resin usually appears as a white staining or milkyness. The resin will not fully cure.

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Remedial action</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Resin has been contaminated by water.</td>
<td>• Any laminated resin treated this way will not cure.</td>
</tr>
</tbody>
</table>

#### 5) Streaky laminate/topcoat

**Description of problem**
Laminate has partially cured, but has streaks of wet resin or lighter/darker colour.
## Troubleshooting Guide
### Problems that Occur After the Roof Has Been Laid

<table>
<thead>
<tr>
<th>Potential cause</th>
<th>Remedial action</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Resin may have been inadequately mixed.</td>
<td>• Always ensure that topcoat is applied thinly (0.5mm.) This makes it possible to reapply another layer of either properly catalysed or thoroughly mixed, pigmented topcoat. If using pigment or catalyst, add more to the second coat.</td>
</tr>
<tr>
<td>• Pigment may not have been mixed in thoroughly.</td>
<td></td>
</tr>
<tr>
<td>• May be contaminated by water.</td>
<td></td>
</tr>
</tbody>
</table>

### 6) Failure of topcoat to cure

**Description of problem**
Topcoat is still wet and has not cured.

<table>
<thead>
<tr>
<th>Potential cause</th>
<th>Remedial action</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Topcoat has been used with unsuitable catalyst (i.e. Summer catalyst in winter.)</td>
<td>• After water has evaporated apply another very thin layer of topcoat, ensuring that it is vigorously and thoroughly rolled in to the uncured layer.</td>
</tr>
<tr>
<td>• Topcoat has not been sufficiently mixed or not enough catalyst has been mixed in.</td>
<td>• Always add more catalyst to the second batch, up to double if necessary.</td>
</tr>
<tr>
<td>• Topcoat might be contaminated by water.</td>
<td></td>
</tr>
</tbody>
</table>

### 7) Entrapment of debris in laminate

**Description of problem**
Debris entrapped in the laminate, possibly poking through the laminate, holes in laminate.

<table>
<thead>
<tr>
<th>Potential cause</th>
<th>Remedial action</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>• This is usually seen while consolidating. The debris needs to be removed and patched over. This can be done while the laminate is still wet and then patched up with a new section of laminate.</td>
</tr>
<tr>
<td></td>
<td>• When the laminate has cured, the surface can be lightly rubbed with a coarse sand-paper. This will highlight any imperfections. The affected area must then be patched with a new laminate.</td>
</tr>
</tbody>
</table>

### 8) Spillages

**Description of problem**
Spillage/resin spray.

<table>
<thead>
<tr>
<th>Potential cause</th>
<th>Remedial action</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>• Resins stick by mechanical adhesion; they soak into a surface and cure. It is essential to clean the resin off the surface before it cures.</td>
</tr>
<tr>
<td></td>
<td>• The solvent for uncured resin is acetone. This can be used to remove resin from most surfaces including clothing (WARNING: acetone is extremely flammable.)</td>
</tr>
<tr>
<td></td>
<td>• If used to clean paintwork or coloured fabrics it may discoulour or remove paint or dye from the surface.</td>
</tr>
<tr>
<td></td>
<td>• Resins will generally not adhere to anything that has a shiny surface. If resin has cured onto a surface such as glass, metal or paintwork, it may be flicked off using a sharp edge or by vigorously rubbing with a coarse cloth. The cleaned surface may then be buffed with wax polish or a cutting compound.</td>
</tr>
<tr>
<td></td>
<td>• With larger spillages (e.g. driveways or walls,) a hot pressure washer is the best choice, but high pressures will be required and strong detergents are usually necessary.</td>
</tr>
<tr>
<td></td>
<td>• Preventative measures are essential to avoid spillages.</td>
</tr>
<tr>
<td></td>
<td>• Always mask off adjacent areas where fine spray droplets, caused by the consolidator roller, may fall. Polythene sheeting is the best material for masking.</td>
</tr>
</tbody>
</table>
1) Delamination of the laminate from the boards

Description of problem
This will not cause the roof to leak.

<table>
<thead>
<tr>
<th>Potential cause</th>
<th>Remedial action</th>
</tr>
</thead>
<tbody>
<tr>
<td>• This is caused by poor adhesion of the laminate to the boards and is more likely to happen with plywood rather than OSB.</td>
<td>• The laminate can be completely removed and reapplied after priming the boards with G4 to ensure no further delamination occurs.</td>
</tr>
</tbody>
</table>

2) Delamination of topcoat

Description of problem
This will not cause the roof to leak, but will spoil its appearance.

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Remedial action</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Application of the topcoat to a contaminated surface (usually wet).</td>
<td>• The topcoat cannot just be reapplied on top of existing topcoat.</td>
</tr>
<tr>
<td>• Application of the topcoat to a hot laminate may also cause this to happen.</td>
<td>• Generally, the best solution is to clean and abrade the surface, removing all of the flaking top coat, then re-laminate the entire roof surface and reapply the top coat.</td>
</tr>
<tr>
<td>• Whenever the adhesion of the topcoat is poor, some topcoat delamination may occur.</td>
<td></td>
</tr>
</tbody>
</table>

3) Cracking of the topcoat

Description of problem
Cracks may appear as fine lines on the substrate. This will not cause the roof to leak.

<table>
<thead>
<tr>
<th>Potential cause</th>
<th>Remedial action</th>
</tr>
</thead>
<tbody>
<tr>
<td>• This is usually caused by the topcoat being applied too thickly, topcoat should never be applied thicker then 0.5mm.</td>
<td>• The only solution is to relaminate over the cracked area after careful surface preparation.</td>
</tr>
</tbody>
</table>

4) Cracking of laminate

Description of problem
Could cause the roof to fail if cracking is severe enough.

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Remedial action</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The roof is over 50m² and an expansion joint has not been incorporated into the roof.</td>
<td>• Grind down and laminate over the crack with two layers of 450g/m² CSM.</td>
</tr>
<tr>
<td></td>
<td>• It may be necessary to cut out a section and laminate in an expansion joint at 50m² intervals.</td>
</tr>
<tr>
<td></td>
<td>• Always check the board fixings, these may need to be re-fixed if they have been pulled away from the joists.</td>
</tr>
</tbody>
</table>

5) Ponding/standing water

Description of problem
A common problem and one which will not affect the performance of the roof but can be unsightly when a roof is overlooked, or, worse still, if it occurs on a balcony.
## Troubleshooting Guide

Problems that Occur After the Roof Has Been Laid

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Remedial action</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The roof has been installed with an inadequate fall.</td>
<td>• A filled resin concrete can be applied to the area where the ponds. This must then be laminated over to ensure that there surface cracking.</td>
</tr>
<tr>
<td>• The decking has not been rebated where A-trims have been attached, causing a lip which holds water back.</td>
<td>• While this will displace the water, the best solution is to ensure the original quotation confirms that the roof may be subject to ponding, and unless specified, it is difficult to guarantee that this will not occur.</td>
</tr>
</tbody>
</table>

### 6) Board swelling ('tile' outline on the roof)

**Description of problem**
This will cause a 'tile' effect to appear on the roof as the outlines of the boards appear as ridges on the roofs surface. The roof is unlikely to leak but in very bad cases, some cracking may occur at the joints.

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Remedial action</th>
</tr>
</thead>
<tbody>
<tr>
<td>• This is caused by moisture uptake in the boards. It may be due to excessive condensation, but is more likely to be a result of some porosity in the laminate, allowing water to seep into the boards.</td>
<td>• The roof must be cleaned and all of the ridges ground down.</td>
</tr>
<tr>
<td>• The problem is made worse by poor board fixing, allowing the boards to move and rise up off the roof timbers.</td>
<td>• New expansion joints must be fitted to the roof using G180 trim the entire roof surface must be relaminated.</td>
</tr>
<tr>
<td>• Insufficient expansion gaps have been left between the boards if over 50m².</td>
<td>• In very bad cases, it may be necessary to fix new boards over existing roof and relaminate, ensuring adequate provision for expansion with expansion joints on larger roofs.</td>
</tr>
<tr>
<td>• May cause ponding (see above.)</td>
<td></td>
</tr>
</tbody>
</table>

### 7) Tacky topcoat

**Description of problem**
Topcoat has suitable catalyst and has been adequately mixed but is still tacky. This problem usually manifests itself in very hot conditions.

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Remedial action</th>
</tr>
</thead>
<tbody>
<tr>
<td>• This is usually caused by application of the top coat in hot, sunny conditions, so that the waxy surface layer cannot properly form.</td>
<td>• Clean down with acetone and re-apply in cooler conditions.</td>
</tr>
<tr>
<td></td>
<td>• Tacky topcoat usually occurs at approximately 55°C and this is usually caused by very hot conditions and direct sunlight.</td>
</tr>
</tbody>
</table>

### 8) Colour fade of topcoat

**Description of problem**
This can take several years to appear and the problem may be worse if the top coat was tacky when first laid.

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Remedial action</th>
</tr>
</thead>
<tbody>
<tr>
<td>• This is caused by erosion of the topcoat and is more likely to occur with darker colours.</td>
<td>• It may be possible to clean down, abrade and re-topcoat the but it is difficult to guarantee that no topcoat delamination will thereafter. It is possible to use a PU varnish to restore the colour this may have to be reapplied after 2-3 years.</td>
</tr>
<tr>
<td>• The effect of the colour returning when the surface is wet with rain is often reported.</td>
<td>• The only way to guarantee the longevity of the colour is to re-sk the roof with another laminate.</td>
</tr>
<tr>
<td></td>
<td>• This is also a method for refurbishing old, damaged or well-worn that may have been subjected to heavy foot traffic.</td>
</tr>
<tr>
<td></td>
<td>• The roof needs to be completely cleaned down and wiped with aci G4 primer should then be applied on top of the laminate and the tc can be applied on top of this.</td>
</tr>
</tbody>
</table>

---

24