TUFF STUFF

THE GRP FLAT ROOFING SYSTEM

INSTALLATION GUIDE

www.tuffstuff.co.uk

bsi. ISO 9001 Quality Management
FS 622967

bsi. ISO 14001 Environmental Management
EMS 641663

TUFFSTUFF 25-YEAR PRODUCT WARRANTY

BUILDING REGULATIONS COMPLIANT
FULL FIRE CERTIFICATE

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Our mission is to create successful long-term relationships with our customers by understanding their needs, delivering market-leading products and providing premium support services.

About Us:

TuffStuff® is the UK's premium designer, manufacturer and supplier of heavy-duty GRP waterproof flat roofing systems.

From our bespoke premises in North Yorkshire we supply our products through a dedicated Stockist network located throughout the country.

TuffStuff® has a dedicated product development team that work closely with customers and our own UK based manufacturing facility to produce an evolving product range that is suitable for multiple flat roof applications.

Our History:

Throughout our 30-year history we have invested heavily in research & development, our processes and our people to ensure TuffStuff® continues to set new standards in flat roof waterproofing solutions.

From our humble beginnings in the mid 1980's, we have grown year-on-year to become a key figure in the GRP flat roof market. We are proud that our product range is now utilised across multiple domestic and commercial environments.

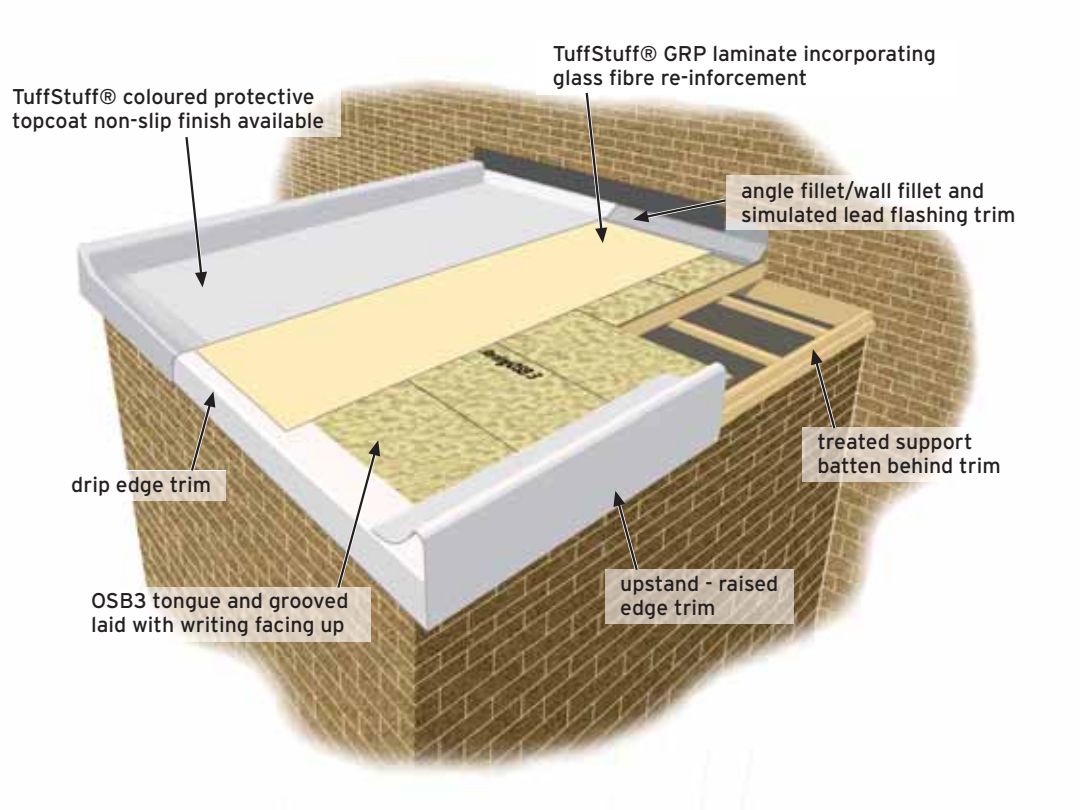
Our success to date has been significant but it is our commitment to developing our product offering in the future that really excites us. Our dedicated team of UK based product developers work on a daily basis with our UK manufacturing facilities to push the boundaries of GRP roofing systems to new levels.

We know there will be many challenges to overcome in the years ahead, but the structure we have in place gives us the ideal platform to evolve our product range and support customers in the delivery of their own unique projects.

contents

TuffStuff® overview:

A TuffStuff® GRP roof is a wet laid, single ply GRP laminate made up of two layers of base coat resin sandwiching a layer glass fibre reinforcing mat. It is applied to a good quality new OSB3 or WBP plywood deck (18/25mm). Profiled GRP edge trims are applied to the roof edges and abutments and the roof is finished with a coat of coloured top coat resin.



TuffStuff® cross section diagram

system features:

- All components engineered to be used together.
- Range of profiled edge trims to suit all applications.
- 25 year product guarantee.
- Fire retardant to BS476-3 to comply with Building Regulations with both F.AA and F.AB ratings available dependent on the finish selected for the roof.
- Low styrene emission resins.
- UV Resistant.
- The TuffStuff® laminate is fully resistant to wind uplift as it is 100% bonded to the new timber substrate.
- Textured slip resistant finishes available.

insulation:

Insulation can be used in a cold roof (insulation between joists) or warm roof (insulation above joists) configuration to comply with current Part L Building Regulations.

resistance to foot traffic:

TuffStuff® is available with two levels of reinforcement.

- Standard Duty 450gsm reinforcement for areas of occasional foot traffic.
- Heavy Duty 600gsm reinforcement for areas of heavy foot traffic in conjunction with slip resistant finish.
- For areas where an even heavier duty reinforcement is deemed desirable, then two layers of 450gsm reinforcement may be used.

training:

Onsite training is available at your local stockist.
See your distributor or website for details www.TuffStuff.co.uk

Training is always recommended before installing a TuffStuff® roof.

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section 1: components and application tools:

TuffStuff® system components:

Primary Components:

- Base coat resin (15kg/10m² cans & 5kg/3.3m² cans).
- 450gsm/600gsm chopped strand reinforcing mat.
- Coloured Top coat resin (5kg/10m² + 15kg/30m² cans).
- Liquid catalyst (hardener) 1kg/0.9 Litres & 5kg/4.5 Litres.
- Pre-formed GRP edge trims in 3m lengths.

See TuffStuff® "Edge Trim Guide" for profiles, sizes and usage illustrations.

Ancillary Components:

- Acetone (for bucket, roller and brush cleaning).
- Trim adhesive (for ensuring correct fixing of trims).
- 75mm wide chopped strand bandage (for joining trims to roof).
- 100mm lightweight tissue for ensuring neat finish on visible moulded corners or tidying up details such as roof penetrations.
- G4 polyurethane primer (for priming a concrete, brick or metal surfaces to accept TuffStuff® laminate).
- Textured granules (for adding to surface of top coated roof to create a textured and slip resistant finish, grey slate or brindle available).

Other Materials (Not Supplied as Part of a TuffStuff® GRP System):

- Treated tile battens (19mm x 38m) for giving rigidity to edge trims.
- OSB3 decking boards (2400 x 590 x 18mm T&G).
- Plywood decking boards - 2400 x 1200 x 18mm WBP, exterior grade, good one side, CE2+.
- Fixings for decking boards - either ring shank nails, sheradised or plated woodscrews (minimum 65mm).
- 15mm galvanised clout (felt) nails - for fixing trims.
- Clear silicone or proprietary pointing sealant e.g. Leadmate -for pointing flashing trims into wall.

Do not use a budget 'filled' silicone - it will let you down!

Application Rollers (frame and sleeve):

- 3", 7" & 10" wide for applying base coat and top coat resins (replacements sleeves available).
- Rollers perform best when an extension is applied to the handle.

Paddle Rollers:

- 3", 6" and 9" ribbed metal rollers for consolidating and distributing base coat into reinforcing mat to ensure an even and correct resin to mat ratio (3 to 1) and to remove any air bubbles from the laminate.
- 3", 6" and 9" Bubble Buster Paddle Rollers for reducing spray that is generated when in use.
- Catalyst safety dispenser for measuring and dispensing the correct quantities of catalyst (see catalyst guide).
- Laminating brushes 1", 2", 3" and 4" wide for application of base coat resin and moulding to shape in difficult to access areas. Also useful for topcoating detailing such as bottom lip of trims.
- Mixing Buckets for measuring base coat and top coat resins, mixing in catalyst and transferring to roof surface.
- Nitrile powder free gloves to protect hands when applying resins.

other tools:

- Stanley knife.
- Sweeping brushes.
- Shovel/spade.
- Hand brush.
- Wrecking bar.
- Sandpaper (60 grit).
- Claw hammer.
- Mastic gun.
- Circular saw.
- 4" OR 5" grinder + stone cutting disks.
- Diamond blade for grinder for cutting a chase into wall.
- Roll of heavy duty polythene for groundsheet and waterproof sheet to protect roof in case of rain.
- A Starter Pack of tools and equipment is available comprising of:-
  - 1 x 3" Roller Complete
  - 1 x 7" Roller Complete
  - 1 x 3" Paddle Roller
  - 1 x 6" Paddle Roller
  - 3 x 3" Sleeves
  - 3 x 7" Sleeves
  - 1 x Catalyst Dispenser
  - 2 x 2" Laminating Brushes
  - 2 x 4" Laminating Brushes
  - 2 x 14L Mixing Buckets
  - 1 x Thermometer
  - 1 x Installation Manual

health and safety - materials handling:

When mixing/applying TuffStuff® resins we recommend the use of:

- Hand protection (nitrile gloves).
- Eye protection (protective goggles/glasses).

Additionally, we recommend that eyewash liquid (saline solution or clean fresh water) is available in the event that resin splashes into eyes.

If resin splashes into the eyes, irrigate thoroughly with eyewash liquid or fresh water and consult a medical professional if irritation persists.

section 2: preparing and laying the deck:

check weather forecast prior to installation

Before opening a customer's roof to the elements always check the weather forecast. If rain is forecast before you are likely to finish the job it may be wise to wait for a more suitable opportunity. Consult with your customer.

On larger roofs consider only stripping and decking small areas which can be waterproofed or protected prior to the arrival of rain.

Roof stripped showing firrings on top of joists

If the existing substrate is unsuitable for laying your decking boards onto, it should be removed to expose the roof joists. Check that the joists are free from rot, replace those that are affected and also check that adequate falls are provided for the roof to drain. This may require you to fit shaped firring strips to the joists to provide a fall. Building regulations call for a **minimum** fall of 1:60. The better the fall the less chance of ponding!! If the roof insulation is being upgraded then it will be necessary to remove all previous decking and waterproofing.

cold roof construction:

A cold roof is where the insulation (usually glass or mineral fibre quilt) is laid between the joists and supported by the ceiling. A 50mm gap should be left from the top of the insulation to the underside of the decking. Ventilation of this space will be necessary to avoid the formation of condensation.

Prior to laying your decking boards, ensure that they are dry. TuffStuff® like most waterproofing systems will not bond to wet or damp boards, leading to almost certain delamination in the future.

OSB3 tongued and grooved joint

It is often desirable to apply a sealer coat of catalysed base coat resin to the decking boards (often referred to as "licking"), before taking them to site. This will ensure they remain unaffected by moisture throughout the "decking stage".

decking:

We recommend using OSB3 as your decking board and specifically 2440 x 590 x 18mm, T & G Boards

The advantages of choosing to use OSB3 as your decking are:

- They are easier to handle and carry up onto the roof because they are 2440 x 540 x 18mm and therefore lighter than full size ply boards (2440 x 1220)
- They are designed to minimise the effects of expansion and contraction due to the design of the tongue and groove
- T&G joints means the shorter join need not occur on a joist, thus reducing wastage although a noggin will be required to be inserted to ensure support.
- T&G joints mean no bandaging required for T&G board joints.

Square edged boards (either OSB or plywood) can be used (18mm WBP exterior grade 2400 x 1200 CE2+ Good one side or 18mm OSB3 2440 x 1220) however; all boards joins will need to be made on a joist/noggin a 3mm gap left between each board and all joins will need to be bandaged. (See 'Bandaging')

laying the deck:

Using 2440 x 570 x 18mm OSB3 T&G boards lay them at 90° to the joists, laid with the writing side uppermost. This will ensure that the gap in the T&G joint will fill with resin when base coat is applied to help bond the boards together.

Begin laying the boards at the furthest edge from the draining edge. Where the board is laid along a wall, an expansion gap of 18-25mm between board and wall should be allowed.

Decking fixed to support joists

Decking laid - writing side up

Commence Decking (see photographs)

Square off the short edge of the board with the fascia and lay the boards end to end until they reach the opposite edge. Trim the last board to fit and use the off cut (if it is longer than 400mm) to begin the next row, thus creating staggered joints. Ensure that the tongues of each board are correctly engaged with the grooves of its neighbours.

Proceed in this manner, cutting and shaping where necessary until the roof is fully decked. NOTE Roofs over 50sq metres will require the use of expansion trims. See under 'Expansion Trims' how the roof needs to be prepared.

When laminated, the roof surface will reflect any imperfections in the deck.
Good deck - good roof!

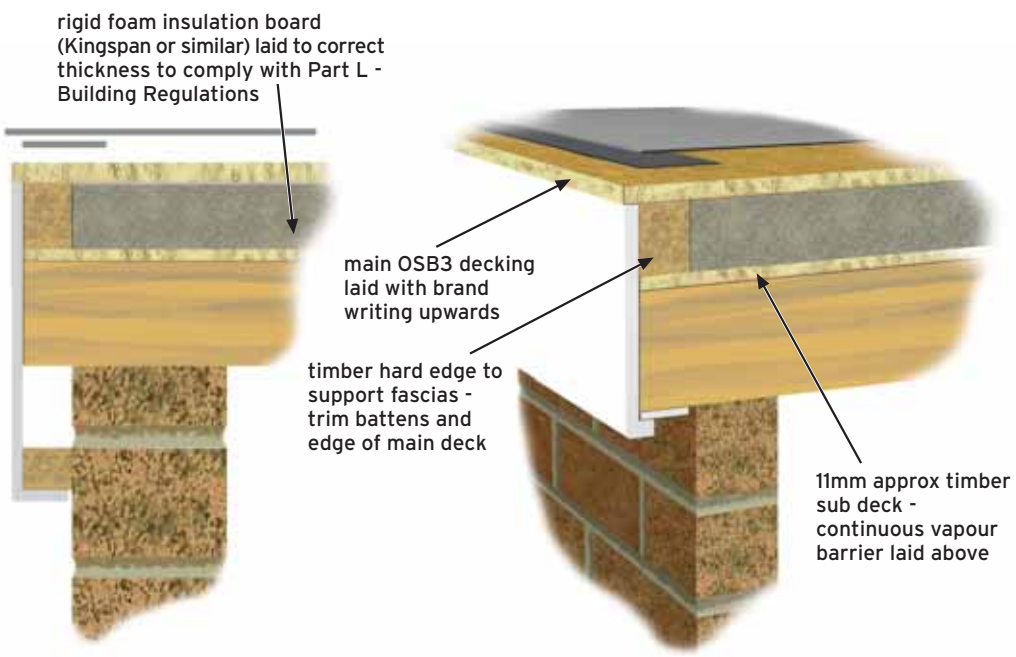
The recommended methods of fixing are either a gas powered nail gun using 65mm sheradised ring shank nails, or screw gun using plated/passivated woodscrews min 65mm.

Fixings should be inserted at 200mm spacing (4 fixings across 590mm width) on every joist. If over boarding (i.e. laying a new deck on top of an existing one) it is important that your fixings locate into the joists. If you are fixing into steel, there are proprietary fixings that will be suitable. You may wish to consult our Technical Helpline.

If the roof is also a balcony or heavily trafficked area, it may be desirable to use 25mm decking boards as this will have much less 'flex' when walked upon. The 25mm decking boards are likely to be 'square edged' rather than T&G so remember to bandage all board joints. Any edges not supported by a joist should have 'noggins' inserted to ensure all board edges are supported.

warm roof construction:

Laying and fixing the deck



Warm roof detail

If a 'Warm Roof' is required (insulation placed above the joists) it will be necessary to create a sub-deck (either 11mm Plywood or 11mm OSB) to carry the insulation, fastened to the joists/firrings in the previously described manner. It is then recommended that a continuous vapour barrier i.e. visqueen, is laid onto the sub deck, any overlaps or joints taped with a waterproof tape.

Part L of the Building regulations unhelpfully requires that the vapour barrier be sited on the warm side of the roof e.g. on the underside of the joists! This can be accommodated on new build but practically impossible on a flat roof refurbishment. Insulation manufacturers provide a lot of advice in their literature and websites.

Foil or tissue faced insulation board (PUR or PIR) is then placed onto the sub deck long edges at 90° to the long edges of the sub deck and a 'top deck' of OSB3 2400 x 590 x 18mm laid on top as per the decking instructions and fixed through to the joists using suitable fixings of the appropriate length.

A timber 'hard edge' may be necessary at the perimeter, depending on the roof layout, to facilitate the fixing of battens, fascias and trims.

Reverse firring to level front and rear elevations

note:

When laying a 'warm' roof, the position of the insulation i.e. immediately below the timber deck, can cause an abnormally high build-up of heat in the timber deck which will cause it to 'move' under expansion pressures, through a greater range of movement than would normally be experienced. This can lead to "stress relieving" in the timber deck which is manifested as a 'cracking' sound and will often trigger a chain reaction of 'stress relief cracking' across the roof.

In order to minimise this effect it is recommended that the following precautions are observed.

1. Adequate, and if necessary, improved and increased fixings for the supporting timberwork. Consider using noggins to increase the fixings available for decking boards and reduce the flexibility of the structure as a whole.
2. Ensure that extra fixings are used when fastening the deck to the supporting timber work.
3. Consider using expansion joint trims at more regular intervals even if the roof area is below the 50m^2 recommended for the use of expansion trims.
4. Use 'tissue' faced insulation rather than in 'foil-faced' insulation - This will reduce the amount of heat reflected back into the deck.

When using firrings, the deck will obviously have a 'fall' to the lowest edge. If that fall runs parallel to the front edge, when your trim is in place along that front edge, it will follow the same 'fall' as the roof. This may not look attractive when viewed from the ground, especially if the front edge of the roof is on the front or rear elevation of a property. You may wish to discuss this detail with your customer at the survey or pre installation phase.

To level up the trim, use a firring the same size as used on the joists but place it on top of the deck, along the front edge, falling the opposite way to the roof and position your trim on top of it. This will have the effect of straightening the trim and making it level.

section 3: trimming

general:

Edge trims are manufactured in GRP and are 100% compatible with TuffStuff® roofing resins.

One side has a matt finish for high adhesion and the other side a glossy finish. Always bond to the side with the matt finish. Any laminate applied direct to glossy side will delaminate. Pre moulded corners are also 'glossy' and will need sanding before use.

fixing:

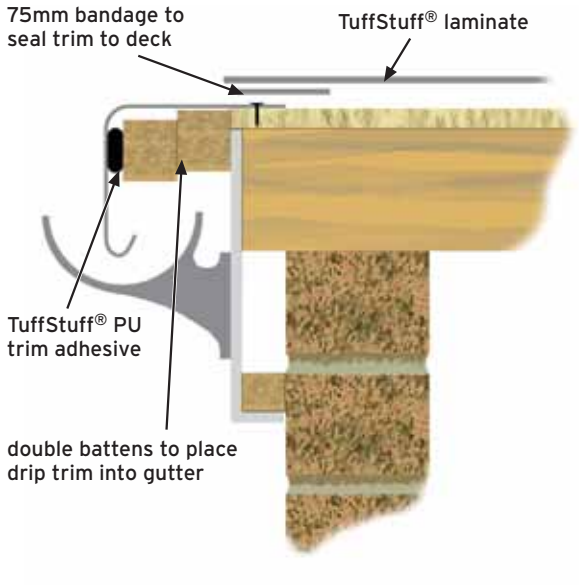
All trims can be fixed in place using 15mm clout (felt) nails or staples

First, battens (19mm x 38m treated) should be fixed around the roof perimeter in a position suitable for each trim profile and prior to fixing the trim in place; a continuous bead of polyurethane trim adhesive should be applied to the battens. The trim can now be positioned and 'rubbed' into place to ensure the face is vertical and that the adhesive is engaged. Mechanical fixing to the deck using clouts or staples can now take place.

note:

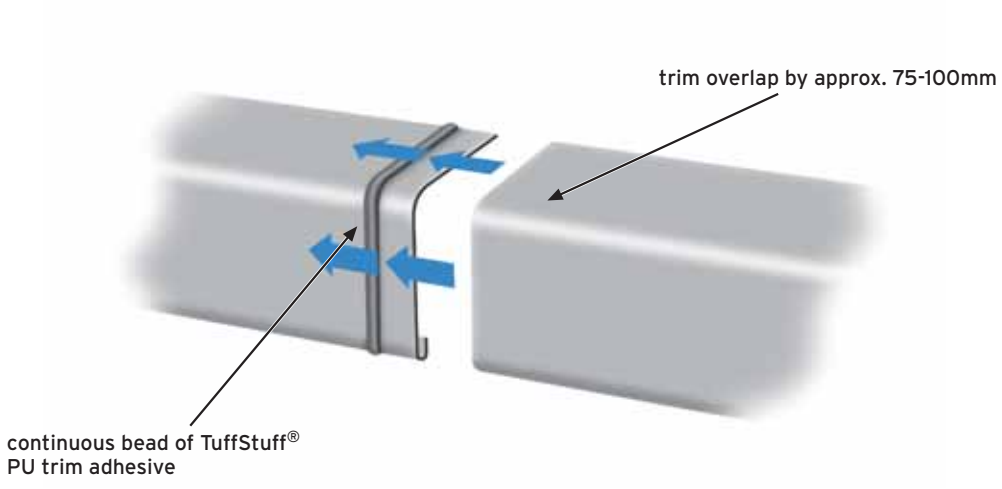
Battens must be kept dry to allow a 'bond' to the trim adhesive.

When using the drip edge trims (A170, A200 and A250) it may be necessary to 'double batten' to ensure the bottom edge of the trim is located as close to the centre of the gutter as possible (see drawing).

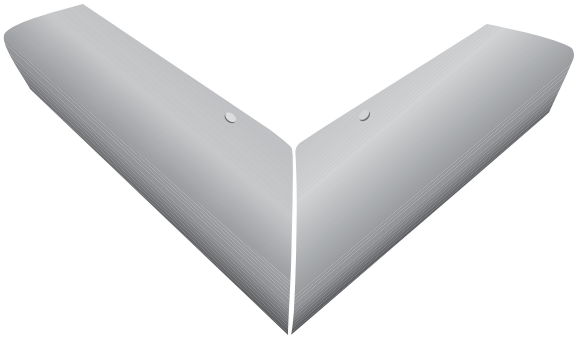


Drip edge trim detail

Where trims are overlapped onto another, all joins need to be sealed using a continuous bead of trim adhesive. In addition, all trim joins should be bandaged (See Trims - Bandaging).



Typical trim jointing detail



Drip to drip edge trim mitred corner

Upstand to upstand trim mitred corner

Where trims meet at corners, whether it is the same profile or two different profiles, the join can be made either using TuffStuff® pre-made corners or by cutting/mitring and moulding a corner, using reinforcing mat and catalysed base coat.

If you are using pre-made corners, always remember that any trim-to-trim join needs the overlap sealing with trim adhesive and then bandaging.

For a complete listing of trim profiles see 'TuffStuff® Preformed GRP Trims' Catalogue".

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A170/A200/A250 - Drip Edge Trims:

Drip edge trims are fitted to the lowest edge of the roof where the rainwater flows into the gutter. To ensure the vertical leg of the trim sits into the centre of the gutter, the trim needs to be 'packed out' by using two support battens, the first fixed just below the level of the deck and the second 10mm below the first, to allow the trim to sit flush with the roof.

Double Battens to Locate Drip Trim Over Centre of Gutter.

Before offering the trim into place, apply a continuous bead of PU trim adhesive to the batten. The trim can now be 'rubbed' into place and the flange clout nailed or stapled to the deck.

For shallow pitched roofs, the profile of the trim when fixed in place may cause rainwater to 'pond' slightly at the front edge. To avoid this, plane approximately 2mm off the leading edge of the deck the width of the trim flange so the trim can be 'recessed' into the front edge and lay completely flush with the roof.

All trim overlaps should be sealed with PU trim adhesive and bandaged.

B230/B260/B300 - Upstand (Raised Edge) Trims

Upstand trims are placed on the non-draining open edges of a roof, overlapping the top of the fascia boards. A single batten should be fixed on the outside of the fascia board level with the top edge of the deck. PU trim adhesive should be applied to the battens in 30mm beads at 300mm centres before 'rubbing' the trim into position. If a ladder is to be used for access against this profile of trim on a regular basis, reinforcement may be necessary to avoid distortion or possible damage by using one of the following techniques.

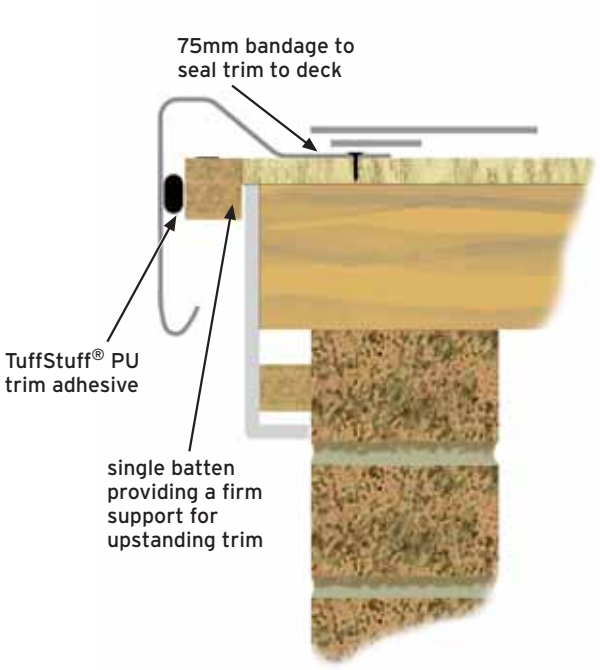
1. Shape a timber batten into the ridge of the trim.
2. Fit a short length of the same profile trim over a section and bandage, using tissue to disguise the join.
3. Encapsulate an area of trim in the TuffStuff® laminate, using tissue to maintain a smooth finish.

note:

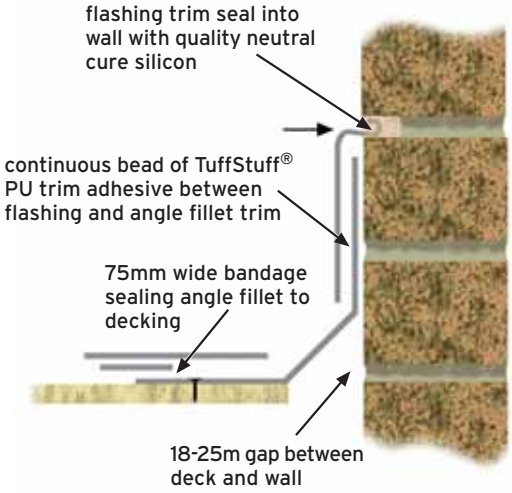
All trim overlaps should be sealed with PU trim adhesive and bandaged into place and fixing through the flange.

D260/D300 - Angle Fillet Trim:

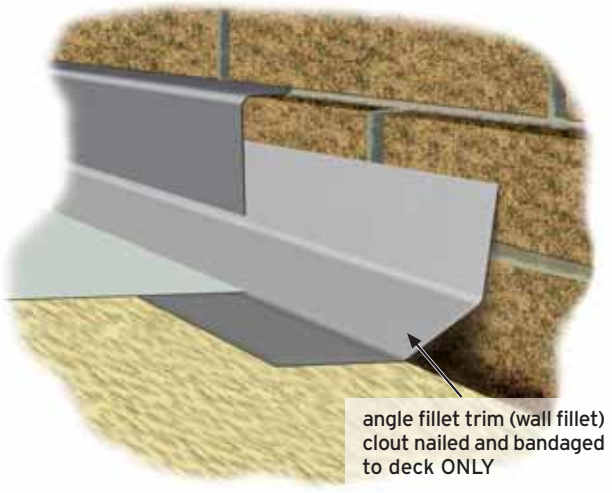
This trim is for use against an abutting wall or parapet. Place the trim against the wall making sure it sits squarely. Fix in place to decking **NOT** the wall using 15mm clout (felt) nails, at 150-200mm centres. Where the angle fillet trim needs to be joined by overlapping, use a bead of PU trim adhesive across the full width of the trim. The whole join should then be bandaged, sealing both trims together.



Upstand-raised edge trim detail



Typical angle fillet to flashing trim detail



Angle fillet trim (wall fillet)

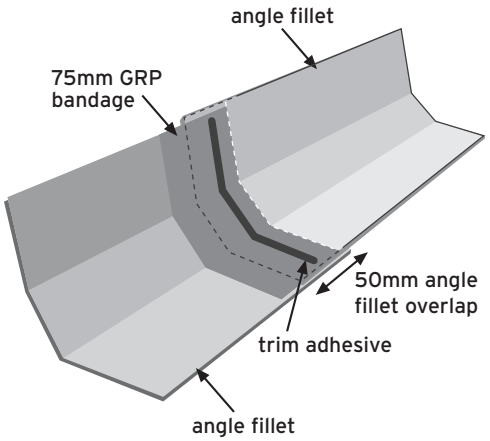
If the roof is left overnight without a flashing trim in place a bead of silicone sealing the top edge of the angle fillet to the wall will help protect the property, the main flat area of the roof being covered with a tarpaulin.

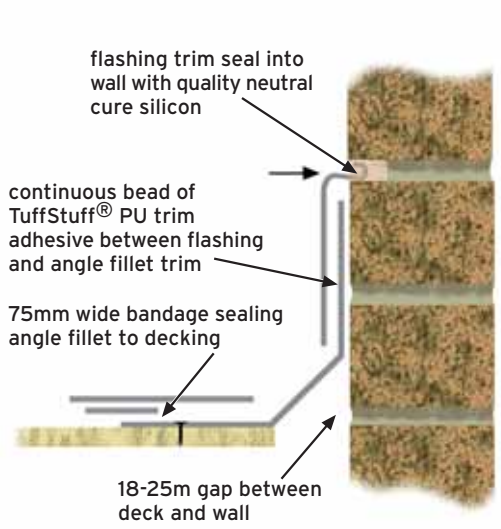
C100/C100MT/C100L/C100 LMT/C150/C150L - Simulated Lead Flashing

Used with D260/D300 angle fillet trim to flash into brickwork/stonework. Cut a chase into the brickwork mortar joint with an angle grinder and insert the flashing trim into chase having first applied a continuous bead of PU trim adhesive to its rear side. The rear side of the flashing trim will need to be wiped clean prior to the application of the trim adhesive. This will bond the flashing trim to the angle fillet, eliminating any possibility of water ingress.

Press the flashing trim firmly into the chase, overlapping the angle fillet trim and neatly point with clear/translucent neutral cure silicone or Leadmate.

Also available with moisture trap (MT) increased penetration (L) and long vertical leg (C150).





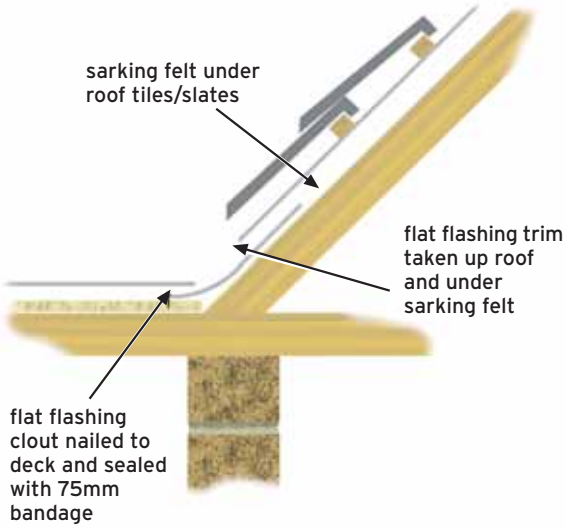
Typical angle fillet to flashing trim detail

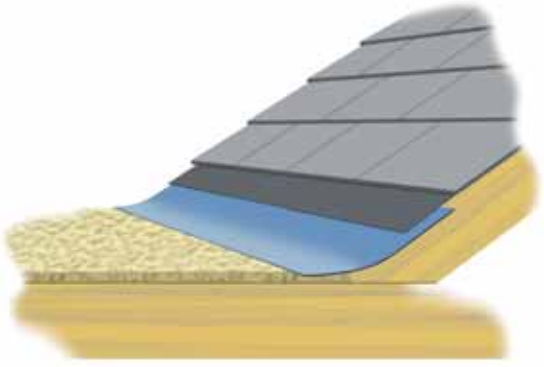
Uneven stone walls - random or otherwise may benefit from a conventional lead flashing where the irregularities of the stonework prevent the use of the GRP flashing trim.

On rendered walls it is advisable that the flashing penetrate through the render into the wall behind, thus minimising problems if the render fails in the future. In this situation, C100L or C150L may be the appropriate 'flashing' trim to use

F300/F600/F900 - Flat Flashing:

Used mainly at the intersection of flat roof and pitched roof. Should be overlapped by the main house roof sarking felt, and bent down onto the flat roof and nailed. The main flat roof laminate should be extended to cover the nailed section of the flat flashing affixed to the decking on the flat roof but need not be extended up the pitched roof section. Additionally, the pitched roof section should not be fixed but allowed to 'float' thus allowing for expansion movement. If a length of the flat flashing needs to be joined to another, ensure a bead of trim adhesive is used with bandage to the join of the trim.





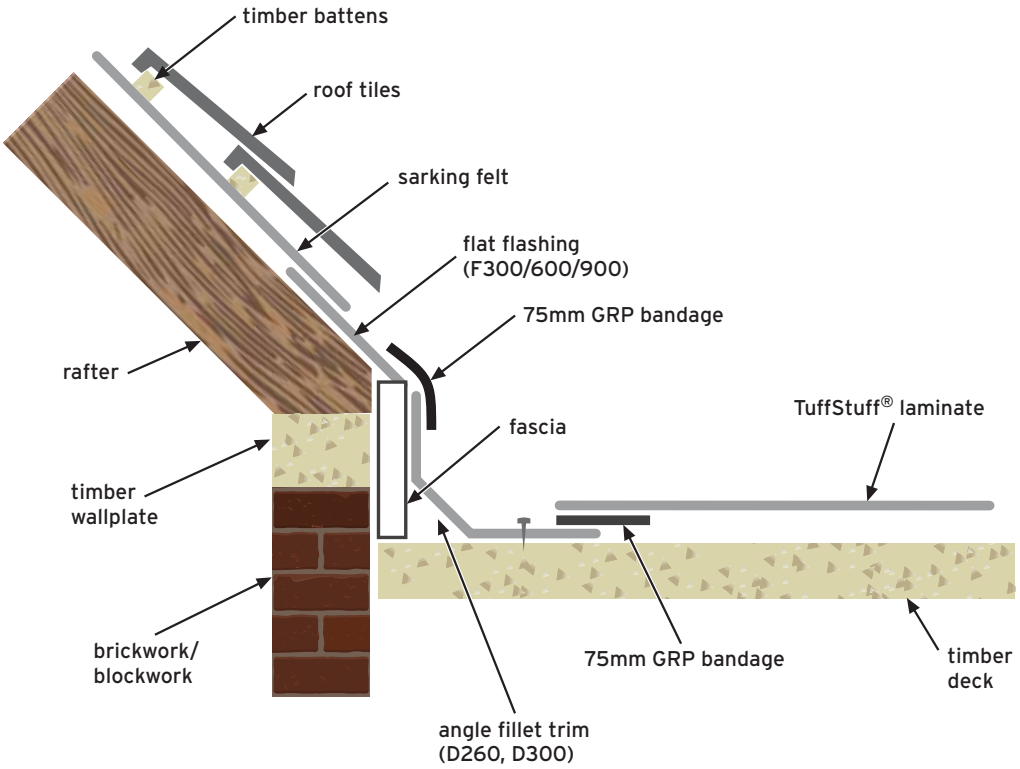
Flat flashing detail

In some circumstances a thin support sheet of ply under the flat flashing on the pitched section may be appropriate dependant on the centres of the main house roof rafters.

Flat to Pitched Roof (Separated by a Fascia Board):

If the flat roof and the pitched roof are separated by a vertical face or fascia board, this can be accommodated by locating the Flat Flashing (F300/600/900) on the pitched roof, beneath the sarking felt and supported by rafters, with its bottom edge level with the top of the fascia board.

An angle fillet trim (D260/300) can be located on the flat roof pushed up tight against the fascia and mechanically fixed to the flat roof deck.



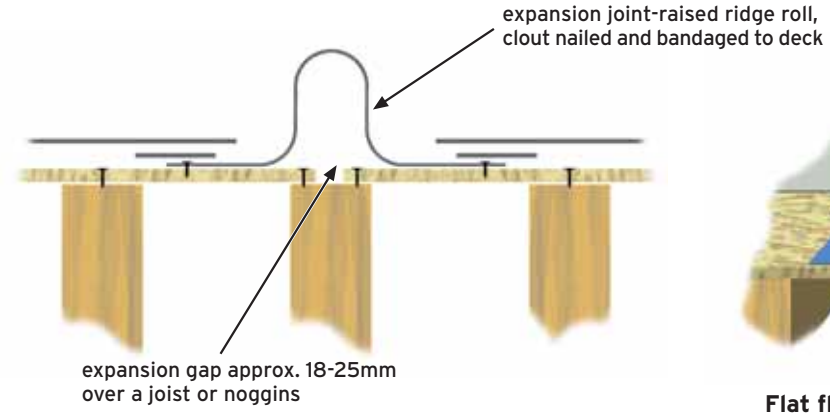
The gap between the top of the Angle Fillet Trim and the Flat Flashing can be 'bridged' using either a strip of 75mm wide bandage or, if the gap is wider, an appropriate sized strip of glass fibre reinforcement cut from the roll being used to laminate the roof.

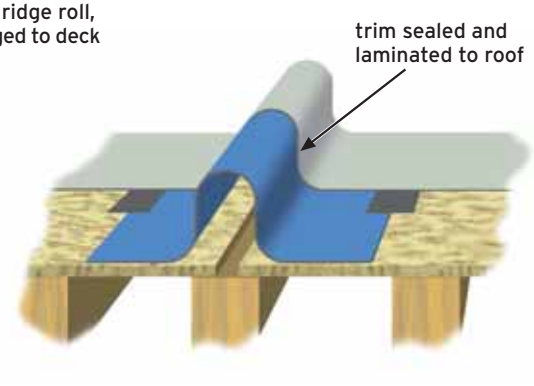
Once laminated together this will form a seamless transition from flat to pitched.

E280 - Expansion Joint:

This trim is used to create an expansion joint on larger roofs (over 50m^2) and also to create a ridge between two sloping surfaces. A 18/25mm gap should be created in the decking (noggins may need to be inserted to give support) with the expansion trim sat over it. The trim should be nailed at approximately 200mm centres and bandaged to the deck. Joins between lengths of trim should be treated with PU trim adhesive and the entire trim laminated over.

To finish the ends, the C5 closure can be used, which will also require to be joined using trim adhesive and over laminated, alternatively the ends may be closed by 'moulding' an end using chopped strand mat and base coat resins prior to topcoating. If the roof is a 'warm roof' the expansion gap need only be created in the 'top deck' and **NOT** the insulation.





Flat flashing detail

C5 Closure Trim

Premade Corners:

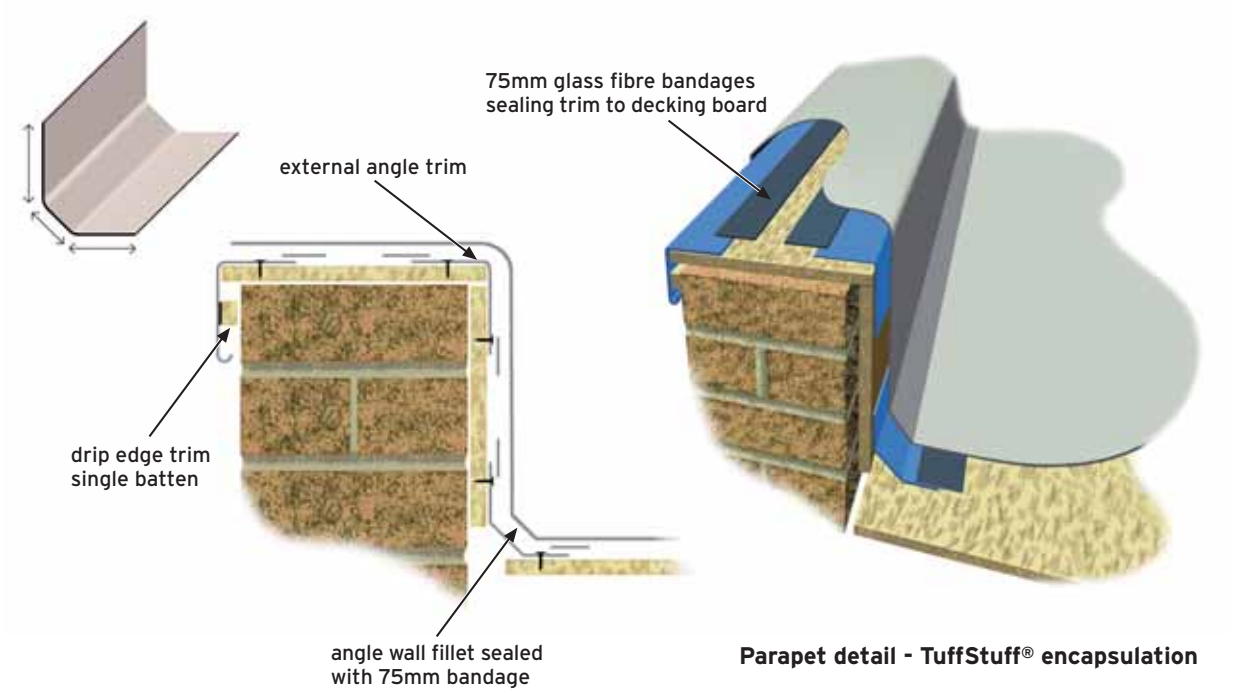
1. All the pre-made trim corners are manufactured with a shiny surface which will need to be sanded to create a 'key' when applying base coat resin for bandaging or laminating.
2. When over lapping trims onto the pre-made corners the overlapping join will need to be sealed with a continuous bead of trim adhesive positioned approximately 50mm back from the join. The join will also need to be bandaged.
3. The lack of a 'return lip' on the underside of the C1 universal external corner means that the trims need to be cut and extended to the corner to preserve the appearance from below.

Application Instruction - Parapet Walls:

A perpetual source of maintenance issues, parapet walls can be encapsulated into the TuffStuff® system to remove them from future maintenance.

The parapet can be encapsulated by cladding the top of the parapet and inside face with decking board and using a combination of trims. The D260/D300 angle fillet trim should be used on the inside face, the AT195 external angle trim on the top inside corner and the A170/A200/A250 drip edge trim on the outer corner.

All trims should be nailed into position and bandaged. Trim joins will need to have PU trim adhesive applied as will the application of the trim to the timber batten on the outside face. All trim joins will also need to be bandaged.



Parapet detail - TuffStuff® encapsulation

THE GRP FLAT ROOFING SYSTEM

The top surface of the parapet can have coping stones fitted for a conventional appearance. It is recommended that dry sand be sprinkled into the final layer of resin prior to curing to provide a 'key' to allow the mortar to bind to.

Outlets Through Parapet Walls:

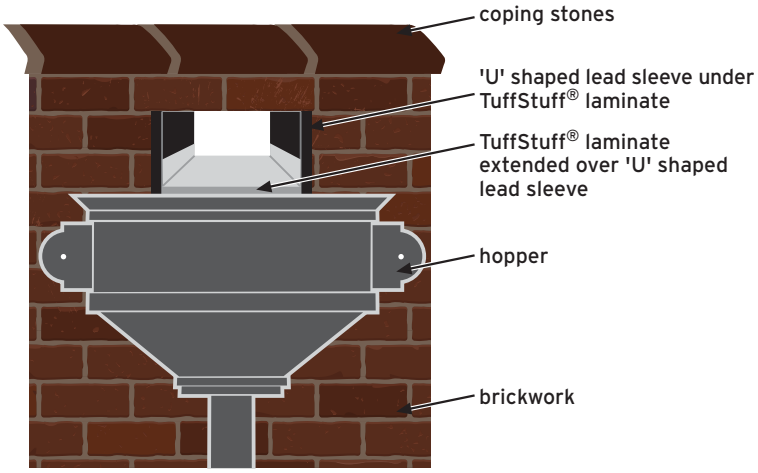
Some of the roofs with parapets will have a drain through the parapet wall and into a hopper placed on the outside of the parapet wall.

To facilitate water to drain into the hopper, the water has to be channelled through the parapet to the hopper.

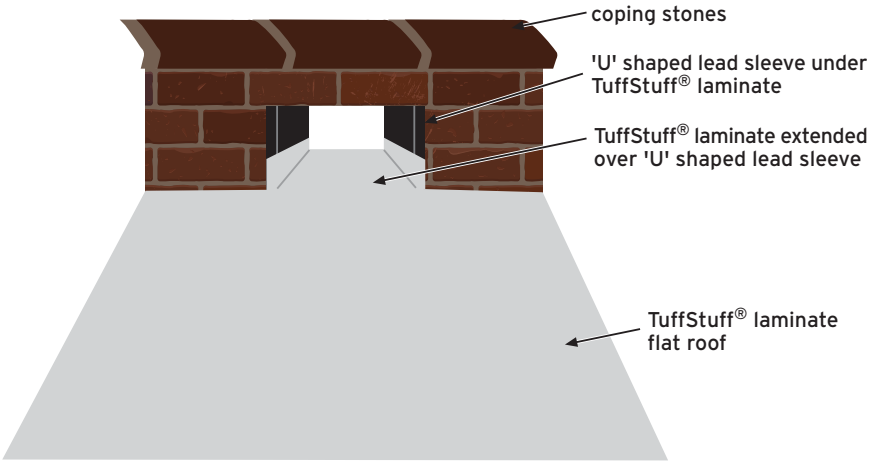
There are several ways to achieve this; the obvious and most popular method is to use a shaped lead 'sleeve' through the parapet and shaped on the outside to discharge into the hopper.

To laminate onto the lead 'sleeve', firstly treat with G4 Polyurethane primer onto the area to be laminated. Once the G4 Primer has become 'tacky' the laminate can be applied.

An alternative method would be to line each side of the outlet with an Angle fillet trim (D260/300)and use a short piece of Drip Trim (A170/200/250) to allow water to discharge into the hopper. These trims can be laminated together to form a GRP 'sleeve'.



Outside view



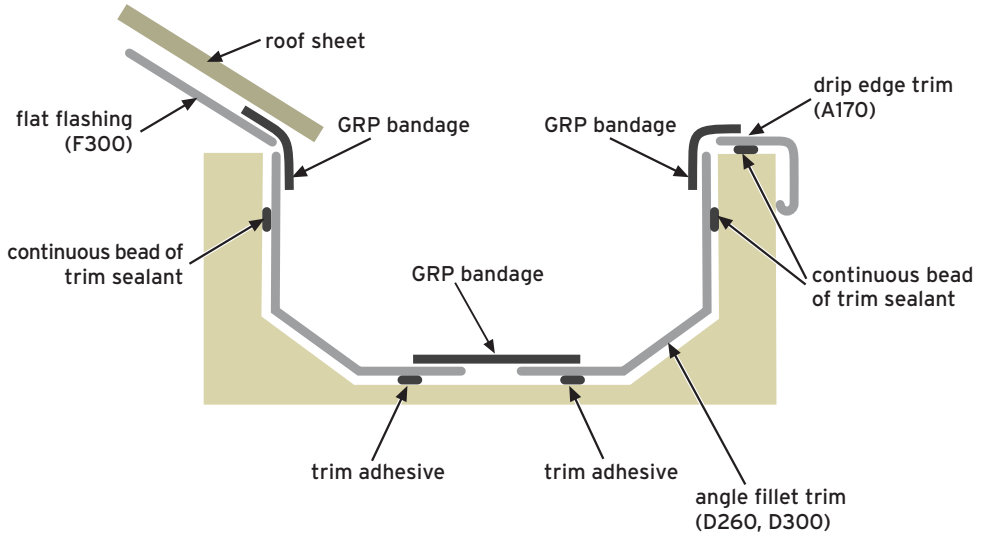
Inside view

Box Gutters:

To waterproof a box gutter using the TuffStuff® system firstly the gutter needs to be cleaned out and any previous waterproof coatings removed.

The gutter can now be lined with timber, both on the base and up the sides.

Once lined with timber, Angle Fillet Trims (D260/300) can be used against each side of the gutter and the whole box gutter can be laminated and topcoated. The outer edge would need to be closed off using an A170 Drip Edge Trim.

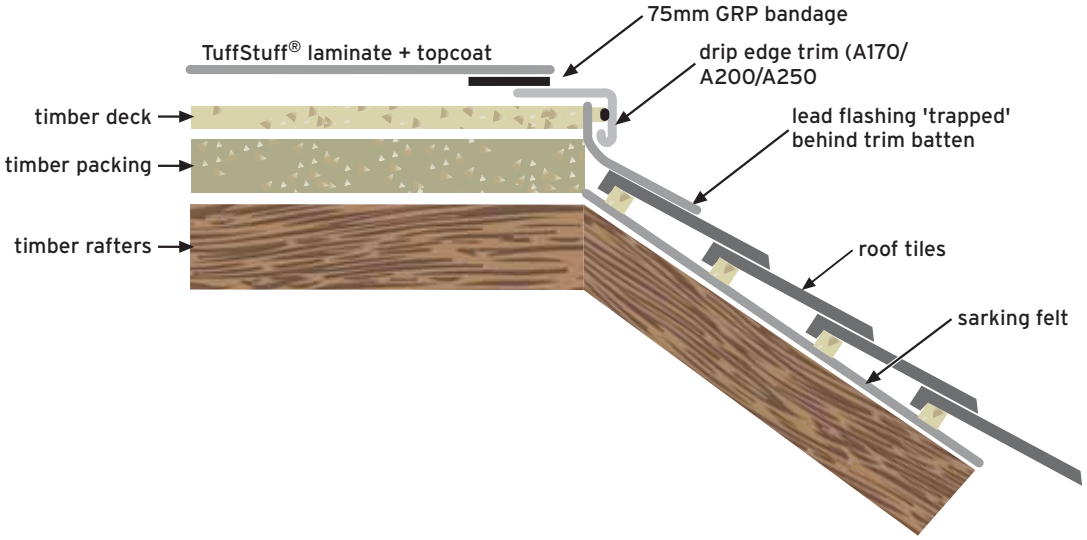


Flat Roof to Pitched Roof (Pitched Roof Falling Away):

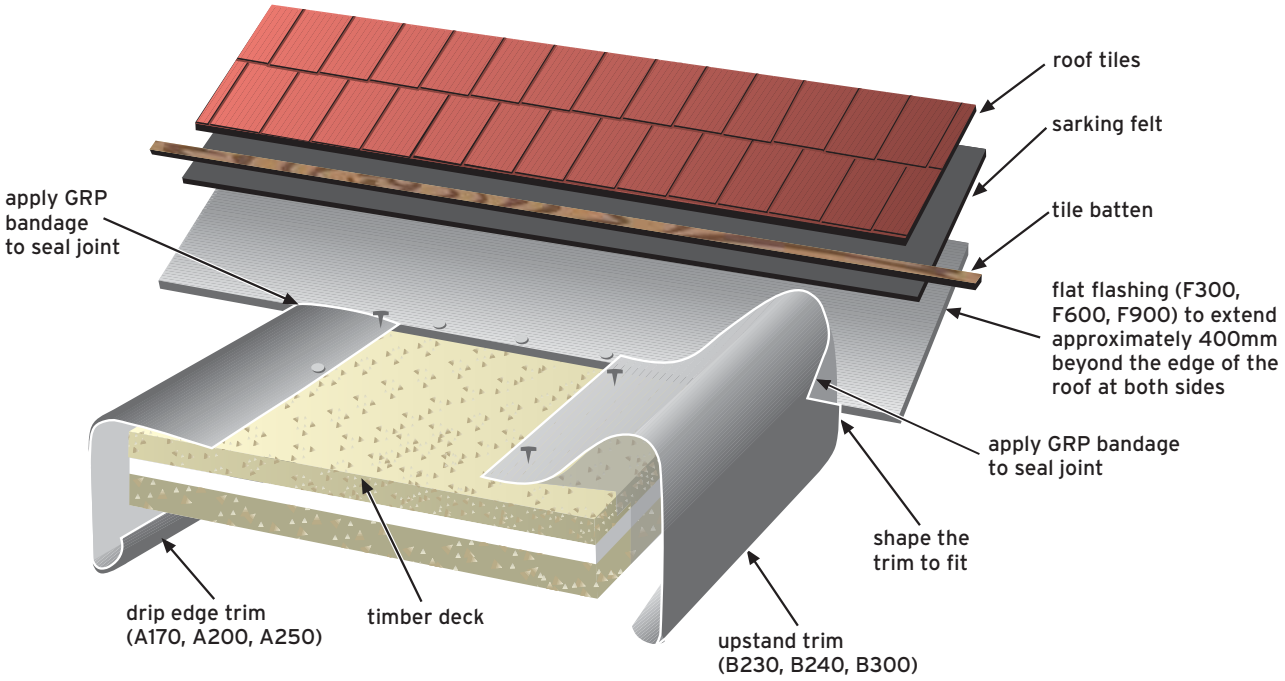
To create this detail, it may be necessary to raise the level of the flat roof to create a vertical 'step' at the roof edge to allow a Drip Edge Trim (A170/200/250)to be located.

Prior to the locating the drip trim in place, shape a lead flashing down the end of the timber joist and overlap approx. 200mm onto the tiles or slate. Fix the lead flashing by tacking into the ends of the timber joist.

Install a trim batten by trapping the lead flashing between the trim batten and joist and fix. The Drip Edge Trim can now be located over the trim batten trapping the lead flashing in place.

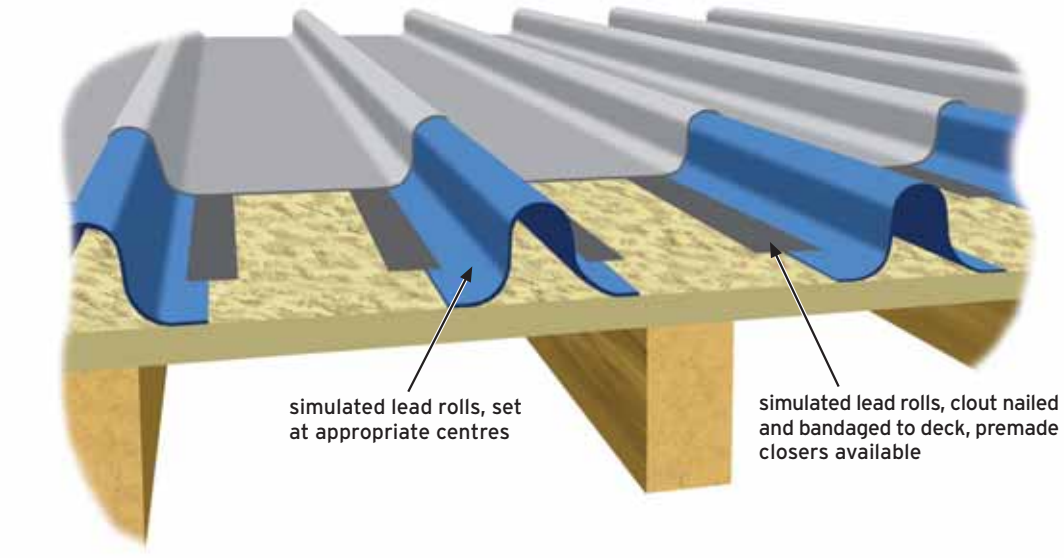


Dormers:



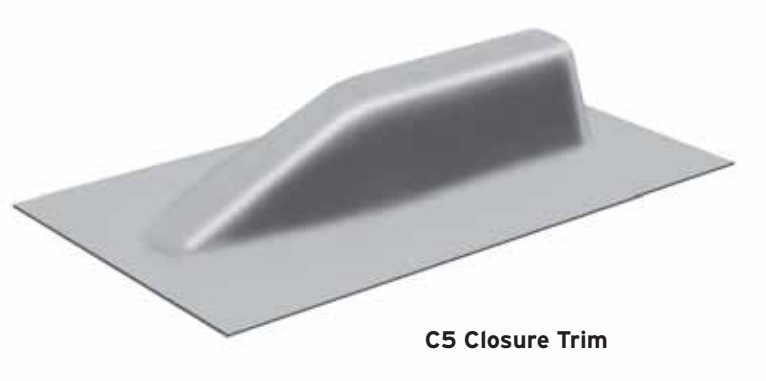
E35/40 - Simulated Lead Roll:

Used to simulate the appearance of lead rolls, the trims should be nailed in place at appropriate specified spacing's. Nails should be at approx. 200mm centres and the trims should be bandaged to the roof prior to encapsulating with the TuffStuff® laminate. Trims should be joined together using PU trim adhesive and the joints bandaged.



Simulated lead roll details

A C6 pre-moulded closure is available for the ends which should be nailed in place and joined using PU trim adhesive. The join should be bandaged before encapsulation with the laminate. Again the ends may be closed by 'moulding' and end using chopped strand reinforcement and TuffStuff® base resins.



C5 Closure Trim

section 4: application of TuffStuff® System:

overview

Base Coat:

TuffStuff® Base Coat resin is supplied in cans of either 15kg or 5kg. The 15kg can contains approx. 13.5 Litres with a coverage of 10m^2 including detailing, and the 5kg can contains approx. 4 Litres with a coverage of 3.3m^2 including detailing.

The correct ratio of base coat resin to glass fibre reinforcing mat (450gsm) is 1.2 Litres of resin per m^2 of mat. For 600gsm mat your base coat resin usage will be approximately 30% higher - the thicker the mat the more resin usage.

important

All cans should be stirred before use to ensure that any components that have settled to the bottom are thoroughly mixed in.

The 'Catalyst Addition Chart' will guide you on how much catalyst to add to the resin to make it cure. Resins, both base and top coat will not cure without the addition of the correct liquid catalyst.

The target working time used for each mix of the resin is 20-30mins.

When preparing bandage and reinforcing mat, it is important that it remains dry. Always return the full roll to its protective bag after use. If it becomes damp or wet, it will prevent the proper curing of the laminate.

laminating procedure

READ IN CONJUNCTION WITH DETAILED INSTRUCTIONS:

1. Ensure all debris, tools etc. are removed from the roof and the roof is swept clean and is completely dry!
2. Cut the reinforcing mat for detailing work.
3. Prepare bandage for sealing all trims to new roof deck and for bandaging board joints if necessary.
4. Roll out and cut mat for the whole roof surface (remembering 50mm overlap).
5. Roll up strips of mat and place nearby. Keep dry!

Lay out first strip of mat along lowest point

Continue overlapping each strip by 50mm

6. Prepare tools, i.e. synthetic lamb's wool application rollers (3" or 7") metal paddle rollers (3" or 6") laminating brushes, mixing buckets.
7. Select an area on the ground, adjacent to the ladder for mixing. Protect the mixing area from spills or splashes using either an off cut of decking or a plastic sheet preferably both!
8. Mix a small batch of base coat (1-2 Litres) for detailing and bandaging. This is an ideal opportunity for assessing the quantity of catalyst you are using and whether you need a longer working time (less catalyst) or shorter working time (more catalyst).
9. Mix and apply base coat resin and reinforcing mat for whole roof area including consolidation - see detailed instructions below.
10. When cured, sand down in preparation for topcoating.
11. Apply Top coat.

If a small area (i.e. less than 1m^2) of decking has evidence of damp prior to laminating it can be dried and coated with G4 primer and then laminated.

weather note!

Before laminating, always ensure that the weather will remain dry at least until the laminate has cured.

DO NOT LAMINATE IN WET/DAMP OR VERY COLD CONDITIONS.

important

Before using TuffStuff® resins please check the batch label found on every can of Base Coat & Top Coat. This batch label will have a batch number and a date. This is the date of manufacture and the resin must be used within 6 months of manufacture. DO NOT USE RESIN THAT IS OLDER THAN SIX MONTHS!

Corners:

For corners, cut a piece of mat, either from the roll or from off cuts generated, approximately 300mm square. Lay it on the roof deck adjacent to where it is to be used and 'wet out' with catalysed resin on both sides, using a 3" soft application roller. Peel away from deck and drape the wetted mat into position on the corner/detail, making sure the bottom edge is approximately level with the bottom radius of the trim. Fold around the corner and over the top of trim and down onto the deck. Using the 3" application roller or a laminating brush, the mat can now be worked into the contours of the trim until you are satisfied with the shaping. The small hard/consolidation roller can also be used to ensure that all the creases and folds are worked out.

To "disguise" the application of the corner bandage, a strip of 100mm tissue can be overlaid on the bandage to smooth out the course texture of the glass fibre. This application can easily be accommodated using the residue of the base coat resin on your application roller to 'smooth' the tissue bandage into place until it disappears.

When 'cornering' it is always possible to revisit the corner when installing the main flat roofs laminate applying a little extra resin if any pin holing is noticed especially over any voids. Uneven edges, can be trimmed with a Stanley knife prior to sanding.

trims - bandaging

Where the trims meets the deck 75mm bandage needs to be applied. Bandage is supplied in rolls approximately 65m long and can be applied either directly from the roll, or torn, or cut to length.

Dip the 3" application roller into the catalysed resin and run it down the trim/deck join, half on the trim and half on the deck approximately 1 metre at a time. Unroll the bandage into the resin and then repeat the process until that 'run' of trim has bandage in place. Return to the start and impregnate the bandage with a further coat of resin. Once again, when complete, return to the start and using the paddle roller (either 3" or 6") consolidate and distribute the resin through the bandage using light pressure until the bandage is transparent. Any white areas will need further resin adding.

If square edged boards are being used it will be necessary to 'bandage' each board join using 75mm CSM bandage in the same way as bandaging the trims to the deck. This is to give extra reinforcement to the board joints as increased 'flexing' will be experienced when square edged boards are walked upon.

Resin for bandage

Bandage laid into resin

More resin for bandage

Use paddle to consolidate until transparent

When applying bandage to squared edged board joints, be aware that resin can run down into the gap between the boards and drip onto whatever is beneath. Care needs to be taken to protect articles at risk.

Always ensure the bandage covers the nail heads on the trims and check that where the trim edge meets the deck there is no pin holing due to lack of resin.

When changing direction, tear the bandage and overlap it but not until the first bandage is resin impregnated. Never apply 'dry on dry'. Any joins in the trims should be bandaged in the same way.

When using the paddle rollers, it is possible to generate a 'spray' of resin if used too vigorously. The slower the roller turns equals less spray. On a windy day, this spray can be carried significant distances so care needs to be taken. 'Spray' can usually be removed from glass and window frames but not from cars and caravans or garage doors! Make sure the paddle roller is used in a controlled fashion (slower) so as not to generate spray.

If it is not possible to laminate the roof immediately after detailing and bandaging, the roof surface can be sealed temporarily by applying a light coat of catalysed base coat to the whole roof area and allowing to cure (often referred to as 'licking'). Ensure that enough resin is used to fill the board joints (T & G Only) and seal the surface.

We always recommend where possible that additional protection such as a tarpaulin also be used as of course the roof is not fully waterproofed until it is fully laminated.

laminating the main roof area:

Beginning at the lowest edge of the roof, apply the catalysed base coat resin to 1m^2 of roof. (To achieve the correct ratio of resin to reinforcing mat, approximately 1/3 needs to be applied to the deck and 2/3 to the mat. An easy way of monitoring this is using a 7" application roller to apply 3 'dunks' of resin to the deck and 6 dunks of resin to the mat, per 1m^2 of roof.) Lay the leading edge of one of the strips of mat you cut earlier into the resin and unroll the first square metre. Impregnate the mat you have unrolled before continuing to repeat the process along the length of the strip of mat.

If an area of roof or detailing is slow to cure (it may be in a shaded area or a particularly exposed corner) it can be speeded up using warm/hot air.

NOTE:- No naked flames!! A hair dryer or paint stripper may be used, to inject some extra heat to speed up the cure.

how much base coat resin will I need?

Area (m^2)	Base coat Resin (litres)
1m^2	1.2
2m^2	2.4
3m^2	3.6
4m^2	4.8
5m^2	6.0
6m^2	7.2
7m^2	8.4
8m^2	9.6
9m^2	10.8
10m^2	12.0
15m^2	18.0
20m^2	24.0
25m^2	30.0
30m^2	36.0
40m^2	48.0
50m^2	60.0
60m^2	72.0
70m^2	84.0

TUFF STUFF
THE GRP FLAT ROOFING SYSTEM

When laminating the main roof area, never mix more than 8 Litres at a time, even less in warm weather. This will ensure that you do not risk the Base coat resin going 'off' in the bucket and becoming unusable.

Consolidating:
After the first 2m^2 of mat has been laid and impregnated, the paddle roller is used to evenly distribute the resin across the mat. Using the paddle roller, apply light pressure to the wetted mat and using long, even strokes, make sure that the whole area of the mat is worked until transparent. Any area that is white or opaque will require more resin applied. Continue until the whole flat area of the roof is laminated and consolidated.

The mat is properly 'wetted out' when it appears transparent i.e. you can clearly see the decking below.

Remember to work towards an area where you can get off the roof. Don't get marooned!

Use the paddle roller in long continuous 'strokes' maintaining contact with the laminate throughout. Do not use vigorously or too much spray will be generated. Consider using Bubble Buster Paddle Rollers to minimise the spray.

If drips, or spots of resin are found on windows or window sills, they can be wiped away if not cured. If cured they can be 'flicked' off with a blade. However, if cured on a painted surface, the paint may be marked. Remember prevention is better than a cure!

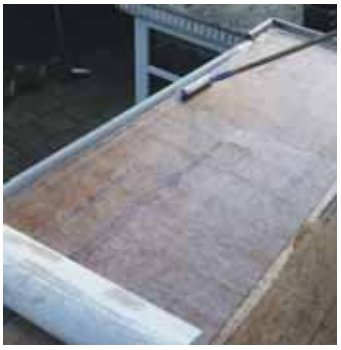
Base resin onto deck

Mat laid into resin

More resin onto mat

Paddle roller

Paddle roller



Paddle roller

Repeat this process until the whole roof is laminated.

Fully laminated roof - laminate is transparent. Note writing on deck

note:

Each strip of reinforcing mat requires a 50mm overlap to the next. Always overlap with the 'feathered' edge as this will make the joins appear less pronounced.

When laminate is complete and cured, inspect for 'pinholes' and any areas short of resin. If found, apply a further coat of catalysed base coat resin to the affected areas. Work the resins to fill the pinholes caused by not enough resin in between the reinforcing mat weave.

To make overlapped areas 'disappear' tear the cut edge to make it feathered.

Always mix the resins on a sheet or board or a board adjacent to the ladder. When dismounting from the roof always inspect the soles of your shoes/boots to avoid resin being 'walked' onto your customers property.

When adding catalyst resin, always mix well to ensure even distribution. At least a minute of stirring is recommended.

Never mix too large a quantity. You can always mix more - you can never put it back if you have mixed too much.

In winter use winter catalyst, in summer use summer catalyst and on very hot days use extra slow summer grade to slow down the cure. Catalyst addition at first seems complicated but it is easier than it seems, you will soon get a 'feel' for correct catalyst/resin combination. Use the catalyst addition chart provided.

When working in low temperatures, it will be beneficial if the resin is pre-warmed. Keep it indoors for 48 hours before using or if you have the space, build an insulated cupboard, heated by an electric tube greenhouse heater (No naked flames!) to store your resins. The difference in performance/curing will surprise you!

As it is heat that cures the resins on a cold day it can be useful to heat up the decking boards using a deck dryer before laminating (Hot air only - NO Naked flames!)

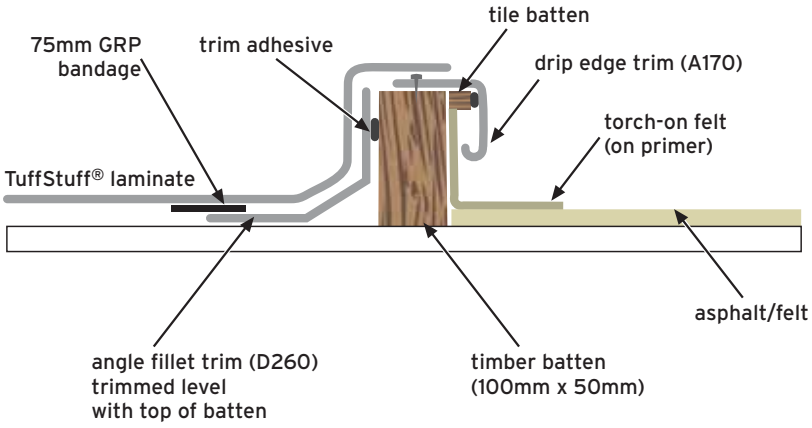
To avoid the risk of 'pin holing', apply a light coating of catalysed base coat to the laminate prior to top coating, to 'fill in' any pin holes that may be present.

From time to time, it is necessary for a TuffStuff® roof to join a neighbouring felt/asphalt roof. If the adjoining roof belongs to your customer then it is sometimes possible to persuade him of the benefits of having both roofs waterproofed using TuffStuff®, however if that cannot be achieved then a join is necessary.

Bitumen based products do not react well to the polyester resins (TuffStuff®) so it is necessary to construct a join without applying resins to the adjoining felted/asphalt roof.

Seal Construction:

1. Along the join of the felt roof to GRP roof, fix a timber section 4" x 2" with a triangular 'tilt' fillet immediately behind it.
2. Apply a bitumen primer along a 12"-18"stretch of the felt roof adjoining the timber section and up and on to the face of the timber, and torch a length of torch on felt onto the primed sections. (Caution no naked flames!)
3. Fix a timber batten to the top of the timber section trapping the torch on felt between it and the timber section.
4. Fix A170 drip edge trim to the top of the timber section overlapping on to the torch felt strip.
5. Laminate down from the flat flange of the A170 drip edge trim, down the tilt fillet and onto the deck of the GRP roof.
6. Laminate roof as normal, overlapping onto laminate encapsulating the join detail.



primers

Using G4 Primer:

G4 is a liquid applied polyurethane coating which we recommend for use when bonding TuffStuff® GRP to:

- Cement rendered surfaces
- Brick/Stone
- Metal Surfaces

When cured, G4 forms a flexible bond to the surface to which applied and allows TuffStuff® to form a bond to the G4 primed surface.

Instructions for Use:

G4 is air curing and is suitable for application down to 0°C

Porous surfaces may need more than one coat of G4 primer to the application of TuffStuff® laminate. Coverage rates are shown on the can. Subsequent coats will need to be applied within 4 hours of the original coat. Once applied to the surface requiring priming, allow to cure to a 'tacky' finish, before applying TuffStuff® laminate. Do not apply to an area that is too large to laminate whilst still 'tacky'.

Once G4 has cured dry, DO NOT APPLY TuffStuff® as a 'bond' will not take place. Re-coating with G4 will be required but must be within 4 hours of the previous coat. Once again TuffStuff® laminate can be applied when the surface is 'tacky'.

G4 can also be used to 'prime' an area of timber decking that is damp and is unsuitable for the direct application of the TuffStuff® base coat. Use as described above.

note:

Where a roof is being used as a balcony, there are a number of extra measures that need to be considered, namely:

1. Decking Boards - to accommodate the extra traffic, it may be desirable to increase the thickness of the decking boards from 18mm to 24/25mm. This extra rigidity will reduce the amount of 'flex' that the boards are subject to and reduce the range of movement your TuffStuff® roof will need to accommodate.

   If using 24/25mm boards, it may be necessary to use square edged boards rather than T&G. Don't forget that the board joints will need bandaging.

2. Heavier Duty Laminate- increased foot traffic will lead to increased wear and tear on the TuffStuff® laminate. To cope with the extra wear, we recommend using either the heavier grade of reinforcement (600gsm) or two layers of standard weight (450gsm) reinforcement. Remember, using 600gsm reinforcement will require the use of 33% more Base coat resin. It may also be prudent to give extra protection to the Angle Fillet trim (D260/300) to prevent damage. We recommend inserting a triangular timber fillet behind the Angle fillet to give support in the event it is trodden upon.

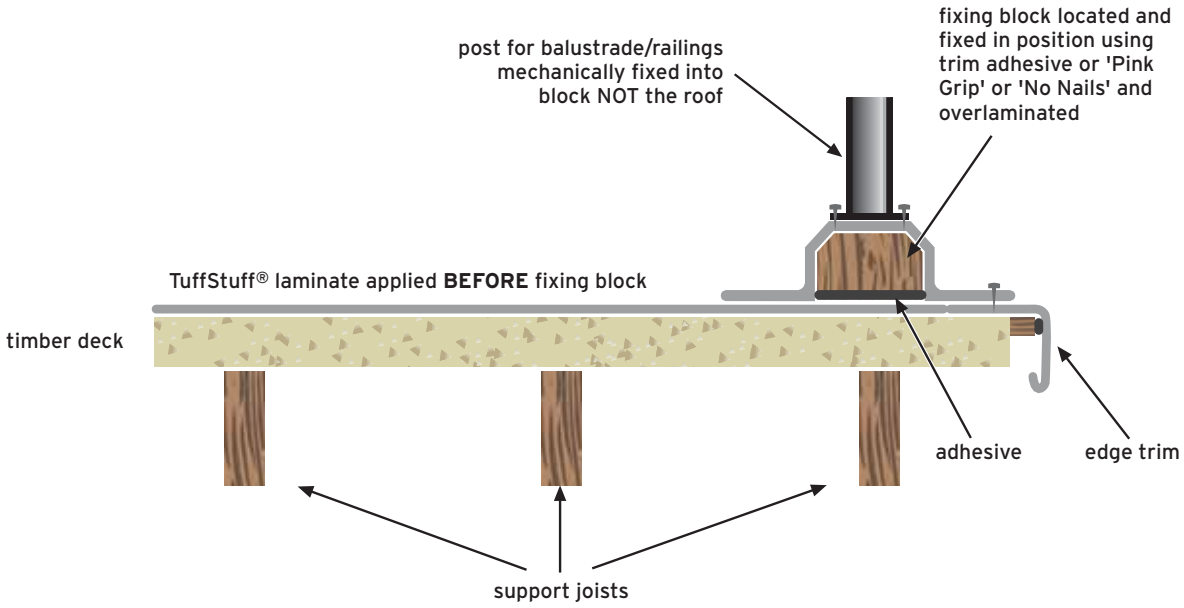
3. Textured Non Slip Finish - The slip resistance of the finished laminate can be improved by using the textured finish. If patio furniture is to be used on the balcony, we recommend that extra protection is used to prevent damage from heavy/sharp furniture. The options you may consider are paving, decking, and artificial turf. If you need advice about any of these options, call our Technical Support helpline.

balustrades/decorative railings:

If the balcony already has metal railings to protect the edges, it may be necessary to laminate around each one, dependent upon how the railings are fixed. If you need to laminate each one, you will need to sand back any paint finish to expose the metal, prime the metal using G4 polyurethane primer and laminate directly onto the primed surface when the primer is 'tacky'.

Ideally, the railings can be removed and re-fixed after completion of the TuffStuff® roof.

If the railings need to be fixed directly to the roof surface, you may want to locate 'fixing blocks' on the roof which you can encapsulate with TuffStuff® system as you go. The blocks should be located to coincide with the fixing brackets of the railings. The sketch below shows how this should be undertaken.

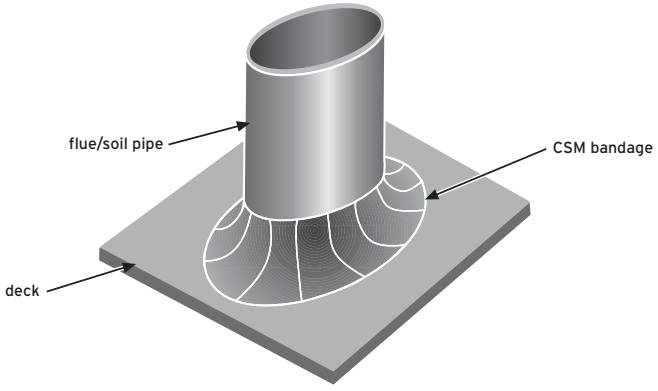


Flues and Vent Pipes:

It is not unusual for flues and vent pipes to protrude through a flat roof and one of the great strengths of the TuffStuff® system is its ability to seamless seal around these protrusions.

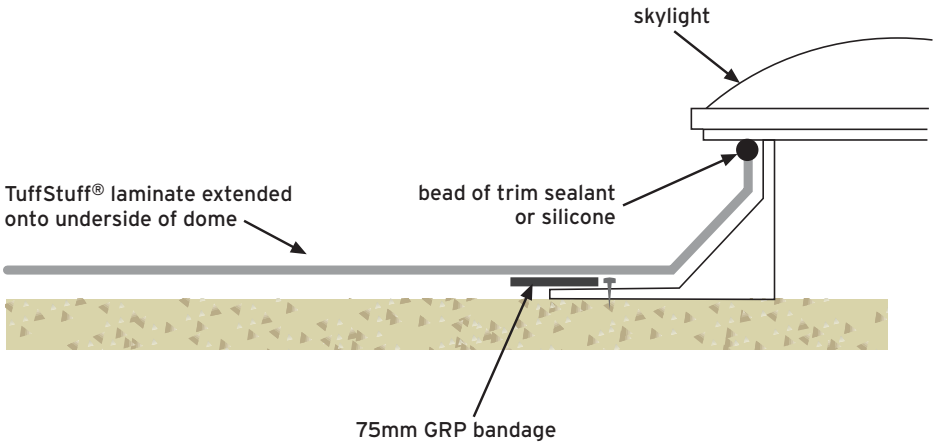
If the flue/vent pipe is metal it will need to be primed with G4 primer prior to laminating and if it is plastic it will need to be abraded to create a 'key' for bonding. (Many flues/vent pipes will have had attempts to seal them previously leaving a residue of various materials around them. These will need to be removed prior to sealing with TuffStuff®.)

1. Clean the surface to be laminated, approx. 10cm from deck level upwards.
2. Prime or abrade flue/vent pipe.
3. Cut pieces of reinforcing mat approx. 20cm x 15cm, enough to cover the full circumference of the flue/vent pipe, allowing overlap where pieces meet.
4. Lay your pieces of cut reinforcing mat on the roof and impregnate with catalysed base coat resin.
5. 'Drape' your pieces into place, 10cm onto the flue/vent pipe and 10cm onto the deck surrounding.
6. Work into position using laminating brushes and 3" paddle roller.



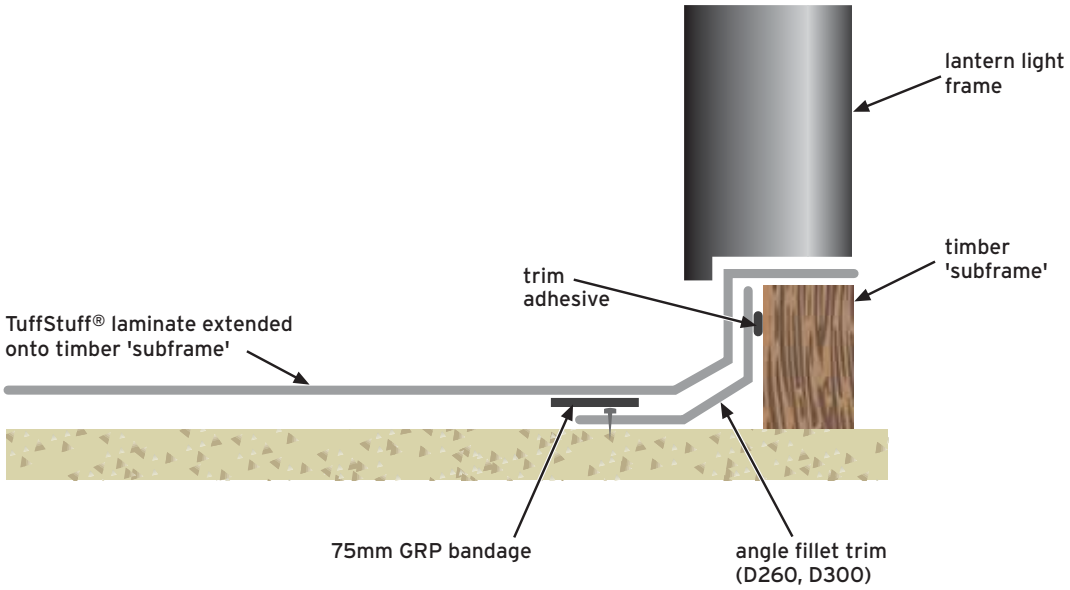
skylights:

The main frame of a pre-made skylight are usually, metal, GRP or UPVC. Metal frames will need priming with G4. GRP frames will need abrading to create a 'key' and UPVC frames will need abrading and priming with G4. If the domes of the skylight are detachable, we recommend they are removed to prevent damage, if not, care needs to taken.



A timber sub frame needs to be created (usually 10cm x 5cm) for the lantern light to locate upon. This can be clad around the perimeter using Angle fillet trim (D260/300).

When laminating extend laminate up the vertical face of the timber frame and onto the top surface. Once top coated, the lantern light can be located over the kerb ensuring a seal.



topcoating:

TuffStuff® Top coat (colour coat) in our standard 'Grey Slate' colour is supplied in 15kg cans which equates to approximately 30m^2 of coverage and 5kg cans equating to 10m^2 giving you flexibility and reducing wastage.

All cans must be thoroughly stirred and if more than one can is being used mix together to avoid any possibility of colour variations between batches

The catalyst addition chart will guide you on how much catalyst to add to the top coat to ensure correct curing.

First mix small batch to check curing times, it can be used for topcoating the edge trims.

Lightly sanding cured laminate

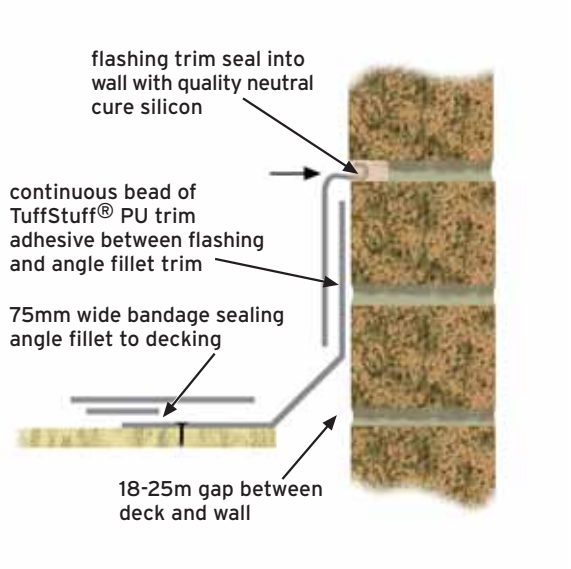
Preparation for Topcoating:

Before applying TuffStuff® Top coat it will be necessary to lightly sand the whole of the roof surface, corners and details. A smooth, unblemished surface will produce a high quality finish when topcoated. Any areas of 'pinholing' or 'resin starvation', can be treated with an extra layer of catalysed base coat at this point.

Using a sanding pad or sandpaper (40-60 grit) lightly sand the corners, taking care not to create 'holes'. Any unsightly fibres can be trimmed off using a Stanley knife. If a hole in the laminate is found this should be 'patched' with a square of reinforcement and resin before proceeding.

If the roof requires the use of C100/C150 flashing trims, these should be inserted prior to topcoating, sealing in place using a good quality clear (translucent) silicone (neutral curing, low modulus)or proprietary product e.g. Leadmate.

Flashing in place. Laminate sanded ready for top coating



Typical angle fillet to flashing detail trim

Remember a bead of PU adhesive between the angle fillet and inside of the flashing trim

Timing:

Always aim to apply top coat immediately the roof can be walked upon after laminating. If topcoating is left more than 24 hours after laminating or if the laminate has been rained upon prior to topcoating, then a further light coat of catalysed base coat resin should be applied after drying the roof surface to create a 'key' for the top coat.

'BEFORE TOPCOATING, STIR THE CAN WELL! The pigment may have settled.

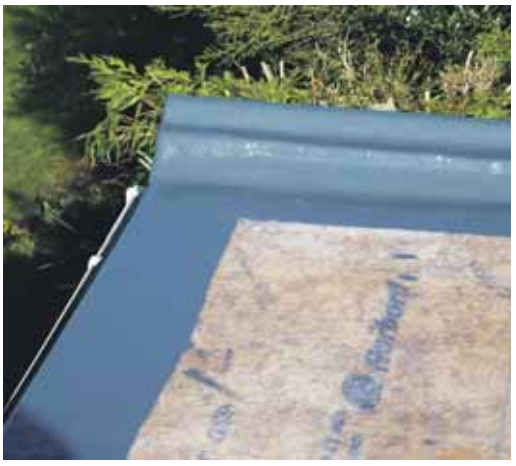
topcoating the edge trims

Catalyse a small quantity of top coat (1 - 2 Litres) and apply to all the edge trims and approximately 100mm onto the roof.

Top coat trim face

Trim face fully topcoated

Top edge onto deck



Detailing complete

To protect the fascia boards when applying top coat to the trims, it may be necessary to slide an off cut of flashing or angle fillet trim between the trim and fascia to protect the fascia.

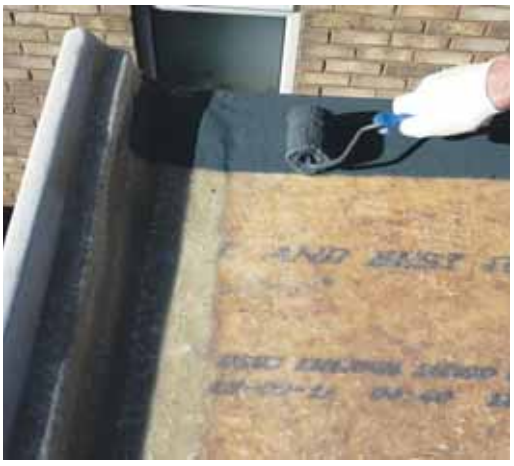
If necessary, use a brush to apply top coat to the radius at the bottom of the trim. It may be necessary to do this either from the ground or from a ladder.

Use a brush and a steady hand to top coat the angle fillet trim where it meets the flashing trim. Do not apply top coat to the flashing trim as these are 'pre-finished' in a darker grey.

The edge trims are the most often 'seen' area of the entire roof. Take extra care to make sure that they look as good as possible. Your customer may well judge the standard of the entire roof by the presentation of the parts most often seen.

Calculate the amount of top coat required, measure out into a bucket (or buckets) and add catalyst to each batch of top coat as you need it. Stir well for at least 2 minutes. To calculate the amount of top coat requires see chart at the end of this section.

Apply to the roof surface starting at the furthest point from the access and using a 7" soft application roller. The coat applied should allow the fibre pattern of the laminate to still be visible after application. If applied too thickly, the top coat may crack over a short period of time. Using long smooth strokes, apply the top coat to the laminated roof surface, finishing at the point of access.



Part topcoated

Nearly complete

If a non-slip aggregate is to be added, this needs to be sprinkled by hand as the roof is topcoated. It can be left uncoated to give a 'mineral' finish or encapsulated with top coat to give a textured finish.

For an 'ultra neat' finish use masking tape to define the edges of the aggregated areas. When the top coat has fully cured "grabbing" the aggregate, sweep off the excess and discard.

Roof in its original leaking state

Mineral or non slip finish:

The procedure for adding non-slip aggregates to a TuffStuff® roof is as follows:-

1. Base coat laminate the roof and after curing, prepare the roof for top coating in the normal way.
2. Using masking tape create a border around the roof by applying the tape to the roof with its outer edge abutting the inner edge of the edge trims. This identifies the border of the roof, which is not to be covered with chippings.
3. Mix enough top coat to cover the border/trims area and apply same as normal, slightly overlapping the edge of the tape. Remove the tape before the top coat cures.
4. Allow the border top coat to fully cure.
5. The roof is now ready to be prepared for applying the top coat and chippings.
6. Carefully apply the tape to the newly cured top coat area around the whole of the roof such that the inner edge of the tape coincides with the inner edge of the newly cured border top coat.
7. Calculate the area of the roof and the required quantity of chippings (approximately one 25kg bag for each 10sqm). If more than one bag is to be used, pre-mix all the dry chippings to ensure an even colour consistency, remember slate is a natural stone product and variances in colour will occur.
8. Select the initial area of the roof furthest away from your ladders to be covered with top coat and chippings.

9. Prepare a top coat mix ensuring the mix will remain uncured until the chippings are distributed over the prepared roof area.
10. Apply an area of the top coat to approximately 3m^2 and immediately throw copious quantities of chippings onto it, WHILST THE TOP COAT REMAINS IN A LIQUID STATE taking care not to get the chippings too close to the working edge.
11. Repeat this process until the roof is complete.
12. When the roof is completely cured, remove the tape and sweep off the surplus chippings. You will find the chippings have bonded into the roof surface to give an excellent non-slip finish with a neat top coat border.

Encapsulated Non Slip Finish - (Where Top Coat is Applied Over Chippings):

1. Complete step 1-9 as listed above.
2. Apply an area of top coat of approximately 3m^2 and sprinkle chippings into the top coat so that the surface is covered, but not too excessively.
3. With a second application roller loaded with a minimal amount of top coat, begin encapsulating the chippings with top coat.
4. Repeat this process until the roof is complete.

note:

- Do not attempt to lay chippings in high temperatures, avoid sunny days.
- Always extend the curing time for the chippings top coat, using a lower level of catalyst addition than you would normally use.
- This is a two person process.

Remember if unsure of the procedure - please contact the Technical Support helpline at Tuff Waterproofing Ltd.

If you are using a fresh roller sleeve to apply the top coat, wash with clean acetone and dry before using. This will ensure any loose pile in the roller will be removed and not deposited in the top coat to form an unsightly blemish on the roof surface

Mixing buckets can be re-used time after time. When each mix is finished, coat the inside of the bucket with the base coat or top coat. 30mins later you will be able to peel the coating away from the walls leaving the bucket clean and ready for re-use.

To clean tools, use acetone in a re-sealable container. Only use paintbrushes with unpainted handles as the paint will contaminate the resin.

The sleeves for the application rollers (3" and 7") are replaceable after each application

Always use nitrile powder free gloves when handling resins, or use hand cleaner to clean off resin residue. Never clean hands with acetone.

Topcoating with Non-Standard Colour

For one of the non-standard colours from our colour range, 'Clear' top coat is supplied in 15kg cans (30m^2) along with a 1.5kg can of colour pigment. The entire contents of the pigment should be added to the 15kg can of clear top coat and mixed thoroughly for at least 5 mins to ensure the pigment is properly dispersed throughout the top coat.

Mix well to ensure even colour and coverage across the roof. On larger roofs mix carefully to ensure even coverage especially where more than one can of Top coat is used.

How Much Top Coat Will I Need?

Area (m^2)	Top coat (litres)
1m^2	0.5
2m^2	1.0
3m^2	1.5
4m^2	2.0
5m^2	2.5
6m^2	3.0
7m^2	3.5
8m^2	4.0
9m^2	4.5
10m^2	5.0
15m^2	7.5
20m^2	10.0
25m^2	12.5
30m^2	15.0
40m^2	20.0
50m^2	25.0
60m^2	30.0
70m^2	35.0

TUFF STUFF
THE GRP FLAT ROOFING SYSTEM

When applying top coat, never mix more than 8 Litres at a time, even less in warm weather. This will ensure that you do not risk the top coat going 'off' in the bucket and becoming unusable.

note:

Quality Control Note: If the laminate has been 'resin starved' or poorly consolidated it is possible for 'pin holes' to appear in the top coat. If spotted before the top coat has cured, they can be filled by adding more top coat. However, if not spotted until after cured, the area would need to be heavily sanded, re-primed using catalysed base coat and re top coated when the base coat has cured.

How Much Catalyst Will I Need?

TEMPERATURE	25-30°c	14-24°c	4-13°c	IN COLD CONDITIONS STORE THE RESINS IN A WARM ENVIRONMENT
CATALYST GRADE	EXTRA SLOW SUMMER	SUMMER	WINTER	

TEMPERATURE	20-30°c	13-19°c	9-12°c	4-8°c
PERCENTAGE CATALYST	1% CATALYST	2% CATALYST	3% CATALYST	4% CATALYST

note:

These temperature breaks are approximate. Always test catalyst additions with your first mix and adjust up or down as required.

Catalyst Required (Millilitres)

CATALYST REQUIRED (Millilitres) - always mix well				
QUANTITY OF RESIN (Litres)	WARMER ← CATALYST REQUIRED →			COOLER
	1% MIN	2%	3%	4% MAX
1	10ml	20ml	30ml	40ml
2	20ml	40ml	60ml	80ml
3	30ml	60ml	90ml	120ml
4	40ml	80ml	120ml	160ml
5	50ml	100ml	150ml	200ml
6	60ml	120ml	180ml	240ml
7	70ml	140ml	210ml	280ml
8	80ml	160ml	240ml	320ml
9	90ml	180ml	270ml	360ml
10	100ml	200ml	300ml	400ml
11	110ml	220ml	330ml	440ml
12	120ml	240ml	360ml	480ml
13	130ml	260ml	390ml	520ml
14	140ml	280ml	420ml	580ml
15	150ml	300ml	450ml	600ml

important notes:

1. Never use less than 1% catalyst. In summer if the resin is curing too quickly, mix smaller quantities.
2. Never use more than 4%, as the cure time will not be increased by using larger quantities and excess catalyst may damage the integrity of the laminate, commonly referred to as gassing... forming pinholes through the laminate.
3. Resin will cure faster in direct sunlight.
4. Use more catalyst if laminating on a windy day. The wind will 'strip out' the styrene, one of the components of the resin which will slow the cure.
5. After adding catalyst to resin, always mix thoroughly for at least 1 minute. Poorly mixed resin will cause failure.

TuffStuff® green roof specification:

Introduction:

Green roofs are becoming more common in the UK having been established for many years in continental Europe.

A Green roof is a combination of a waterproofing system (TuffStuff® GRP) and various types of vegetation/planting the most common of which is sedum, laid onto proprietary substrates - see later.

An efficient Green Roof requires a very particular type of waterproofing system to be installed that preferably has the following qualities:-

1. **A seamless structure.** A flat roof will fail first at the joints or the detailing. A seamless system such as GRP has no joints or seams across the whole roof unlike bitumen felt, rubber sheets or single ply membranes.
2. **A hard membran**e that will not allow roots of the vegetation to penetrate through. This is why 'Planters' in Parks, Shopping Centres and Offices etc. are made from GRP, as it is both waterproof and highly resistant to root attack.
3. **A totally waterproof system** - A Green Roof can for many months of the year hold water in contact with the waterproofing membrane. GRP is well suited to this circumstance which is why 95% of all boats are constructed of GRP.

Using TuffStuff® as a Waterproofing System Suitable for a Third Party Green Roof Planting Regime.

general:

Roof Structure:

A 'Green Roof' when saturated with water can weigh up to 55kg per square metre. The construction of the roof structure should be specified to carry such loadings.

Drainage:

The roof should have a sufficient fall to the outlets to allow excess water to drain away.

Irrigation:

A roof with a slope of more than 20° may require additional irrigation to ensure the survival of the sedum as a greater proportion of water will drain away. This is often accomplished by an artificial means such as drip line irrigation.

Curing Time:

Do not lay a green planting regime onto a new GRP for 7-10 days. This will allow any chemicals such as styrene to escape from the laminate, leading to a healthy sedum growth.

Laminate Thickness:

As green roofs can hold considerable amounts of water it is essential that the roof be 'double laminated'. This means that a single 450gsm reinforced layer is laid in accordance with the guidance in the TuffStuff® Installation Manual and when cured a second 450gsm layer is laid using our standard 450gsm reinforcement and the recommended amounts of catalysed base coat resin.

This provides a strong totally waterproof laminate suitable for green roofs and ready to accept your chosen proprietary green roof system.

The two layers of 450gsm mat should preferably be laid at 90° to each other the second layer only being laid when the first layer is cured (usually approximately 30-40 minutes).

Installing the TuffStuff® Roof:

To accept a proprietary Green Roof substrate (drainage and water retention layer) and sedum mat/planting.

Considerations:

A sedum roof including the proprietary drainage and water retention layers will require an edge detail (perimeter) of approx. 75mm high to retain the green roof elements above the waterproofing layer.

This can be achieved in a number of ways, the most common ways being:

Parapet Wall - Diagram A1:

The diagram illustrates the design elements, all to be read in conjunction with the TuffStuff® Installation manual.

Important note the upstand above the sedum layer should in accordance with the building regulations be a minimum of 150mm higher than the 'new roof level'.

Open Edges:

Using a metal retention trim
Using a timber 'hard edge'

Metal Retention Trims - Diagram A2:

Construct the TuffStuff® roof in accordance with the TuffStuff® manual but do not apply top coat, installing all trims as necessary.

When the laminate is cured, the metal retaining strip around the open perimeter side can be installed. We recommend that the trims be located in the correct location (suggested by the proprietary green roof system you are using) with the first fix being achieved with TuffStuff® trim adhesive between the trim and the TuffStuff® base coat laminate. This will set in approx. 30-60 minutes sufficient for the next operation. Trims can be overlapped and sealed on the laps using the same PU adhesive.

When the trims are secure then coat the horizontal leg with G4 Primer and leave until 'tacky' to the touch. Apply a 75mm bandage from the horizontal leg onto the previously laid TuffStuff® laminate using TuffStuff® catalysed base coat; this will firmly secure the trim to the TuffStuff® laminate on the roof.

note:	When subsequently top coating the entire roof the metal of the retaining strip should be G4 coated and left to go 'tacky' before top coating the strip. (This achieves a better bond to metal)

Using a Timber Hard Edge - Diagram A3:

The timber hard edge should be mechanically fixed to the deck/joist ends preferably screwed; TuffStuff® Trim Adhesive can also supplement this process.

Trimming the Hard Edge:

We recommend encapsulating the hard edge with both internal and external AT195 trims with a A250 or suitable trims around the outside, battened with slate battens (see TuffStuff® Installation Manual). The trims should be clout nailed to the hard edge- overlaps sealed with TuffStuff® PU adhesive and then bandaged and laminated in place to each other and the flat roof laminate previously laid on the main flat roof structure.

note:

Obviously gaps will have to be left in the hard edging to allow water drainage.

Final Top Coat:

When all the detailing and double laminate is completed and perimeters in place the whole roof should be lightly sanded and topcoated.

When fully cured (7days minimum) the roof is now ready to receive the proprietary Green Roof build up.

notes:

1: Please remember to G4 exposed metalwork prior to topcoating and leave the completed topcoated system for approximately 7 days before laying the sedum/planting.

2: If the laminate has been left overnight then give the base laminate a thin 'reactivating' coat prior to topcoating to improve adhesion.

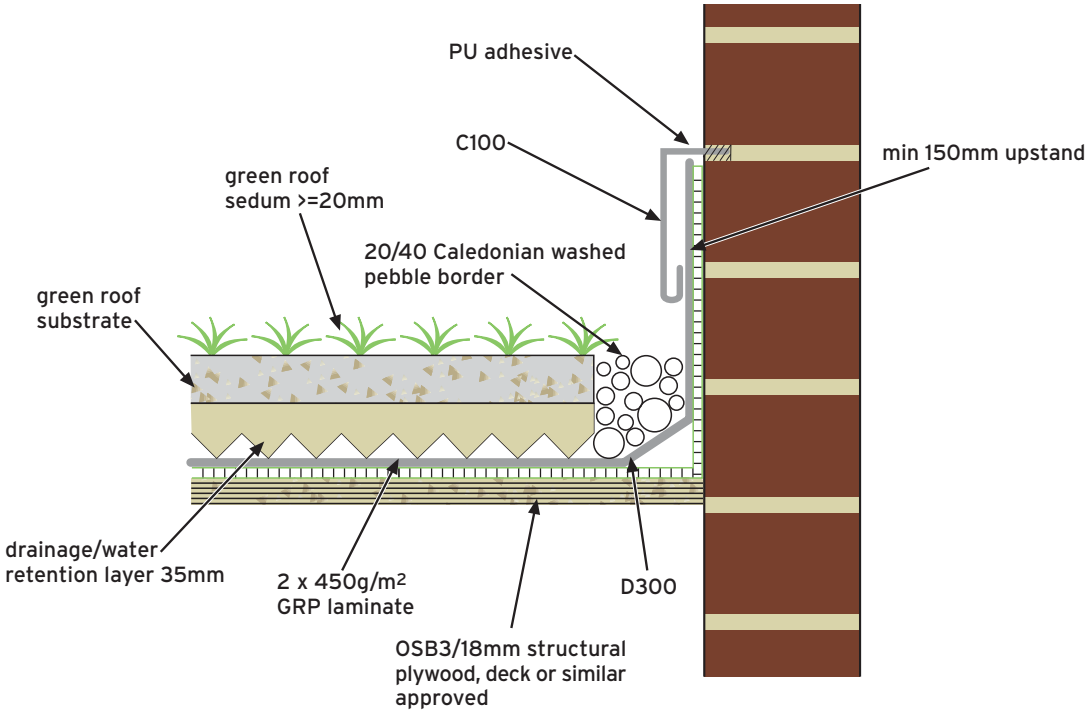


Diagram A1

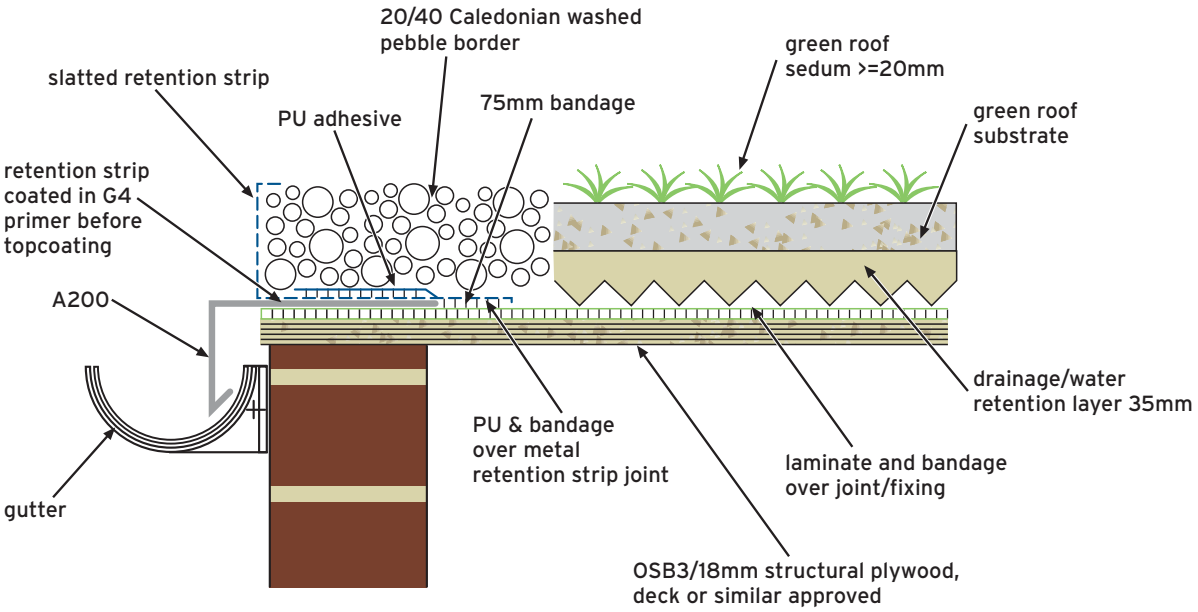


Diagram A2

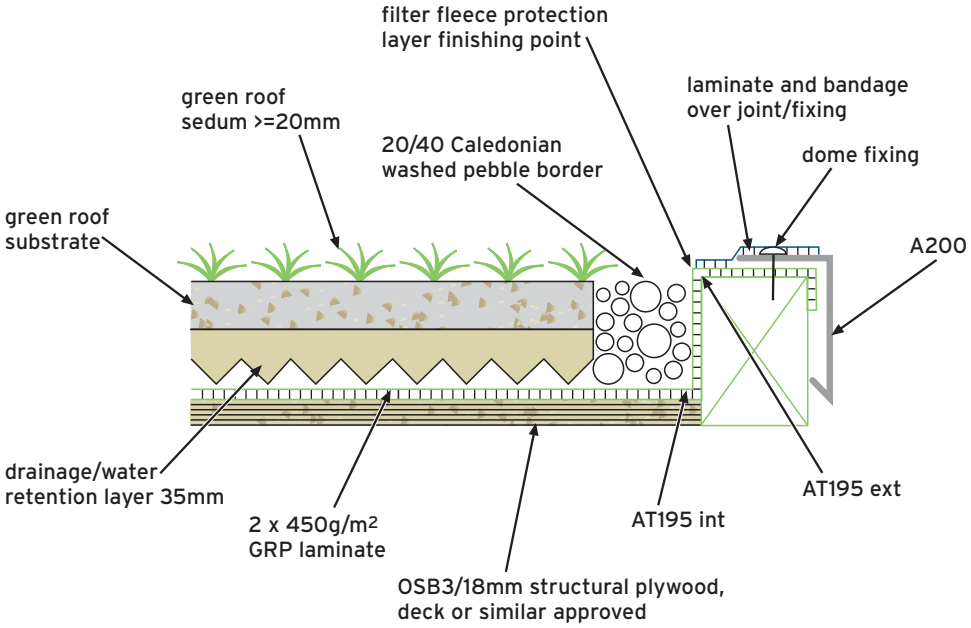


Diagram A3

Safe Working:

It is the installer's responsibility to establish safe working practices for themselves, their employees, their customers and the general public.

Material Safety Data Sheets (MSDS) are available for all TuffStuff® components and it is the installer's responsibility to ensure that all concerned are aware of the nature of the product. (See website at www.TuffStuff.co.uk)

Always use Personal Protection Equipment (PPE) i.e. hand protection, eye protection, ear protection, hard hats and safety footwear where and when appropriate.

Working in Unsettled Weather Conditions:

We would never recommend commencing the installation of a TuffStuff® roof if the weather is unsuitable. However the changeable nature of British weather means that it is possible to be 'caught out' by rapidly changing weather conditions.

Here are a few tips to help if you find yourself 'caught out':-

- Always carry a roll of visqueen (DPM) or tarpaulins on your van so that you can cover the roof in the event of a shower.
- Use pre-sealed decking boards to avoid getting them wet in the event of a shower. This means applying a thin 'sealer' coat of catalysed base coat resin to the decking boards and allowing them to cure before use. This can be done either on your premises in advance of starting the job or on site prior to laying the boards. Either way, ensure they are cured before using to avoid contamination.
- Plan your job in phases so as to achieve water tightness as soon as possible. This may mean 'sealing' the decking boards as soon as they are laid i.e. before applying edge trims etc.
- If the laminate gets wet before curing, it may be necessary to remove that part that is still uncured, and re-laminate once all the moisture has been removed.
- REMEMBER if heat is required to dry an area of the roof/laminate NEVER USE A NAKED FLAME!!! The styrene emissions from the resin are highly flammable and should be kept away from any source of ignition. Hot or warm air is the recommended way of drying.
- If the laminate has got wet before fully curing, it will show as 'milky white' in colour. If the laminate is soft to touch, it will need to be removed and re-laminated. If, however, it has cured hard, ensure all the moisture is removed from the surface and apply a further coat of catalysed base coat resin to the affected area.
- If the fully cured laminate gets wet before the top coat can be applied, all the moisture must be removed from the laminate before proceeding. This can be done by sweeping, squeegeeing, soaking up the moisture with rags and finally drying using hot or warm air. Once dried, a further coat of catalysed base coat resin will need to be applied and be cured before the top coat can be applied.
- If it rains on the top coated roof before it has cured, it may cause small indentations in the surface where the rain drops have landed. There is nothing that can be done until the roof has been cured and the moisture has been removed. The top coat now needs to be sanded back to the laminate, re-primed with catalysed base coat resin and re-top coated.

Hot Weather Working:

- On a hot sunny day, the roof deck can reach very high temperatures before you begin laminating. Often they can exceed the recommended upper temperature limit for application of TuffStuff® of 30°c to reduce this problem, cover the roof as decking progresses, removing the covers only at the last minute.
- Use extra slow summer grade catalyst - this will slow down the cure of the resins to allow you to work longer with the resin.
- Mix in smaller quantities.
- Laminate in short runs.
- After laminating, the roof surface can become too hot to apply the top coat. Applying top coat to a roof surface that is too hot can disrupt the normal curing cycle of the top coat and produce a roof that remains 'tacky'. This can be avoided by getting the timing right i.e. laminating and top coating at the coolest parts of the day.

Cold Weather Working:

- Always check the local weather forecast.
- Do not apply resins to wet or frozen roof, or to damp boards, if you ignore this advice the TuffStuff® laminate and or top coat will delaminate.
- Heat the deck prior to laminating.
- Use pre-warmed resins as warm resins cure faster even in cool conditions.
- Do not apply below minimum temperatures i.e. 4°c.
- Keep a waterproof sheet handy to cover the roof in case of a shower.
- If the roof cannot be laminated the same day as it is laid then seal the decking boards overnight using a light coating of catalysed base coat resin.

Safe Disposal of 'Out of Date' Resin:

The safest way to dispose of unwanted/out of date resins to convert them to 'inert waste' by adding catalyst (hardener) and curing the resin into a solid state.

We would recommend de-canting the resin into small quantities (3-5 Litres) adding the appropriate amount of catalyst (see how much catalyst you will need on page 51) and allowing the resin to cure. Warning: Resin left to cure in a container will get VERY HOT! Take appropriate precautions. Once cured and cooled, the resin 'blocks' are no longer regarded as 'hazardous' and can be disposed of with your usual waste.

Technical Helpline:

Please call 01977 680250 if you need technical support.

During very busy periods (office hours are Mon-Fri 9-5pm) we may have to call you back.

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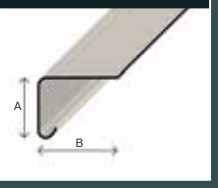

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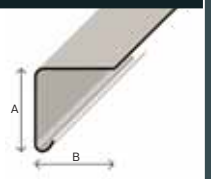

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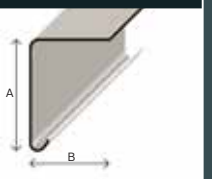

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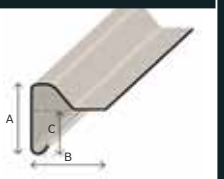

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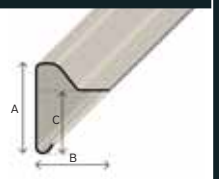

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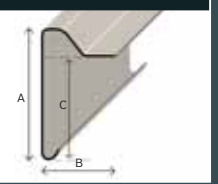

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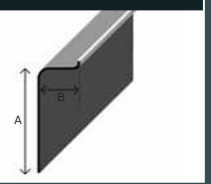

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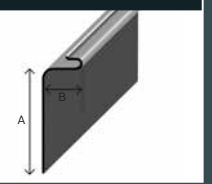

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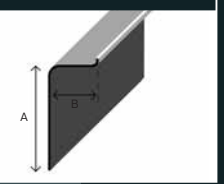

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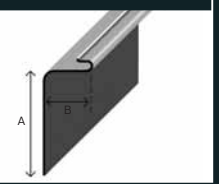

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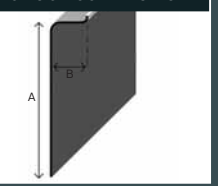

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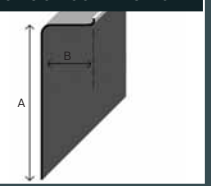

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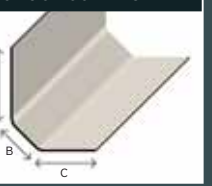

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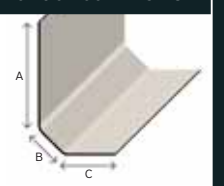

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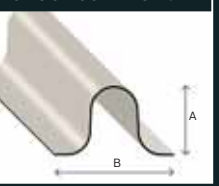

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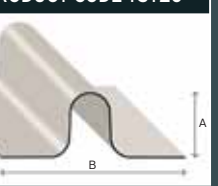

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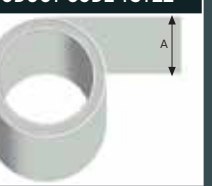

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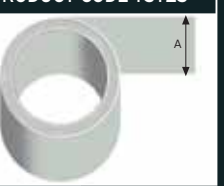

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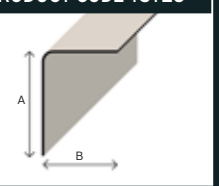

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PRODUCT CODE TST30

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PRODUCT CODE TST32

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PRODUCT CODE TST34

PRODUCT CODE TST35

PRODUCT CODE TST36

PRODUCT CODE TST37

TUFFSTUFF 25-YEAR PRODUCT WARRANTY

BUILDING REGULATIONS COMPLIANT FULL FIRE CERTIFICATE

Rev 7 : June 2016

TUFF STUFF

THE GRP FLAT ROOFING SYSTEM

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Tuff Waterproofing Ltd
T: 01977 680250
E: info@tuffwaterproofing.co.uk
www.tuffstuff.co.uk