STRONGHOLD
GRP ROOFING SYSTEM

GRP FLAT ROOFING SYSTEM

INSTALLATION GUIDE

25 YEAR GUARANTEE

FIRE RETARDANT F.AA FIRE RATED

EXTREMELY DURABLE

2x STRONGER WITH KEVLAR®*

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SECTION 1: Materials & Tools Required

The following materials will be required:

Resin:**

STRONGHOLD Base Resin
When estimating quantities allow:
3.5 kg/m² for composite Kevlar security layer and 600g/m² glass csm.
4.5 kg/m² for composite Kevlar security layer and 2 layers of 450g/m² glass mat balcony specifications.
2.5 kg/m² for single layer 600g/m² glass csm.
3.5 kg/m² for 2 layers of 450g/m² glass csm balcony spec.
2.0 kg/m² for budget single layer 450g/m² glass.

Kevlar® Reinforcing:

The Kevlar® reinforcing is 200g/m² high strength weave.
Kevlar® should be stored in a sealed polythene bag.
Moisture is not a problem for the Kevlar® but will contaminate the finished laminate.
Keep dry.

*Our GRP flat roofing system is 2x stronger than any other flat roofing system available when reinforced with Kevlar® technology.

DuPont™ and Kevlar® are trademarks or registered trademarks of E.I. du Pont de Nemours and Company.

Glass (CSM):**

Stronghold CSM (chopped strand mat) should be 450gram or 600gram /m².
Stronghold glass mat is manufactured to BS3496.
Old, damp glass mat should never be used.
Glass (the binder) is hydroscopic and will become damp if left exposed to the air.
Unused glass should be stored in a sealed polythene bag.

Topcoat:**

Stronghold Topcoat is specially formulated to harden with the same catalyst as the Stronghold Base Resin.
Application rate of the topcoat is 0.5 kg/m².
Stronghold topcoat is available in mid grey or dark grey.
Any British standard colour available as an optional extra.

The Stronghold Topcoat is normally pigmented but may be supplied clear (non-pigmented) if specified, in which case the topcoat will require the addition of a polyester pigment paste to achieve the finished colour of your choice.
(see page 13.)

Catalyst:**

You will need catalyst or hardener in order to make the resin and topcoat cure.
This is methyl ethyl ketone peroxide (MEKP) liquid.
The catalyst must be added to both the resin and the topcoat at the rate of between 1% and 4% by weight, depending on conditions. Resins and catalysts are adjusted to compensate for seasonal temperature differences.

Inexperienced installers should start the roof using small resin batches.
Catalyst ratios can then be adjusted accurately.
This can save resin loss through too fast a cure or time waiting for too slow a cure.
If the roof takes too long to cure it may not be possible to apply the topcoat on the same day, which may be detrimental to a good topcoat bond.

****Please note:** These materials are hazardous and MUST be handled with care as specified in the manufacturer's safety data provided in Section 2 of this Installation Guide. Material Safety Data Sheets are also available at: www.strongholdgrp.co.uk.

Decking Boards Listed in order of preference:

OSB 3 T+G:

OSB 3 (orientated strand board) T+G conditioned roof/floor grade decking is recommended. Minimum 18mm, usually 2400mm x 600mm.
Allows for an excellent finish, which can be less susceptible to stress fractures, than butt-jointed products.

Suitable for high security applications with a composite Kevlar® and 600gram/m^2 glass CSM laminate.
Suitable for maintenance foot traffic with 600gram/m^2 glass CSM laminate.
Suitable for balconies with 2 layers of 450 gram/m^2 glass CSM laminate.
Can be laid with gap to topside or underside.
With all board types allow a 20mm expansion gap against any walls.
Guarantee available.

WBP PLY:

A good quality ply is also acceptable if specified by the architect although they should be considered a second best option.
Joints must be reinforced. Suitable for all applications. Use good side up.
Guarantee available when joints are taped and bandaged.

OSB 3:

2400mm x 1200mm butt jointed boards may also be used.
Joints must be reinforced. Suitable for maintenance foot traffic in a roofing application with 600 gram/m^2 glass mat.
No guarantee available with this board type.

Fixings:

All nails should be galvanised, 60–70mm long ring shank nails or better/equivalent for fixing deck sheets to the roof joists. The fixing should be at least 40mm into the joist. For high security applications use minimum 75mm ring shank nails or screws to achieve 55mm joist penetration.

Galvanised 20 mm long, large head clouts should be used for tacking the roofing trims to the deck. The deck sheets may be fixed to the roof joists with galvanised or sherardized screws. Screws or nails MUST be countersunk. Screwing or nail guns may help avoid ceiling damage.

Tape:

Packing tape or cello tape are good options to bridge board joints, 50mm.

Mastic (Adhesive Sealant):

Gun able polyurethane mastic is required to fix edge trims to fascia carried batten and to join or seal certain roof detail.
Polyurethane mastics bond well with polyester.
Two recommended grades are Soudaflex and Sikaflex.
Silicones and other mastics should NOT be used.

The following tools will generally be required to cut and fit the component parts correctly:
(Includes tools required for installing a new deck as well as overlay applications)

Tools Required:

- Power saw
- Stanley knife
- Hammer
- 10-20 litre buckets
- 2"- 4" Brushes
- Disposable gloves
- Heavy grade abrasive paper
- Sweeping brush
- Hand saw
- Hand grinder with stone cutting disc
- Mixing tool
- Mastic gun
- Stronghold application rollers
- Stronghold laminating rollers 75mm and 225mm.

(For small roofs a 150mm will suffice)

- Catalyst dispenser

(Or 1 litre Stronghold catalyst product with in built measuring dispenser)

- A suitable hand cleaner and solvent for brushes & rollers should also be at hand.

The best solvent for resin is acetone. It is extremely flammable NO SMOKING when handling these materials.

Important note: Dust masks should be used when handling all glass products. Suitable protective clothing should be worn. An eye bath should be at hand in the event that resin, catalyst or acetone makes contact with the eye. This list should not be considered definitive, and reference made to the material safety data sheets included in section 2 of this installation guide.

Note: Roofs over approximately 50m² should incorporate expansion and contraction joints or allow for expansion and contraction by other means. This will reduce stress in the single skin GRP roof avoiding cracks occurring as a result of stress fatigue.

SECTION 1: Decking Preparation

A fibreglass roof should always be laid directly onto a new timber decking.
Bitumen based substrates such as felt or asphalt will affect the cure of the base resin.
Note the weather prior to removing the old roof. The decking must be dry and the fibreglass must be laid in dry conditions.
If resin comes into contact with water it will never cure correctly. Consequently water contaminated resin will have to be removed. This is costly and time consuming.

Remove the old decking, and check joists for rot. Roof joists and timbers must be sound and rot free. Replace as necessary.
Install insulation as required. Most flat roofs show some pooling. This is not a problem for Glass Reinforced Plastic (GRP) but it is better to drain the roof completely. If possible, nail firing pieces to joists prior to deck fitting.
A fall of approximately 1 in 40 is ideal, 1 in 80 is sufficient to clear most pooling. If the roof is very flat a planner can be used to recess any draining edges by 2mm to allow 'A' trims to be fitted flush with the deck. This will reduce pooling to a minimum, but probably not altogether.

Authors note:

Most flat roofs exhibit pooling which although not a problem can be unsightly.
Felt roofs often have gravel spread on them to assist thermal dissipation of excess heat from sun, or is it to hide the puddles?
If the roof structure is very flat then the customer should be advised that pooling is likely. If this is going to be a problem then firings to reduce or dressing with stones to hide, should be suggested.

Technical note:

As it is possible to apply GRP to a vertical surface, a steep roof pitch poses no problems for the product. Be aware however, that polyester resins are slippery and a steep surface should be worked with caution and suitable equipment.
Resin drainage may be a problem for inexperienced users.

SECTION 1: Kevlar® Layer Application

Allow 1kg of Stronghold resin per square metre.
The general rules for laminating apply and the section on laminating should be read prior to starting the work.

The Kevlar® layer should be installed first on to the clean dry new deck.
DO NOT trim the roof first as with normal glass reinforcement.

- First cut Kevlar® pieces to size using shears available from your supplier.
- The pieces should overlap by 100mm and cover all of the new deck area.
- Set aside the Kevlar® pieces in order.

- Any butt joints in the deck should be first taped with masking tape and then using a small amount of resin, glass bandage should be applied to seal joints.

- The area can then be wetted with resin using the lambs wool rollers at the rate of 0.5kg/m^2.
- The Kevlar® is then rolled into place and more resin applied on top at the same rate of 0.5 kg/m^2.
- A laminating roller should then be passed at least 3 or 4 times over the wet area to remove any trapped air.
- After this layer is cured the GRP roof trims should be applied and the chopped strand glass mat (CSM) layer applied last.

Please Note: Kevlar® resists sanding so it is very important to install Kevlar® layer carefully to ensure a flat finish. Rough or bumpy areas will need to be reworked with angle grinders and even this is not a quick process. Make sure deck is flat and has no wood "sticking up" before applying Kevlar layer. Then apply carefully one piece at a time.

Kevlar® fights against distortion and hence is difficult to form around complex shapes. For this reason it is best installed against the new flat deck. Any mistakes in the work can be reworked using angle grinders. Wear eye protection.

SECTION 1: GRP Edge & Detail Trims

Trims are available to suit most applications and configurations
All trims have both a matt finish and a gloss finish. Always bond to the matt side. (It is a good idea to study all trims and become familiar with the matt and gloss finishes, in order to easily distinguish when applying) If a bond is ever required to the gloss side, then it should be lightly sanded to achieve a matt finish and wiped with acetone to facilitate a good bond.

Gutter or A trims:

Where it is required that water drains into a gutter, an A detail or gutter trim should be used.
This trim needs to be 35-50mm off the fascia when dressed into a standard domestic gutter. To achieve this fix two 19mm battens onto fascia. Battens should be about 10mm lower than roof surface to allow for the radius of the "A" trim.

Parapet or B trims :

B trims are fixed in the same manner except only a 19mm off stand is required to allow for the return on the bottom of the trim. A single 19mm batten fixed to the fascia or board edge is sufficient.

Fixing A or B trims :

To fix edge trims A or B first apply small beads of polyurethane mastic at 300mm centres to the batten so that when the trim is offered up to it, it will adhere to the back of the trim. Always rub trims into place to ensure a good bond.
Fix the trim to the roof by nailing the horizontal flange with 20mm Large Head Clout nails. DO NOT nail through the front of the trim. 15mm Clout nails may also be used. Where a joint must be made, simply overlap the trim ends by about 100mm and sandwich a bead of polyurethane adhesive in the joint before clipping the two together. Wipe off excess sealant.

Fixing D wall fillet trims:

When sealing the roof edge to an abutting wall, a fillet or D trim should be used. This should be snugged into the corner formed by the wall and roof deck and fixed to the decking with 20mm galvanised Clout nails. The vertical flange of the trim should NOT be fixed to the wall as this is a point of movement between the roof and the adjoining wall. Any fixing here may stress the roof.
The flat roof is also able to vent air behind the D trim. Joints can be made simply by overlapping and must be sealed with polyurethane adhesive in the overlap. It is better to use too much adhesive and wipe off the excess, than not enough resulting in a weak joint. Reinforce D trim joints.

Important note: Decking should NOT be fitted tight against an abutting wall. A gap of 20-50mm is sufficient to allow the roof to vent behind the D trim underneath the lead flashing. This gap also allows for expansion of the roof area in hot periods.

Fixing expansion or E280 trims:

Use expansion trims if the roof is over 50m² or for runs longer than 10 metres.
A 20mm gap should be left in the decking (or cut out after laying deck) and the trim should be bandaged and then laminated over with the main layer of GRP

Fixing F trim or flat flashing:

When joining to an adjacent pitched roof, the flat flashing Section F should be used.

Important note: Always fold back existing felt before fitting. It is advisable to change the first course of felt if a little old or perished as this will always fail before the new GRP roof and becomes the reason for costly "call backs" later.
DO NOT nail the flashing to the pitched roof structure. The flashing should be allowed to move when expansion/contraction occurs. Nail the flashing to the new deck with most of it curving up onto the existing roof rafters. Reinforce any joints with bandage and take the main GRP layer up the flashing past the point where the bottom of the tiles / slates sit to reinforce any possible wearing areas. After the GRP roof is completed and cured, redress the felt and tiles etc. over the flashing.

Tips For Fitting Trims:

- Pull A and B trims slowly onto the batten until their outside face comes vertical.
- Nail trims close to inner edge of trim as this makes it easier to cover nails with bandage without getting resin runs on the face of the trim.
- DO NOT use silicone to join or fix trims as it will eventually lose its bond. Polyurethane products bond far better to GRP which is why they are specified.
- When overlapping A or B trims a bigger overlap (about 100-150mm) helps the "line" of the roof stay truer.
- When fitting A trims, it is strongly advised to fit the guttering first. It is very difficult to fix later. Use a short off cut of A trim to guide the fitting of the highest and lowest fitting and use a string line to fit the rest of the gutter brackets. Pay attention to falls.
- Always use a polyurethane mastic behind A or B type trims. Not doing so will result in the trim warping in hot weather and the "line" of the trim will be difficult to reinstate later. The trim may also pull up when the resin contracts during the curing stage.
- It is good practise to nail trims at each end and in the middle before finally nailing at 150mm centres along entire length.
- All roof edges require trims.

Corners:

Corners may be achieved by mitring on site and laminating over the joint formed with two layers of mat. Preformed corners can also be used.
Once the trims are fitted, the roof is ready to be laminated. The roof at this stage should have trims fitted to each edge so that the area to laminate is edged by the horizontal flanges of the trims around the perimeter.

Important note: All trims should be bandaged to the deck using glass bandage prior to applying the main layer.

SECTION 1: Laminating Process / Applying Stronghold Resin

Allow 2kg of Stronghold resin for every m^2 of 450gram glass mat.
Allow 2.5 kg for every m^2 of 600gram glass mat.
For second layers 1.5kg and 2kg are enough for 450gram or 600 gram respectively. (See Page 3.)

For catalyst allow 1% in hot weather, 2% in mild, 3% in cold and 4% in very cold weather.
For longer curing times in hot weather less then 1% can be used but be sure to stir in thoroughly.
(see Catalyst addition Page 17.)

Stronghold resin and topcoat require catalyst to cure. Use graduated buckets and catalyst dispensers to achieve correct ratios. Always wear eye protection and gloves when handling catalyst. CATALYST IS HARMFUL.

Stronghold resin and topcoat contain additives that settle when stored. Always stir them before decanting.

Be aware not to allow resin and/or topcoat to become stuck to other surfaces such as; brickwork, skylights, paved driveways, patios or vehicles (these are easy to cover but expensive to replace). Mask off any areas close to the roof to ensure this will not occur, as consolidating rollers can spray and wind can carry that spray.

Forming the glass fibre membrane on the prepared deck is really quite straightforward but requires everything to be prepared before the catalyst is added to the resin.

Stage 1 - Preparation:

Ensure that the deck is clean, dry and free from any surface contamination.

Stage 2 - Cutting Glass to Size:

Unroll the glass chopped mat carefully and cut to size the pieces required to cover the entire area to be worked using a sharp Stanley knife or scissors.
Each piece should overlap the next by about 75mm (never less than 50mm).
The pieces should also overlap any edge trims by about 50mm.

Place pieces to one side, in order, so that you know where each piece goes.

Next cut some "patches" of mat approximately 200mm square to reinforce any corners or joins, allowing 2 per detail plus a few extra will be sufficient.

Have ready enough glass bandage to reinforce all edge trims and any butt joints in the decking.

Stage 3 - Sweep Area:

With the roof trimmed around all edges and the glass mat now cut to size, thoroughly sweep the roof area clean.

Stage 4 - Gathering Tools & Materials:

Before applying the fibreglass to the roof make sure you have an adequate amount of resin, chopped strand mat, catalyst, application rollers, laminating rollers, buckets, gloves and paint brushes all to hand.

Once the Stronghold resin is "open" it is detrimental to get on and off the roof as this invariably introduces dirt to an already swept area.

Stage 5 - Adding Catalyst:

Add catalyst, as specified, to a small amount of resin and mix thoroughly.
If mechanical stirrers are used be careful to not introduce air bubbles into the resin.

Stage 6 - Laminating Corners:

Laminate any corners or joints first.

Pour a small amount of resin into a clean plastic bucket or pail (polystyrene containers should never be used as they dissolve on contact with polyester resins.)

Stage 6 - Laminating Corners: (Continued.)

Add catalyst as specified and mix thoroughly.
Wear eye protection and gloves when handling catalyst.

On a clean area of decking first wet two at a time the glass mat patches cut earlier and dress over any corner or joint to reinforce. Hang the glass mat over the corner until level with the bottom trim return, then pull over the corner.
Apply the second piece and work the glass mat to shape by stippling with a 2" brush and/ or a 3" laminating roller.

Repeat until all corners are reinforced.

Joints on D or fillet wall trims should also be reinforced.
For edge trims such as A or B trims it is sufficient to apply plenty of polyurethane sealant into the joint such that it squeezes out and the excess can be wiped off.
For area detail trims such as gutters or expansion joints remember that the main laminate should also cover them to add strength.

Stage 7 - Edge Bandage:

Now apply bandage to all edge trims
(Approx. 2" on the roof and 2" on the tail of the trim)
Mix up enough resin then apply to wet the edge of the trim.
Unroll the bandage on to this and apply more resin to the top of the bandage.

Note: Be careful to cover the nail heads and be mindful not to get any resin running down the face of any A trims.

This bond is very important and should be consolidated with a laminating roller or with the stippling action of a paintbrush.

Stage 8 - Joint Bandage:

Butt jointed boards will now require bandaging over all joints.
Use glass bandage and resin to cover all board joints, which should by now already be masked with adhesive tape.

Consolidate with a laminating roller.

If T+G boards are used some of the joints may not be tight or you may have some butt joints. These should also be taped and bandaged as resin drainage will occur and cause porosity and failure.

Stage 9 - Preparing the Resin:

The main area is now ready for laminating.

Pour enough resin for one roll into a clean, empty bucket (never more than 20kg at once). Add catalyst as specified and mix thoroughly.

Tip: If you want to cure 7 litres of resin with 2% catalyst, then to work out use the method of resin times catalyst and then add one nought.
(E.g. 7 resin x 2 catalyst = 14. Then add one nought =140. So 7 litres at 2% catalyst needs 140ml of catalyst in total.)

Authors note: Experience tells us that a common fault is to add drops of catalyst in summer and big splashes in winter. Sooner or later this causes problems with "too slow" or "too fast" mixes. As with all trades, a little bit of practical knowledge can make a lot of difference.

Stage 10 - Applying the Resin:

If using 450gram glass mat allow 0.5 kg of resin per metre of glass mat.
If using 600gram glass mat allow 2.5 kg of resin per metre of glass mat.

Apply the Stronghold resin to the deck with a application roller at the rate specified above ensuring that the whole area that is to be covered on this pass is generously wet with resin.

Stage 11 - Applying Glass Mat: Roll out the glass mat ensuring that there are no folds or kinks and that the pieces are correctly overlapped.

Stage 12 - Apply More Resin: Apply more catalysed resin to the glass mat at the rate of 1 kg per square metre. Ensure that the laminate is not porous anywhere.

Stage 13 - Consolidate Area: Allow 2 or 3 minutes for the glass mat to soak up resin, then go over the whole area with a consolidating roller.

You must get all the air out of the glass mat so that the glass fibres disappear and the grain of the timber below becomes apparent as the laminate becomes transparent (or the Kevlar® layer).

Note: Areas appearing white are either too dry, in which case apply more resin, or contain air bubbles and should be worked again with the laminating roller.
Pay attention to overlaps and be careful of excess spray from rollers.

Stage 14 - Continuing the Process: Continue this operation with the next piece of glass mat, overlapping the first piece by about 75mm.

Note: You will find that you finish the last section of the roof standing on the ladder or scaffold.

Stage 15 - Curing the Resin: Now leave the roof to cure.

This will take between 1 hour to several hours depending on the weather conditions. (The lower the temperature, the longer the cure will take).

Note: You will find that the resin thickens up at low temperature and takes longer to wet out the glass. DO NOT be tempted to add more resin because of this. It is necessary to achieve an even and correct glass to resin ratio.

Note: Never work over 30°C as it is detrimental to the resin cure. Never work below 5°C as resin will not cure no matter how much catalyst is added. Catalyst levels over 4% will not speed up the cure but will make the resin brittle.

Note: Never apply more than 2 layers of glass mat at one time. Areas requiring more than 2 layers should be done in stages with time allowed for each layer to cure.

Note: Do not use laminating rollers aggressively as they tend to spray the resin. Resin is difficult to remove from brickwork, motorcars etc. and should always be applied with care.

Tips:

- When laminating a large area it is possible to put one piece of glass mat at one end of the roof and then start working at the other end of the roof. The last piece of glass mat can then be worked whilst standing on the first piece laid, as it is likely to be fully cured by the time you reach it.
  This can be safer than working off the ladder or scaffold for the last piece.
  (Inexperienced roofers be careful not to "trap" yourselves on the roof.)

- If applying another layer of glass mat or before applying a topcoat it is advisable to flash sand the entire roof area with a 40 /80 grit paper, then wipe with acetone. This will ensure no glass protrusions and facilitate a better bond for the next layer applied.
  It's a quick step that eliminates topcoat delamination or glass strands protruding. (Up close glass resembles rope. Any glass left outside the laminate can encourage water ingress through osmosis, which leads to a leaky roof.)

IMPORTANT! NEVER put catalysed, uncured resin into your vehicle or out of sight. Always ensure that any catalysed containers are kept separate from other materials on site and allowed to cure. Pour a small amount of water on any unused resin if you have mixed too much and have some left in the bucket.

RESIN, TOPCOAT AND CATALYST ARE HAZARDOUS. In their solid state they are inert and can therefore be disposed of safely. When stored they should be kept separately in a cool dark environment. Never store or transport resins and catalyst close together. Curing resin produces heat and can therefore be hazardous if inadvertently mixed with catalyst. If a container of resin or topcoat starts to smoke due to excessive heat build up, then it is advisable to pour some water onto it to ensure that it does not self-ignite. This is very rare, but it does happen. Be aware.

NEVER APPLY GRP TO A DAMP SURFACE.
The most common reason for GRP roof failure is delaminating.

The most common reason for this is when the roofer applies GRP onto damp decking fitted by others. (Example seen below)

Example of What NOT to Do:

- *The builder fits the decking and covers with a plastic sheet. The plastic sheet is temporarily held down by battens nailed through the sheet.*
- *The weather (rain, dew, etc.) get through the plastic sheet overlaps and into the nail holes which causes damp areas.*
- *The roofer arrives and is under pressure to complete the roof.*
- *GRP is applied to areas that are still damp.*
- *The bond is poor and breaks down, then delamination occurs.*
- *The GRP membrane eventually splits and leaks.*

Always change a damp deck or dry it thoroughly.

Authors note: With over 20 years experience installing over 5000 Glass Reinforced Plastic roofs, we have never seen a GRP roof delaminate when installed onto a new, dry deck.

The delamination force on OSB3 boards is about 9000kg /sqm or about 250kg for a 6" square area.

SECTION 1: Applying Stronghold Topcoat

Applying the finishing topcoat to the completed roof.

Pigmented Topcoats:

Stronghold Topcoat is normally supplied in its pre-pigmented form. (Stronghold Topcoats are available in mid-grey or dark grey.)

Alternatively, to achieve the colour of your choice using a clear topcoat, mix in the pigment at the recommended level of 10% (2kg pigment per 20kg clear topcoat). It is advisable to choose a light coloured pigment as this will keep the roof area cooler in the summer when in direct sunlight.

Note: As with all pigmented finishing products it is strongly advised to mix ALL of the topcoat together prior to decanting into usable quantities. As 2 pails from the same batch may exhibit slight colour variations. The key is to mix everything together to reduce this effect to a minimum.

Attempt to be consistent with catalyst levels and method of application for a more even result.

Ensure that the roof is adequately cured (not too sticky so that it lifts when you stand on it) and sand off any protrusions from the resin (e.g. glass strands or pieces of debris), then wipe with acetone.

A GRP laminate has adequate cure when it is impossible to move the glass fibre strands within the laminate.
DO NOT stand on the laminate until it has reached this stage.

Topcoat Application

Topcoat should be applied at the rate of 0.5kg/m².

Topcoat requires catalyst to cure. Between 1% and 3% is normally sufficient.
Allow 0.5kg for every m² of roof area.

Stage 1: Mix up the entire batch of topcoat to be used per application, to ensure consistent colour over the roof. Pigments can settle during transit. Stir well.

Stage 2: Decant a small amount of topcoat and add catalyst, as specified.
Use this small batch of topcoat to paint with a brush any corners or roof details which may prove difficult to paint with an application roller.

Stage 3: Decant a small amount to apply with an application roller to the edge trims.
Half of the bottom radius can be coated by tilting the roller. If the remaining part of the trim return is requiring topcoat then use a trim off cut to protect the fascia.

Stage 4: Decant enough topcoat to cover about 10m² of roof area (approx. 5 litres) add catalyst, as specified, stir well. Then apply with a application roller.

Stage 5: It is important to keep this layer even, since the finished appearance of the roof will depend on how well the topcoat has been applied.
The topcoat should be free from runs, sags, brush marks and roller marks.
(What you see is what you get.) Apply with care.

Stage 6: Repeat stage 4 until the roof area is completed.

The topcoat should be applied to the whole of the roof laminate including the edge trims. Use a brush or roller to vigorously apply, to ensure an even finish and a good bond.

Pour water on any unused resin or topcoat if you have mixed too much and have some left in the bucket.

Always apply Stronghold Topcoat within 24 hours of laminating the roof. This will ensure that the topcoat bonds well to the laminate and the completed roof will gradually continue its cure over the next few weeks.

Although the roof will normally withstand light foot traffic within 24 hours. If it is not possible to apply the topcoat the same day as the resin, the roof should be lightly sanded to obtain a key. Then wipe the roof with acetone prior to applying the topcoat.

Stronghold Topcoat is a high performance, fire retardant, modified resin and will behave in the same way as the Stronghold Resin.

Overview:

- **NEVER use Stronghold Topcoat in wet conditions.**
- **NEVER apply topcoat in temperatures below 5°C.**
- **Keep the topcoat colour light.**
- **Keep the topcoat application even.**
- **Always apply topcoat immediately after the laminate is cured.**
- **Always sand and acetone wash if applied later than 24 hours.**

Non Slip Surfaces & Balconies:

For balconies or foot traffic areas, 2 layers of glass mat should be applied to the surface area. Apply the second layer using the same method as the first.
It is advisable to cut the glass mat for the second layer when cutting for the first layer.

A non-slip surface can be achieved by sprinkling dry slate dust onto the topcoat as it is applied, and then rolling over it until it is completely covered.
1kg of slate dust can comfortably cover 20m^2.

Tips:

- Topcoat, for technical reasons, tends to cure faster than resin. Allow for this when calculating catalyst levels.
- Stir the topcoat well prior to adding catalyst and after. This will ensure an even colour, as pigment can settle over time. For larger areas the whole batch should be mixed together first before applying.
- Remove any loose pile from a new roller by applying the first roller load to a piece of off-cut board.

IMPORTANT! NEVER put catalysed, uncured resin into your vehicle or out of sight. Always ensure that any catalysed containers are kept separate from other materials on site and allowed to cure.

To discard old resin or topcoat it is best to mix with catalyst and leave in a safe area to harden. If large volumes get hot then a small amount of water poured onto surface should eliminate the chance of fire.

SECTION 1: Repairing & Jointing Procedure

If the roof surface becomes damaged by impact or must be cut for any reason, it can be easily repaired using the following procedure:

Step 1:	Clean off the damaged area with solvent and abrade the GRP surface with a hand grinder for 100mm from the damaged area. Wash area with acetone.
Step 2:	Cut the (600gram) glass mat to the correct (patch) size to cover the damaged area and mix sufficient resin with catalyst as previously described.
Step 3:	Brush resin evenly onto the affected (patch) area. Place the glass mat over the applied resin, wet out the glass with resin at the rate of 1 kg/m^2. Stipple well with the brush or use a laminating roller for larger areas.
Step 4:	Ensure that the laminate is air free and completely consolidated. Allow to cure.
Step 5:	Mix the topcoat with catalyst as previously described and apply with a brush at the rate of 0.5 kg/m^2. (Go outside the patch area but DO NOT go outside the prepared area)
Step 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 repair over the damaged or cut laminate.

SECTION 1: Summer & Winter Practises

Summer:

Check weather forecast for suitability.
DO NOT use GRP if temperature exceeds 30ºC.
Apply glass mat in shorter runs, in order to allow enough time to laminate bonds and edges correctly.

Use small batches and low catalyst levels. Less than 1% catalyst may be used but extra attention should be given to ensure mixture is stirred through thoroughly.

Allow laminate to cure and cool before applying any topcoat. It may be required to wait until later in the day to achieve this. Topcoat applied to a hot surface can cure extremely fast. Be aware

Winter:

Check weather forecast for suitability.
If wet period is forecast, it is better to wait than to start work.
Always carry a new polythene (Visqueen DPC) sheet. In event of rain then stop work and cover the roof immediately to protect unfinished roof area.
DO NOT continue working until remaining roof area is dried thoroughly.
Often this means coming back to job on a dry day and allowing boards to dry.

If the decking is wet then sweeping, mopping and dry ragging followed by sunshine are the best methods for drying the area.
(Remember it is often better to start the GRP process early in the day if you are unsure how long the process will take.) If unsure; prepare roof surface, cover with (Vis queen) sheet, then start the GRP work early on the next dry day.

DO NOT use Stronghold resin or topcoat if temperature is under 5ºC.
Stronghold base resin contains water and at 0ºC or at freezing point, the curing process stops completely.

Be careful if applying topcoat after 2pm as the sun contributes considerable amounts of energy required to cure topcoat.
Be aware that shaded areas will cure slower than those in direct sunlight.

Uncured topcoat left overnight is to be avoided as dew, rain, leaves, debris etc. can contaminate or become embedded into the GRP and leave an unsatisfactory finish.

Stronghold resin and topcoat can be kept indoors overnight to ensure that it is not too cold when the time comes to use the product.

If it is impossible to sheet over an area then it may be possible to sheath the area with a layer of resin to protect the boards until the laminate can be applied later.
(This method requires a little experience to master the technique.)

Water contamination:

If the laminate turns to a milky colour this normally indicates water contamination.

The contaminated area will have to be removed, then once area is fully dry and flat, a new GRP layer can be applied.

Common reasons for water contamination is due to rain affecting an cured area or due to an existing damp surface.

Another common cause is sweat from the head of the installer. Headbands are the answer here, providing they don't interfere with your safety hats or your street cred.

SECTION 1: Catalyst Addition Information

General Note to the Art of Catalyst Addition:

Catalyst addition charts are reasonably accurate when used in closed (indoor) environments. When used in open (outdoor) environments the accuracy decreases.

Factors that affect catalyst performance are many and varied.
Examples include: resin temperature, deck temperature, air temperature, wind speed, shade temperature, sunlight temperature, time in bucket, household heating, sun rising, sun setting etc.

General rule of thumb: If it is very hot weather (sun trap, no wind, hot decking etc.) then use 1% catalyst or less. If it's very cold weather (overcast, windy, cold garage roof etc.) then 4% catalyst is usually required.
(Always remember that the most experienced roofer will sometimes mix a batch that cures too quickly in the summer and will sometimes mix a batch that is too slow in the winter.) Make sure to carefully think about each batch and consider the results.

If you feel cold, then so does the resin and if you feel hot then the same applies.
Hot weather 1% or less
Warm weather 2% or less
Cold weather 3%
Very cold weather 4%.
Freezing? Go home!

Stronghold resins are designed to give a 20/20/2 cure. This means 20 minutes cure time at 20ºC if 2% catalyst is used. *(For this to work the resin and the deck need to be at 20ºC and ALL the resin leaves the bucket at exactly the same time.)*

Note: Resin contained in a bucket rises in temperature due to exothermic reaction, but resin that is on the deck spreads out, so this heat dissipates.

A Catalyst Addition Chart will always be available on the reverse side of every Stronghold resin and topcoat product.
It will appear as shown below:

CATALYST ADDITION CHART

	5-13 °C	13-16 °C	16-20 °C	20-35 °C
RESIN	CATALYST	CATALYST	CATALYST	CATALYST
1kg	40ml	30ml	20ml	10ml
2kg	80ml	60ml	40ml	20ml
3kg	120ml	90ml	60ml	30ml
4kg	160ml	120ml	80ml	40ml
5kg	200ml	150ml	100ml	50ml
6kg	240ml	180ml	120ml	60ml
7kg	280ml	210ml	140ml	70ml
8kg	320ml	240ml	160ml	80ml
9kg	360ml	270ml	180ml	90ml
10kg	400ml	300ml	200ml	100ml
11kg	440ml	330ml	220ml	110ml
12kg	480ml	360ml	240ml	120ml
13kg	520ml	390ml	260ml	130ml
14kg	560ml	420ml	280ml	140ml
15kg	600ml	450ml	300ml	150ml
16kg	640ml	480ml	320ml	160ml
17kg	680ml	510ml	340ml	170ml
18kg	720ml	540ml	360ml	180ml
19kg	760ml	570ml	380ml	190ml
20kg	800ml	600ml	400ml	200ml

Based on Stronghold catalyst.

Disclaimer

The information provided in this procedure document offers guidance in order to ensure correct and proper installation of the Stronghold GRP Flat Roofing System. The information relates ONLY to the Stronghold GRP Flat Roofing System and is NOT valid for Stronghold Flex GRP Overlay Roofing System.

STRONGHOLD
GRP ROOFING SYSTEM

STRONGHOLD GRP RESIN

SAFETY DATA SHEET

In accordance with Regulation (EC) No 1907/2006

Revision date: 28th January 2022

SECTION 1: Identification of the Substance/Mixture and of the Company/Undertaking

1.1 Product identifier

Product name:	Stronghold Resin 102
Chemical name:	Unsaturated polyester resin
Product form:	Mixture

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

Relevant identified uses:	Resin for Glass Reinforced Plastic (GRP) Roofing. Contact the manufacturer for any other application.

1.3 Details of the Supplier of the safety data sheet

Manufacturer/Supplier:	The Glass Fibre Roofing Company Ltd.
Address:	Unit 33 Pontygwindy Industrial Estate, Caerphilly CF83 3HU
Telephone number:	02920 888020
E-mail:	sales@strongholdgrp.co.uk

This document is available online at http://www.strongholdgrp.co.uk

1.4 Emergency telephone numbers

UK Telephone number:	02920 888020 (Office hours only)
UK Urgent medical problem:	111 (NHS Direct)
UK Life-threatening emergency:	999

SECTION 2: Hazards Identification

2.1 Classification according to Regulation (EC) No 1272/2008 (CLP)

Skin corrosion/irritation:	Category 2
Serious eye damage/eye irritation:	Category 2
Skin Sensitization:	Category 1 - sub-category 1A
Reproductive Toxicity:	Category 2
Specific Target Organ Toxicity (single exposure):	Category 3
Specific Target Organ Toxicity (repeated exposure):	Category 1
Carcinogenicity:	Category 2
Chronic Aquatic Toxicity:	Category 1
Flammable liquids:	Category 3

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008 [CLP]

Hazard pictograms:

Signal word: Danger

Hazard statements:

Flammable liquid and vapour	H226
Causes skin irritation	H315
May cause an allergic skin reaction	H317
Causes serious eye irritation	H319
May cause respiratory irritation	H335
Suspected of causing cancer	H351
Suspected of damaging the unborn child	H361d
Causes damage to organs through prolonged or repeated exposure if inhaled	H372
Very toxic to aquatic life with long lasting effects	H410
Contains alpha-methyl styrene - May produce an allergic reaction	EUH208

Precautionary statements - Prevention:

Keep away from heat/sparks/open flames/ hot surfaces – no smoking	P210
Take precautionary measures against static discharge	P243
Do not breathe vapour	P260
Avoid release to the environment	P273
Wear protective gloves/protective clothing/eye protection/face protection	P280

Precautionary statements - Response:

IF ON SKIN Wash with plenty of soap and water	P302+P352
IF INHALED Remove victim to fresh air and keep at rest in a position comfortable for breathing	P304+P340
IF IN EYES Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing	P305+P351+P338

Precautionary statements - Storage:

Store in a well-ventilated place. Keep container tightly closed	P403+P233

Other hazards: No information available.

SECTION 3: Composition/Information on Ingredients

3.1 Substances

Chemical name	CAS-No. EC-No. REACH Registration No.	% Weight	GHS Classification
Styrene	100-42-5 202-851-5 01-2119457861-32	25 – 50	Flam. Liq. 3 (H226) Repr. 2 (H361d) Acute Tox. 4 (Inhalation (H332) Skin Irrit. 2 (H315) Eye Irrit. 2 (H319) Asp. Tox. 1 (H304) STOT SE 3 (H335) STOT RE 1 (H372) Aquatic Chronic 3 (H412)
Silica, amorphous, fumed	112945-52-5 231-545-4 01-2119379499-16	< 0.5	
Alpha-methyl styrene	98-83-9 202-705-0 01-2119472426-35	0.1 < 1	Flam. Liq. 3 (H226) Asp. Tox. 1 (H304) Skin Sens. 1B (H317) Eye Irrit. 2 (H319) STOT SE 3 (H335) Repr. 2 (H361d) Aquatic Chronic 2 (H411)

Hydrocarbons, C9-C12, n-alkanes, isoalkanes, cyclics, aromatics (2-25%)	64742-82-1 919-446-0 01-2119458049-33	< 0.25	Flam. Liq. 3 (H226) Asp. Tox. 1 (H304) STOT SE 3 (H336) STOT RE 1 (H372) Aquatic Chronic 2 (H411) (EUH066)
Cobalt octolate	136-52-7 205-250-6 01-2119524678-29	~ 0.1	Skin Sens. 1A (H317) Eye Irrit 2 (H319) Repr. 1B (H360Fd) Aquatic Acute 1 (H400) Aquatic Chronic 3 (H412)
Hydroquinone	123-31-9 204-617-8 01-2119524016-51	~ 0.02	Acute Tox. 4 (H302) Eye Dam. 1 (H318) Skin Sens. 1 (H317) Muta. 2 (H341) Carc. 2 (H351) Aquatic acute 1 (H400) Aquatic Chronic 1 (H410)

SECTION 4: First Aid Measures

4.1 Description of first aid measures

General advice:	Show this safety data sheet to the doctor in attendance. DO NOT breathe dust/fume/gas/mist/ vapours/spray.
Eye Contact:	Rinse thoroughly with plenty of water, also under the eyelids. Keep eye wide open while rinsing. If symptoms persist, call a physician.
Skin contact:	Wash off immediately with soap and plenty of water removing all contaminated clothes and shoes. If skin irritation persists, call a physician.
Inhalation:	Move to fresh air. If not breathing, give artificial respiration. Consult a physician.
Ingestion:	DO NOT induce vomiting. Rinse mouth. Consult a physician.
Protection of first-aiders:	Use personal protective equipment. See section 8 for more info.

4.2 Most important symptoms and effects, both acute and delayed

Eye Contact:	Irritating to eyes.
Skin contact:	Irritating to skin. May cause sensitisation by skin contact.
Inhalation:	Danger of serious damage to health by prolonged exposure through inhalation. Irritating to respiratory system.
Ingestion:	Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician:	No information available.

SECTION 5: Firefighting Measures

5.1 Extinguishing media

Suitable extinguishing media:	Dry chemical, Foam, Carbon dioxide (CO2), (closed systems).
Unsuitable extinguishing media:	DO NOT use a solid water stream as it may scatter and spread fire.

5.2 Special hazards arising from the substance or mixture

Fire hazard:	Special exposure hazards arising from the substance or preparation itself, combustion products, resulting gases
Explosion hazard:	Vapours may form explosive mixtures with air. Most vapours are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements. tanks). Heating or fire can release toxic gas: Carbon monoxide.

5.3 Advice for firefighters

Protective equipment for firefighters:	Wear self-contained breathing apparatus and protective suit.
Other information:	Cool containers/ tanks with water spray. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

SECTION 6: Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel:	Remove all sources of ignition, heat, flames and sparks. Take precautionary measures against static charges. Ensure adequate ventilation. Use personal protective equipment.
For emergency responders:	Avoid breathing vapours or mists. In the event of fire and/or explosion DO NOT breathe fumes. Use personal protective equipment.

6.2 Environmental precautions

Environmental precautions:	The product should not be allowed to enter drains, water courses or the soil. DO NOT flush into surface water or sanitary sewer system.

6.3 Methods and material for containment and cleaning up

Methods for cleaning up:	Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). Use clean non-sparking tools to collect absorbed material.

6.4 Reference to other sections

See section 8 and section 12 for more information.

SECTION 7: Handling and Storage

7.1 Precautions for safe handling

Precautions for safe handling:	Avoid static electricity build up with connection to earth. Use only in area provided with appropriate exhaust ventilation. In case of insufficient ventilation, wear suitable respiratory equipment. For personal protection see section 8.
Prevention of fire and explosion:	Keep away from open flames, hot surfaces and sources of ignition. Empty containers may contain flammable or explosive vapours.
Hygiene measures:	When using, DO NOT eat, drink or smoke. Wash hands before breaks and at the end of the workday. Provide regular cleaning of equipment, work area and clothing.

7.2 Conditions for safe storage, 3 including any incompatibilities

Technical measures & Storage conditions:	Keep in a dry, cool and well-ventilated place. Keep at temperature not exceeding 30°C. Keep away from heat and sources of ignition.
Materials to avoid:	Strong oxidizing agents, peroxides, reducing agents.
Packaging material:	Metallic GRP (Glass Reinforced Plastic) containers.

7.3 Specific end use(s)

The identified uses for this product are detailed in Section 1.2.

SECTION 8: Exposure Controls / Personal Protection

8.1 Control parameters

Occupational exposure limits

Chemical name	TWA – 8 hours	STEL – 15 mins
Styrene 100-42-5	100 ppm – 430 mg/m^3	250 ppm 1080 mg/m^3

Derived no effect level (DNEL)
Workers

Route of exposure	Acute effects (local)	Acute effects (systemic)	Chronic effects (local)	Chronic effects (systemic)
Oral				
Inhalation	306 mg/m^3	289 mg/m^3		85 mg/m^3
Dermal		406 mg/kg bw/day		

Styrene 100-42-5
Consumers

Route of exposure	Acute effects (local)	Acute effects (systemic)	Chronic effects (local)	Chronic effects (systemic)
Oral				2.1 mg/kg bw/day
Inhalation	182.7 mg/m³	174.2 mg/m³		10.2 mg/m³
Dermal				343 mg/kg bw/day

Predicted no effect concentration (PNEC)

Type	Exposure	PNEC
PNEC Aqua	Fresh Water	0.028 mg/L
	Marine water	0.014 mg/L
	Intermittent use / release	0.04 mg/L
PNEC Sediment	Fresh Water	0.614 mg/kg.dw
	Marine water	0.307 mg/kg.dw
PNEC Soil	Terrestrial compartment	0.2 mg/kg.dw
PNEC STP	STP microorganisms	5 mg/L

8.2 Exposure controls

Occupational exposure limits

Engineering measures: Apply technical measures to comply with the occupational exposure limits. When working in confined spaces (tanks, containers, etc.), ensure that there is a supply of air suitable for breathing and wear the recommended equipment.

Personal protective equipment

General Information: Use personal protective equipment.

Respiratory protection: Provide a good standard of ventilation (not less than 3 to 5 air changes per hour) If exposure limits are likely to be exceeded (in case of insufficient ventilation) wear suitable respiratory equipment:
Breathing apparatus with filter Type A (Organic gases and vapours filler conforming lo EN 14387, APF40 < 1 hour. APF 200> 1 hour) I Type A(2)/P3 in combination with Particulates filler conforming to EN 143,if exposed to dust.

Eye protection: Safety glasses with side-shields. DO NOT wear contact lenses.

Skin and body protection: Wear fire flame resistant/retardant clothing. Antistatic/ protective shoes or boots.

Hand protection: Wear chemically resistant gloves (tested to EN 374) in combination with "basic" employee training.

Environmental exposure controls

Environmental exposure controls: DO NOT allow material to contaminate ground water system.

SECTION 9: Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Property	Values	Remark
Appearance	Blue	
Physical state	Liquid	
Particle size		No data available
Odour	Styrene	
Odour threshold	0.15 ppm	Values related to styrene
pH		No data available
Melting point/range	-30°C	Values related to styrene
Freezing point		No data available
Boiling point	145°C	Values related to styrene
Flash point	32°C	Values related to styrene
Evaporation rate		No data available
Flammability limits in air		
Upper	6.1 – 6.8 %	Values related to styrene
Lower	0.9 – 1.1 %	Values related to styrene
Vapour pressure	1 kPa @ 25°C	Values related to styrene
Vapour density	3.6	Values related to styrene
Density	1.03 – 1.10 g/cm³ @ 20°C	Values related to styrene
Water solubility	Insoluble in water	No data available
Partition coefficient	3	Values related to styrene
n-octanol/water		
Solubility in other solvents	Medium – Organic solvents Medium – Phthalates	Values related to styrene
Auto ignition temperature	490 °C	Values related to styrene
Decomposition temperature		No data available
Viscosity, kinematic	583 – 777 mm²/s @ 25°C	
Viscosity, dynamic	600 800 mPa s @ 25°C	
Explosive properties		Not applicable
Oxidizing properties		Not applicable

Other safety information

Property	Values	Remark
Solubility in other solvents	Soluble in most organic solvents	Values related to styrene

SECTION 10: Stability and Reactivity

10.1 Reactivity

Product may ignite and burn at temperatures exceeding the flash point.

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

In use, may form flammable/explosive vapour-air mixture.

10.4 Conditions to avoid

Heat, flames and sparks. Exposure to light. Take precautionary measures against static charges.

10.5 Incompatible materials

Strong oxidizing agents, peroxides, reducing agents.

10.6 Hazardous decomposition products

Incomplete combustion and thermolysis produces potentially toxic gases such as carbon monoxide and carbon dioxide.

SECTION 11: Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation:	Danger of serious damage to health by prolonged exposure through inhalation. Irritating to respiratory system.
Ingestion:	Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.

Chemical name	LD50 Oral	LD50 Dermal	ATE CLP (dust, mist)
Styrene 100-42-5	> 5000 mg/kg (Rat)	>2000 mg/kg bw (Rat) 24h OECD 402	11.8 mg/L (Rat) 4h CSR
Silica, amorphous, fumed, crystalline-free 112945-52-5	> 5000 mg/kg (Rat)	>5000 mg/kg (Rabbit)	> 0.14 mg/L (Rat) 4h (analytical) OECD 403
Alpha-methyl styrene 98-83-9	4900 mg/kg (Rat) OECD GHS	14560 mg/kg bw (Rabbit) OECD GHS	22.85 mg/L (Rat) 6h Vapour 41600 mg/m³ (Rat) 4h Similar to OECD 403

Hydrocarbons, C9-C12, n-alkanes, isoalkanes, cyclics, aromatics (2-25%) 64742-82-1	>15000 mg/kg bw (Rat) Similar to OECD 401		>13.1 mg/L air (Rat) 4h Similar to OECD 403
Cobalt octolate 136-52-7	3129 mg/kg bw (Rat) OECD 425	>2000 mg/kg bw (Rat) OECD 402	
Hydroquinone 123-31-9	367 mg/kg bw (Rat) OECD 401	>200 mg/kg bw (Rabbit) OECD 402	

Skin corrosion/irritant

Chemical name	Skin corrosion/irritant
Styrene 100-42-5	Irritating to skin In vitro assay Rabbit
Silica, amorphous, fumed, crystalline-free 112945-52-5	No skin irritation Rabbit OECD 404
Alpha-methyl styrene 98-83-9	Mild skin irritation Rabbit Classification of corrosive hazards, Federal register, Vol 37, No 57, 173.240
Hydrocarbons, C9-C12, n-alkanes, isoalkanes, cyclics, aromatics (2-25%) 64742-82-1	No skin irritation In vitro assay Rabbit OECD 404
Cobalt octolate 136-52-7	No skin corrosion In vitro study OECD 431 EU method B.40
Hydroquinone 123-31-9	No skin irritation

Serious Eye Damage/Eye Irritation

Chemical name	Serious Eye Damage/Eye Irritation
Styrene 100-42-5	Irritating to eyes In vitro assay Rabbit
Silica, amorphous, fumed, crystalline-free 112945-52-5	No eye irritation Rabbit OECD 405
Alpha-methyl styrene 98-83-9	Irritating to eyes Rabbit
Hydrocarbons, C9-C12, n-alkanes, isoalkanes, cyclics, aromatics (2-25%) 64742-82-1	No eye irritation In vitro assay Rabbit OECD 405

Cobalt octolate 136-52-7	Moderate eye irritation OECD 437 EU method B.47 Irritating to eyes Rabbit OECD 405
Hydroquinone 123-31-9	Risk of serious damage to eyes Severe eye irritation

Respiratory or skin sensitisation

Chemical name	Respiratory or skin sensitisation
Styrene 100-42-5	Does not cause skin sensitization Does not cause respiratory sensitization CSR
Silica, amorphous, fumed, crystalline-free 112945-52-5	Does not cause skin sensitization Does not cause respiratory sensitization
Alpha-methyl styrene 98-83-9	May cause sensitization skin contact Mouse OECD 429 EU method B.42
Hydrocarbons, C9-C12, n-alkanes, isoalkanes, cyclics, aromatics (2-25%) 64742-82-1	Does not cause skin sensitization In vitro assay Guinea pig OECD 406
Cobalt octolate 136-52-7	May cause skin sensitization by skin contact In vitro assay Mouse OECD 429
Hydroquinone 123-31-9	May cause skin sensitization by skin contact In vitro assay Guinea pig OECD 406

Mutagenic effects
In vitro study

Chemical name	Ames test
Styrene 100-42-5	Ambiguous In vitro gene mutation study in bacteria (S. typhimurium G46, TA1530, TA 1535, TA100, TA98, TA1538, TA1537) OECD 471
Silica, amorphous, fumed, crystalline-free 112945-52-5	Negative In vitro gene mutation study in bacteria OECD 471
Alpha-methyl styrene 98-83-9	Negative In vitro gene mutation study in bacteria (S. typhimurium G46, TA1530, TA 1537, TA98, TA100) (Escherichia coli WP2 uvrA)

Alpha-methyl styrene 98-83-9 (continued.)	Similar to OECD 471 OECD 472
Hydrocarbons, C9-C12, n-alkanes, isoalkanes, cyclics, aromatics (2-25%) 64742-82-1	Negative In vitro gene mutation study in bacteria (S. typhimurium TA1535, TA 1537, TA98, TA100, TA1538) Similar to OECD 471
Cobalt octolate 136-52-7	Negative In vitro gene mutation study in bacteria (S. typhimurium TA1535, TA 1537, TA98, TA100, TA102) OECD 471
Hydroquinone 123-31-9	Negative In vitro gene mutation study in bacteria OECD 471

Chemical name	**In vitro mammalian cell mutation test**
Styrene 100-42-5	Ambiguous In vitro gene mutation study in mammalian cells hamster OECD 476
Silica, amorphous, fumed, crystalline-free 112945-52-5	Negative In vitro gene mutation study in mammalian cells OECD 476
Alpha-methyl styrene 98-83-9	Negative In vitro gene mutation study in mammalian cells hamster Similar to OECD 476
Cobalt octolate 136-52-7	Negative In vitro gene mutation study in mammalian cells mouse OECD 476
Hydroquinone 123-31-9	Positive In vitro gene mutation study in mammalian cells mouse OECD 476

Chemical name	**In vitro mammalian cell mutation test**
Styrene 100-42-5	Positive Chromosome aberration test in vitro OECD 473 OECD 479
Silica, amorphous, fumed, crystalline-free 112945-52-5	Negative Chromosome aberration test in vitro OECD 473
Alpha-methyl styrene 98-83-9	Negative Chromosome aberration test in vitro Hamster

Alpha-methyl styrene 98-83-9 (continued.)	Similar to OECD 473
Cobalt octolate 136-52-7	Negative Chromosome aberration test in vitro Similar to OECD 473
Hydroquinone 123-31-9	Positive Chromosome aberration test in vitro OECD 483

In vivo assay

Chemical name	Unscheduled DNA Synthesis (UDS)
Styrene 100-42-5	Negative mouse OECD 486 OECD 474
Silica, amorphous, fumed, crystalline-free 112945-52-5	Negative rat
Alpha-methyl styrene 98-83-9	Negative Mouse Similar to OECD 474
Hydrocarbons, C9-C12, n-alkanes, isoalkanes, cyclics, aromatics (2-25%) 64742-82-1	Negative mouse Similar to OECD 474 OECD 475
Cobalt octolate 136-52-7	Negative rat OECD 474 OECD 475

Chemical name	European Union
Hydroquinone 123-31-9	Muta. 2

Carcinogenicity
Styrene (100-42-5)

Exposure route	Method	Species	Does	Evaluation
Inhalation	OECD 453	Rat	NOAEC systemic (carcinogenicity) >= 4.34 mg/L air (nominal)	negative
Inhalation	OECD 453	Mouse	LOAEC (carcinogenicity) female/male = 0.09 – 0.18 mg/L	positive

Inhalation (continued.)	OECD 453	Mouse	air resp. NOAEC (carcinogenicity) male = 0.09 mg/L air	positive
Oral	No information available	Rat	NOAEL (carcinogenicity) >= 2000 mg/kg bw / day	positive
Oral	No information available	Mouse	LOAEL (carcinogenicity) = 150 mg/kg bw / day	positive

Silica, amorphous, fumed, crystalline-free 112945-52-5

Exposure route	Method	Species	Does	Evaluation
Oral	OECD 453	Rat	NOAEL = 1800 – 3200 mg/kg bw / day	negative

Alpha-methyl styrene 98-83-9

Exposure route	Method	Species	Does	Evaluation
Inhalation	Similar to OECD 451	Mouse Rat	LOAEC (male/female) 105 weeks = 100 ppm	negative

Hydrocarbons, C9-C12, n-alkanes, isoalkanes, cyclics, aromatics (2-25%) 64742-82-1

Exposure route	Method	Species	Does	Evaluation
Inhalation	Similar to OECD 453	Rat	NOAEC (female) >= 2200 mg/m³ air NOAEC (male) = 138 mg/m³ air	negative

Hydroquinone 123-31-9

Exposure route	Method	Species	Does	Evaluation
Oral	OECD 453	Mouse	LOAEL = 100 mg/kg bw / day NOEL = 50 mg/kg bw/day	negative

Reproductive toxicity
Styrene (100-42-5)

Exposure route	Method	Species	Does	Evaluation
Inhalation	No information available	Rat	LOAEL = 100 mg/kg bw / day NOEL = 50 mg/kg bw/day	positive

Oral	OECD 422	Rat	NOAEL/LOAEL (fertility)60d = 200 – 400 mg/kg bw/day	positive
Inhalation	OECD 416	Rat	NOAEC (P, F1) = 0.64 mg/L air LOAEC (P, F1) = 2.13 mg/L air NOAEC (F2) = 0.21 mg/L air LOAEC (F2) = 0.64 mg/L air (70d)	negative

Silica, amorphous, fumed, crystalline-free 112945-52-5

Exposure route	Method	Species	Does	Evaluation
Oral	OECD 415	Rat	NOAEL = 497 mg/kg bw / day	negative

Alpha-methyl styrene 98-83-9

Exposure route	Method	Species	Does	Evaluation
Oral	OECD 422	Rat	NOEL (parental female) = 200 mg/kg bw/day NOEL (parental males) = 1000 mg/kg bw/day	negative
Inhalation	Similar to OECD 416	Rat	NOAEC (systemic toxicity) male/female = 0.21 mg/L NOAEC (reproductive toxicity) male/female = 2.1 mg/L	negative

Hydrocarbons, C9-C12, n-alkanes, isoalkanes, cyclics, aromatics (2-25%) 64742-82-1

Exposure route	Method	Species	Does	Evaluation
Inhalation	Similar to OECD 421	Rat	NOAEC (F1) = 1720 mg/m³	negative

Cobalt octolate 136-52-7

Exposure route	Method	Species	Does	Evaluation
Oral	OECD 422	Rat	NOAEL (P&F1) 28d = 30 mg/kg bw/day	positive

Hydroquinone 123-31-9

Exposure route	Method	Species	Does	Evaluation
Oral	EPA OTS 798.4700	Rat	NOAEL (parental toxicity) = 15 mg/kg bw / day LOAE (reproductive effects) = 150 mg/kg bw/day	negative

Developmental toxicity

Suspected of damaging the unborn child.
Styrene (100-42-5)

Exposure route	Method	Species	Does	Evaluation
Inhalation	No information available	Rat	NOAEC/LOAEC (maternal toxicity + developmental toxicity) 50d = 1.08 – 2.15 mg/L air	positive
Inhalation	OECD 414	Rat	LOAEC (maternal toxicity) 6 – 15d = 1.28 mg/L air	positive
Inhalation	OECD 414	Rat	NOAEC (developmental toxicity) 6 – 15d >= 2.56 mg/L air	negative
Inhalation	OECD 414	Rabbit	NOAEC (maternal toxicity + developmental toxicity) 6 – 18d >= 2.56 mg/L air	negative

Silica, amorphous, fumed, crystalline-free 112945-52-5

Exposure route	Method	Species	Does	Evaluation
Oral	OECD 414	Rat	NOAEL (maternal toxicity) = 1350 mg/kg bw / day NOAEL (teratogenicity) = 1350 mg/kg bw/day	negative

Alpha-methyl styrene 98-83-9

Exposure route	Method	Species	Does	Evaluation
Inhalation	Similar to OECD 414	Rat	LOAEC (maternal toxicity) = 297 ppm NOAEC (developmental toxicity) = 600 ppm LOAEL (maternal toxicity) = 180 mg/kg bw/day NOAEL (developmental toxicity) = 3000 mg/kg bw/day NOAEC (maternal toxicity) = 600 ppm	positive

Hydrocarbons, C9-C12, n-alkanes, isoalkanes, cyclics, aromatics (2-25%) 64742-82-1

Exposure route	Method	Species	Does	Evaluation
Inhalation	Similar to OECD 414	Rat	NOAEL (maternal toxicity) >= 5220 mg/m³ air NOAEC (developmental toxicity) >= 5220 mg/m³ air	negative

Hydroquinone 123-31-9

Exposure route	Method	Species	Does	Evaluation
Oral	OECD 414	Rat	NOEL (maternal toxicity and developmental toxicity) = 100 mg/kg bw / day	negative
Oral	EPA OTS 798.4900	Rabbit	NOEL (maternal toxicity) = 25 mg/kg bw / day NOEL (developmental toxicity) = 75 mg/kg bw / day	negative

Specific target organ toxicity (Single exposure)

May cause irritation of the respiratory tract.

Alpha-methyl styrene 98-83-9

Exposure route	Method	Species	Does	Remarks
Inhalation	No information available		C >= 600 ppm	

Hydroquinone 123-31-9

Exposure route	Method	Species	Does	Remarks
Oral	No information available	Mouse	NOAEL (90d) = 50 mg/kg bw / day	

Specific target organ toxicity (Repeated exposure)

Causes damage to organs through prolonged or repeated exposure, target organs(s): central nervous system, ears.

Styrene (100-42-5)

Exposure route	Method	Species	Does	Remarks
Inhalation	OECD 412	Rat Mouse	NOAEC (28d) = 3.47 mg/L air NOAEC (ototoxicity) 28d =2.13 mg/L air NOAEC (28d) = 0.181 mg/L air NOAEC (28d) = 0.688 mg/L air	
Inhalation	No information available	Rat	NOAEC (nasal tract) = 0.85 mg/L air NOAEC (overall) = 2.13 mg/L air NOAEC (ototoxicity) = 0.85 mg/L air LOAEC (ototoxicity) = 3.41 mg/L air	
Oral	No information available	Rat	NOAEC (toxicity) = 1000 mg/kg bw/day LOAEL (toxicity) = 2000 mg/kg bw/day	
Oral	No information available	Mouse	NOAEC (toxicity) = 150 mg/kg bw/day LOAEL (toxicity) = 300 mg/kg bw/day	
Inhalation	OECD 453	Rat	LOAEC local (toxicity) = 0.21 mg/L air	

Silica, amorphous, fumed, crystalline-free 112945-52-5

Exposure route	Method	Species	Does	Remarks
Oral	OECD 408	Rat	NOEL (highest dose) 4000 <= 4500 mg/kg bw/day 90d	
Inhalation	OECD 413	Rat	NOEC = 1.3 mg/m³ air NOEC < 1.3 mg/m³ air 90d	
Dermal	No information available	Rabbit	NOAEL >= 10000 mg/kg bw/day	

Alpha-methyl styrene 98-83-9

Exposure route	Method	Species	Does	Remarks
Inhalation	Similar to OECD 413	Rat	NOAEC (male/female) 14 weeks = 300 ppm	

Hydrocarbons, C9-C12, n-alkanes, isoalkanes, cyclics, aromatics (2-25%) 64742-82-1

Exposure route	Method	Species	Does	Remarks
Oral	Similar to OECD 408	Rat	NOAEL (female) 30d = 1056 mg/kg bw LOAEL (male) 30d = 116 mg/kg bw	
Inhalation	Similar to OECD 413	Rat	NOAEC (female) = 3950 mg/m³ LOAEC (male) = 1975 mg/m³ LOAEC (female) = 7400 mg/m³	
Dermal	Similar to OECD 411	Rat	NOAEL (systemic) >= 495 mg/kg bw/day	

Cobalt octolate 136-52-7

Exposure route	Method	Species	Does	Remarks
Oral	Read-across (analogy) cobalt dichloride hexahydrate OECD 408	Rat	NOAEL (30d) = 3 mg/kg bw/day	

Cobalt octolate 136-52-7

Exposure route	Method	Species	Does	Remarks
Oral	OECD 453	Rat	NOAEL (chronic toxicity) = 25 mg/kg bw/day	
Dermal	OECD 411	Rat	NOAEL (male) = 73.9 mg/kg bw/day NOAEL (female) 109.6 mg/kg bw/day	

Aspiration hazard: Due to the viscosity, this product does not present an aspiration hazard.

Other information: None

SECTION 12: Ecological Information

12.1 Toxicity

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
DO NOT flush into surface water or sanitary system.

Acute aquatic toxicity – component information

Chemical name	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates	Toxicity to fish	Toxicity to microorganisms
Styrene 100-42-5	EC50 (72h) = 4.9 mg/L (Pseudokirchnerella subcapitata) EPA OTS 797.1050	EC50 (48h) = 4.7mg/L (Daphnia magna) NOEC = 1.9 mg/L (Daphnia magna) OECD202	LC50 (96h) = 4.02 – 10 mg/L (Pimephales promelas) OECD 203	EC (30min) = 500mg/L (Activaled sludge of a predominantly domestic sewage) OECD 209

Silica, amorphous, fumed, crystalline-free 112945-52-5		EL50 (24h) >= 1000 mg/L (Daphnia magna) OECD 202	LC50 (96h) > 10000 mg/L (Brachydanio rerio) OECD 203	
Alpha-methyl styrene 98-83-9	EC50 (72h) = 11.441 mg/L (Desmodesmus subspicatus) NOEC (72h) = 2.26 mg/L (Desmodesmus subspicatus) LOEC (72h) = 8.3 mg/L (Desmodesmus subspicatus) OECO201, EU Method C.3	EC50 (48h) = 1.645mg/l (Daphnia magna) EC10 (48h) = 0.99 mg/L (Daphnia magna) NOEC (48h) = 0.64 mg/L (Daphnia magna) LOEC (48h) = 1.21 mg/L (Daphnia magna) OECD 202, EU Method C.2	LC50 (96h) = 2.97 mg/L (Danio rerio) NOEC (96h) = 2.13 mg/L (Danio rerio) LOEC (96h) = 3.19 mg/L (Danio rerio) OECD203,EU Method C.1	EC10 (3h) = 661.5 mg/L (Activated sludge of a predominantly domestic sewage) EC50 (3h) > 2000 mg/L (Activated sludge of a predominantly domestic sewage) OECD 209, EU Method C .11
Hydrocarbons, C9-C12, n-alkanes, isoalkanes, cyclics, aromatics (2-25%) 64742-82-1	EL50 (72h) = 4.1 mg/L (Pseudoikrchneriella subcapitata) NOELR (72h) = O.76 mg/ L (Pseudoikrchneriella subcapitata) OECD 201	EL50 (48h) = 10 - 22 mg/L (Daphnia magna) OECD 202	LL50 (96h) = 10- 30 mg/L (Oncorhynchus mykiss) OECD 203	
Cobalt octolate 136-52-7	EC50 (72h) = 144 µg Codiss./L (Pseudoikrchneriella subcapitata) NOEC (72h) = 32.2 µg./L (Pseudoikrchneriella subcapitata) LOEC (72h) = 52.7 µg Codiss./L (Pseudoikrchneriella subcapitata) OECD 201		LC50 (96h) = 1.512 mg/L (Oncorhynchus mykiss) NOEC (96h) = 0.939 mg/L (Oncorhynchus mykiss) LOEC (96h) = 1.577 mg/L (Oncorhynchus mykiss) ASTM guideline (1996)	EC10 (30 min) = 3.73 mg/L (Activated sludge) EC50 (30 min) = 120 mg/L (Activated sludge) Read across with CAS No: 7 646-79-9 OECD 209
Hydroquinone 123-31-9	ErC50 (72)h = 0.330 mg/L NOEC (72h) (growth rate) = 0. 019 mg/L (Pseudokirchnerella subcapitata) OECD 201	EC50 (48h) = 0.134 mg/L (Daphnia magna) OECD 202 NOEC (21d) = 0.0057 mg/L (Daphnia magna) OECD 211	LC50 (96h) = 0.638 mg/L (Oncorhynchus mykiss) OECD 203	

Chronic aquatic toxicity – Component information

Chemical name	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates	Toxicity to fish	Toxicity to microorganisms
Styrene 100-42-5		NOEC (21d) = 1.01 mg/L (Daphnia magna)		

Styrene 100-42-5 (continued.)		LOEC (21 d) = 2.06 mg/L (Daphnia magna) EC50 (21 d) =1.88 mg/L (Daphnia magna) OECD 203		
Alpha-methyl styrene 98-83-9		NOEC (21 d) = 0.401 mg/L (Daphnia magna) LC50 (21 d) = 1.56 mg/L (Daphnia magna) EC50 (21 d) = 1.11 mg/L (Daphnia magna) OECD 211		
Hydrocarbons, C9-C12, n-alkanes, isoalkanes, cyclics, aromatics (2-25%) 64742-82-1		EC5O (21 d) = 0.328 mg/L (Daphnia magna) OECD 211		
Cobalt octolate 136- 52-7	EC50 (7d) = 90.1 µg/L (Lemna minor) NOEC (7d) = 3 .0 µg/L (Lemna minor) LOEC (7d) = 8.8 µg/L (Lemna minor) OECD 221	NOECR (21 d) = 60.8 µg/L (Daphnia magna) LC50 (21 d) = 121.3 mg/L (Daphnia magna) LOECR (21 d) = 93.3 µg Codiss./L (Daphnia magna) OECD 211		

Effects on terrestrial organisms – Component information
Chronic toxicity

Styrene (100-42-5)

Chronic toxicity	Method	Species	Values	Remarks
Toxicity to invertebrates	OECD 207	Eisenia foetida	LC5O (14d) = 120m g/kg soil dw LOEC (burrowing time and mean percent weight change) = 65 mg/kg soil dw LOEC (survival) = 180 mg/kg soil dw NOEC (mean percent weight change) = 34 mg/kg soil dw	

12.2 Persistence and degradability

Chemical name	Degradation	Evaluation
Alpha-methyl styrene 98-83-9	Stable (pH= 4, 7, 9) 25”C OECD 111	Stable

Chemical name	Degradation	Evaluation
Styrene (100-42-5)	97% (20d) similar to OECO 301D	Readily biodegradable
Alpha-methyl styrene 98-83-9	21% (28d) OECD 30 1F, E U Method C.4-D 56% (28d) OECD 301D, EU Method C.4-E	Not readily biodegradable
Hydrocarbons, C9-C12, n-alkanes, isoalkanes, cyclics, aromatics (2-25%) 64742-82-1	74.7% (28d) (Activated sludge, domestic, non-adapted) OECD 301 F	Readily biodegradable
Cobalt octolate 136-52-7	60% (> 10d), OECD 301 B	Readily biodegradable
Hydroquinone 123-31-9	70 % (14d) OECD 301C	Readily biodegradable

12.3 Bio accumulative potential

Chemical name	Method	Species	Bio concentration factor (BCF)
Styrene 100-42-5	Calculation method		74
Alpha-methyl styrene 98-83-9	OECD 305 C	Cyprinus carpio	BCF (56d) = 15 – 140 (25°C) C = 0.3 mg/L BCF (56d) = 12 – 113 (25°C) C = 0.03 mg/L
Hydroquinone 123-31-9	No data available	Leuciscus idus melanotus	40 (3d)

Chemical name	Log Pow
Styrene 100-42-5	3
Alpha-methyl styrene 98-83-9	3.48
Hydroquinone 123-31-9	0.56

12.4 Mobility in soil

Chemical name	Log Koc	Koc
Styrene (100-42-5)	2.55	352
Alpha-methyl styrene 98-83-9	2.84	892
Hydroquinone 123-31-9	0.97 - 1.7	

12.5 Results of PBT and vPvB assessment

Chemical name	PBT	vPvB
Styrene (100-42-5)	This substance is not considered to be persistent, bio accumulating nor toxic (PBT).	This substance is not considered to be very persistent nor very bio accumulating (vPvB).

Silica, amorphous, fumed, crystalline-free 112945-52-5	This substance is not considered to be persistent, bio accumulating nor toxic (PBT).	This substance is not considered to be very persistent nor very bio accumulating (vPvB).
Alpha-methyl styrene 98-83-9	This substance is not considered to be persistent, bio accumulating nor toxic (PBT).	This substance is not considered to be very persistent nor very bio accumulating (vPvB).
Hydrocarbons, C9-C12, n-alkanes, isoalkanes, cyclics, aromatics (2-25%) 64742-82-1	This substance is not considered to be persistent, bio accumulating nor toxic (PBT).	This substance is not considered to be very persistent nor very bio accumulating (vPvB).
Hydroquinone 123-31-9	This substance is not considered to be persistent, bio accumulating nor toxic (PBT).	This substance is not considered to be very persistent nor very bio accumulating (vPvB).

12.6 Other adverse effects

None known

SECTION 13: Disposal Considerations

13.1 Waste treatment methods

Waste from residues / unused:	Dispose in accordance with the European Directives on waste and hazardous waste.
Products:	DO NOT flush into surface water or sanitary sewer system.
Contaminated packaging:	Empty containers should be taken to an approved waste handling site for recycling of disposal.
Other information:	According to the European Waste Catalogue, Waste Codes are not product specific, but application specific. Waste Codes should be assigned by the user based on the application for which the product was used.

SECTION 14: Transport Information

ADR/RID	IMDG/IMO	ICAO/IATA	ADN

14.1 UN Number

UN1866	UN1866	UN1866	UN1866

14.2 UN proper shipping name

UN1866, RESIN SOLUTION, 3, PG III, (D/E)	UN1866, RESIN SOLUTION, 3, PG III, (31°C c.c.)	UN1866, RESIN SOLUTION, 3, PG III	UN1866, RESIN SOLUTION, 3, PG III

14.3 Transport hazard class

Hazard class 3	Hazard class 3	Hazard class 3	Hazard class 3

14.4 Packing group

III	III	III	III

14.5 Environmental hazards

No	No	No	No

Marine pollutant: No

14.6 Special precautions for user

ADR/RID	Classification code: Tunnel restriction code: Limited quantity:	F1 (D/E) 5L
IMDG/IMO	EmS: Limited quantity:	F-E, S-E 5L
ICAO/IATA	ERG Code: Limited quantity:	3L 10L
ADN	Classification code: Limited quantity: Ventilation:	F1 5L VE01

Special precautions for users: No information available

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable.

SECTION 15: Regulatory Information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Regulation (EC) No. 1907/2006 (REACH)

Regulation (EC) No. 1272/2008 (CLP)

Regulation (EU) No. 830/2015

Directive 88/642/EEC

Directive 98/24/EC

Directive 1999/92/EC

Directive 2012/18/EU

SECTION 16: Other Information

None.

Disclaimer

The information provided in this Material Safety Data Sheet is correct to the best of our knowledge, in formation and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

End of Resin Material Safety Data Sheet

STRONGHOLD
GRP ROOFING SYSTEM

STRONGHOLD CATALYST

SAFETY DATA SHEET

In accordance with Regulation (EC) No 1907/2006

Revision date: 4th January 2021

SECTION 1: Identification of the Substance/Mixture and of the Company/Undertaking

1.1 Product identifier

Product name:	Stronghold Catalyst 601
Chemical name:	Organic Peroxide
Product form:	Mixture

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

Relevant identified uses:	Catalyst for Glass Reinforced Plastic (GRP) Roofing. Contact the manufacturer for any other application.

1.3 Details of the Supplier of the safety data sheet

Manufacturer/Supplier:	The Glass Fibre Roofing Company Ltd.
Address:	Unit 33 Pontygwindy Industrial Estate, Caerphilly CF83 3HU
Telephone number:	02920 888020
E-mail:	sales@strongholdgrp.co.uk

This document is available online at http://www.strongholdgrp.co.uk

1.4 Emergency telephone numbers

UK Telephone number:	02920 888020 (Office hours only)
UK Urgent medical problem:	111 (NHS Direct)
UK Life-threatening emergency:	999

SECTION 2: Hazards Identification

2.1 Classification according to Regulation (EC) No 1272/2008 (CLP)

Flammable liquids:	Category 2	H226 Flammable liquid and vapour.
Skin corrosion:	Category 1B	H314: Causes severe skin/eye damage.
Acute toxicity:	Category 4	H302 Harmful if swallowed.
Organic peroxides:	Type D	H242 Heating may cause a fire.

Oxidising:	R 7: May cause fire. R10: Flammable.
Corrosive:	R34: Causes burns.
Harmful:	R22: Harmful if swallowed.

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008 [CLP]

Hazard pictograms:

Signal word: Danger

Hazard statements:

Flammable liquid and vapour	H226
Heating may cause a fire	H242
Harmful if swallowed	H302
Causes severe skin burns and eye damage	H314

Precautionary statements - Prevention:

Keep away from heat/sparks/open flames/ hot surfaces – no smoking	P210
Keep/store away from clothing/ strong acids, bases, heavy metal salts and other reducing substances /combustible materials	P220
Keep cool	P235
Do not get in eyes, on skin, or on clothing	P262
Wear protective gloves/protective clothing/eye protection/face protection	P280

Precautionary statements - Response:

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing	P305+P351+P338
Get immediate medical advice/ attention	P315
Use dry sand, dry chemical or alcohol-resistant foam for extinction	P378

Precautionary statements - Storage:

Store in a well-ventilated place. Keep container tightly closed	P403 + P233

Precautionary statements - Disposal:

Dispose of contents/ container to an approved waste disposal plant	P501

Other hazards: No information available.

SECTION 3: Composition/Information on Ingredients

3.1 Substances

Chemical name	CAS-No. EC-No. REACH Registration No.	% Weight	GHS Classification
Methyl Ethyl Ketone Peroxide	1338-23-4 215-661-2 01-211951469143-0000	>=25 - <35	Org. Perox. C (H242) Acute Tox. 4 (H302) Skin Corr. 1B (H314)
4-Hydroxy-4-Methylpentan-2-one	123-42-2 204-626-7	>=12.5 - <15	Flam. Liq. 2 (H225) Eye Irrit. 2 (H319) STOT SE 3 (H336)
Butanone	78-93-3 201-159-0	>= 3 - < 5	Flam. Liq. 2 (H225) Eye Irrit. 2 (H319) STOT SE 3 (H336)
Hydrogen Peroxide Solution	7722-84-1 231-765-0	>= 3 - < 5	Ox. Liq. 1 (H271) Acute Tox. 4 (H332) Acute Tox. 4 (H302) Skin Corr. 1A (H314)

SECTION 4: First Aid Measures

4.1 Description of first aid measures

General advice: Take off all contaminated clothing immediately.
Never give anything by mouth to an unconscious person.

General advice (cont.):	Remove from exposure, and lie down. In the case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
Eye Contact:	In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
Skin contact:	Wash off immediately with soap and plenty of water.
Inhalation:	Move to fresh air. Consult a physician immediately.
Ingestion:	Clean mouth with water and drink afterwards plenty of water. If a person vomits when lying on his back, place him in the recovery position. DO NOT induce vomiting. If swallowed, seek medical advice immediately and show this container or label.

4.2 Most important symptoms and effects, both acute and delayed

No data available.

4.3 Indication of any immediate medical attention and special treatment needed

No data available.

SECTION 5: Firefighting Measures

5.1 Extinguishing media

Suitable extinguishing media:	Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Unsuitable extinguishing media:	DO NOT use a solid water stream as it may scatter and spread fire.

5.2 Special hazards arising from the substance or mixture

Fire hazard:	Special exposure hazards arising from the substance or preparation itself, combustion products, resulting gases Cool closed containers exposed to fire with water spray. DO NOT allow run-off from fire-fighting to enter drains or water courses.

5.3 Advice for firefighters

Protective equipment for firefighters:	Use personal protective equipment.
Other information:	Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

SECTION 6: Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

Wear respiratory protection. Wear personal protective equipment.

6.2 Environmental precautions

Environmental precautions:	Avoid subsoil penetration. DO NOT allow material to contaminate ground water system. DO NOT contaminate water. If the product contaminates rivers and lakes or drains inform respective authorities. DO NOT let product enter drains.

6.3 Methods and material for containment and cleaning up

Methods for cleaning up:	Remove mechanically and with care (e.g. with clean polyethylene plastic shovel). Contain and collect spillage with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations.

6.4 Reference to other sections

See sections 7, 8, 11, 12 and 13 for more information.

6.5 Other information

Never add other substances or waste material to product residue. Move product residue to a safe place and dispose of properly.

SECTION 7: Handling and Storage

7.1 Precautions for safe handling

Precautions for safe handling:	For personal protection see section 8.
Dust explosion class:	No data available

7.2 Conditions for safe storage, 3 including any incompatibilities

Technical measures & Storage conditions:	Electrical installations / working materials and containers must comply with the technological safety standards. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Keep containers tightly closed. No smoking.
Materials to avoid:	Avoid impurities (e.g. rust, dust, ash), risk of decomposition.
Storage temperature:	< 30 °C
Other data:	Storing temperature for reasons of quality. Liquid up to -25 °C.

7.3 Specific end use(s)

The identified uses for this product are detailed in Section 1.2.

SECTION 8: Exposure Controls / Personal Protection

8.1 Control parameters

Chemical name	CAS-No.	Control parameters	Basis	Update
4-hydroxy-4-methylpentan-2-one (diacetone alcohol)	123-42-2	AGW: 96 mg/m3, 20 ppm	DE TRGS 900	01-2006
Methylethylketone	78-93-3	AGW: 600 mg/m3, 200 ppm	DE TRGS 900	01-2006
4-hydroxy-4-methylpentan-2-one	123-42-2	AGW: 96 mg/m3, 20 ppm DFG, H,	DE TRGS 900	2006-01-01
Butanone	78-93-3	AGW: 600 mg/m3, 200 ppm DFG, H, Y,	DE TRGS 900	2006-01-01

Other information on limit values: see chapter 16

Biological occupational exposure limits - TRGS903

Chemical name	CAS-No.	Control parameters	Sampling time	Update
Butanone	78-93-3	2-butanon: 5 mg/l (U)	a	2004-08-01

Remarks:	a	No time limit
	b	Immediately after exposition or after working hours
	c	In case of long-term exposition: after more than one shift
	d	Before the next shift

8.2 Exposure controls

Occupational exposure limits

Engineering measures: Provide adequate ventilation.

Personal protective equipment

Remarks: Skin should be washed after contact.

Respiratory protection: Short duration filter unit: Filter A

Eye protection: Tightly fitting safety goggles
Face protection.

Skin and body protection: Protective suit
Remove and wash contaminated clothing before re-use.

Hand protection: Material: butyl-rubber
Glove thickness: 0,5 mm
Break through time: >= 8 h

Hygiene measures: Wash hands before breaks and immediately after handling the product.
Keep away from food, drink and animal feeding stuffs.

Environmental exposure controls

Environmental exposure controls: Avoid subsoil penetration.
Do not allow material to contaminate ground water system.
Do not contaminate water.
If the product contaminates rivers and lakes or drains inform respective authorities.
Do not let product enter drains.

SECTION 9: Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Property	Values	Remark
Appearance	Colourless	
Physical state	Liquid	
Particle size	No data available	No data available
Odour	Characteristic	
Odour threshold	No data available	No data available
pH	No data available	No data available
Melting point/range	<-25°C	
Freezing point	<-25°C	
Boiling point	145°C	
Flash point	57°C	
Evaporation rate	Not relevant	No data available
Flammability limits in air		
Upper	Not applicable	No data available
Lower	Not applicable	No data available
Vapour pressure	0.184 Pa @ 25°C	
Vapour density	No data available	No data available
Density	1.01 g/cm³ @ 20°C	
Water solubility	Ca. 6.5 g/l at 20°C	
Partition coefficient	Log Pow: <0.3 at 25°C	
n-octanol/water		
Solubility in other solvents	Mixable Medium – Phthalates	
Auto ignition temperature	Not applicable	Decomposes on heating
Decomposition temperature	ca. 60 °C, SADT (UN test H.4),	SADT possible at temperatures above approximately 60 °C.
Viscosity, kinematic	No data available	No data available
Viscosity, dynamic	13 mPa.s at 20 °C	
Explosive properties	No data available	No data available
Oxidizing properties	Organic peroxide	

Other safety information

Property	Values	Remark
Refractive index	1,431 at 20 °C	

SECTION 10: Stability and Reactivity

10.1 Reactivity

Stable under recommended storage conditions.

10.2 Chemical stability

Contact with incompatible substances can cause disintegration at or below SADT.

10.3 Possibility of hazardous reactions

Vapours may form explosive mixture with air.

10.4 Conditions to avoid

Keep away from heat and sources of ignition.

10.5 Incompatible materials

Accelerators, strong acids and bases, heavy metals and heavy metal salts, reducing agents,
Avoid impurities (e.g. rust, dust, ash), risk of decomposition.

10.6 Hazardous decomposition products

Irritant, caustic, flammable, noxious/toxic gases and vapours can develop in the case of fire and decomposition.
Thermal decomposition: ca. 60 °C Method: SADT (UN test H.4)

Note: SADT possible at temperatures above approximately 60 °C.

SECTION 11: Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Butanone - Inhalation:	Inhalation of high vapour concentrations can cause CNS-depression and narcosis. Inhalation of vapours in high concentration may cause shortness of breath (lung oedema).

Chemical name	LD50 Oral	LD50 Dermal	Inhalation
Methyl Ethyl Ketone Peroxide (40% in dimethylphthalate)	1.017 mg/kg	4.000 mg/kg	17(4h)mg/l *

***Note:** Aerosol, Nominal concentration

Skin corrosion/irritant:	Causes burns.
Serious Eye Damage/Eye Irritation:	Causes burns.

Respiratory or skin sensitisation:	Method: Maximisation Test Test substance: Methyl Ethyl Ketone Peroxide (60% in dimethylphtha-late/diacetone alcohol) Did not cause sensitization on laboratory animals. Germ cell mutagenicity Genotoxicity in vitro: Not mutagenic in Ames Test.
Carcinogenicity:	No data available
Reproductive toxicity:	No data available
Teratogenicity:	Not classified
Specific target organ toxicity (single exposure):	No data available
Specific target organ toxicity (repeated exposure):	No data available
Aspiration hazard:	No data available

SECTION 12: Ecological Information

12.1 Toxicity

Chemical name	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates	Toxicity to fish	Toxicity to bacteria
Methyl Ethyl Ketone Peroxide (33% in dimethylphthalate)			LC50 (96h) = 44.2 mg/L	EC50 (30m) = 48 mg/L
Methyl Ethyl Ketone Peroxide (40% in dimethylphthalate)	EC50 (72h) = 5.6 mg/L	EC50 (48h) = 39 mg/L		

12.2 Persistence and degradability

Biodegradability:	Readily biodegradable.
Method:	Closed Bottle Test
Test substance:	Methyl Ethyl Ketone Peroxide (MEKP)

12.3 Bio accumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

This mixture contains no substance considered to be persistent, bioaccumulating nor toxic (PBT).

12.6 Other adverse effects

No data available

SECTION 13: Disposal Considerations

13.1 Waste treatment methods

Disposal:	Dispose of in conjunction with appropriate waste disposal authorities and in accordance with disposal regulations. Waste codes should be assigned by the user based on the application for which the product was used.

SECTION 14: Transport Information

ADR	RID	IATA	IMDG

14.1 UN Number

UN3105	UN3105	UN3105	UN3105

14.2 UN proper shipping name

ORGANIC PEROXIDE TYPE D, LIQUID (Methyl Ethyl Ketone Peroxide)	ORGANIC PEROXIDE TYPE D, LIQUID (Methyl Ethyl Ketone Peroxide)	ORGANIC PEROXIDE TYPE D, LIQUID (Methyl Ethyl Ketone Peroxide)	ORGANIC PEROXIDE TYPE D, LIQUID (Methyl Ethyl Ketone Peroxide)

14.3 Transport hazard class

5.2	5.2	5.2	5.2

14.4 Packing group

--	--	--	--

14.5 Environmental hazards

No	No	No	No

Marine pollutant: No

14.6 Special precautions for user

ADR	Classification code: Tunnel restriction code: Limited quantity:	P1 (D) LQ16
RID	Classification code: Hazard identification No.: Limited quantity:	P1 539 LQ16
IATA	Labels: Packing instruction:	5.2 (HEAT) 570
IMDG	EmS:	F-J, S-R
Marine pollutant:	No	
Special precautions for users:	See chapter 6, 7 and 8.	

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable.

SECTION 15: Regulatory Information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Regulation (EC) No. 1907/2006 (REACH)

Regulation (EC) No. 1272/2008 (CLP)

Regulation (EU) No. 830/2015

Directive 88/642/EEC

Directive 98/24/EC

Directive 1999/92/EC

Directive 2012/18/EU

SECTION 16: Other Information

None.

Disclaimer

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End of Catalyst Material Safety Data Sheet

STRONGHOLD
GRP ROOFING SYSTEM

CHOPPED STRAND MAT
SAFETY DATA SHEET

In accordance with Regulation (EC) No 1907/2006

Revision date: 4th January 2021

SECTION 1: Identification of the Substance/Mixture and of the Company/Undertaking

1.1 Product identifier

Product name:	Stronghold Continuous Filament Glass Fibre (CFGF) 901
Chemical name:	Fibre Glass
Product form:	Substance (Technically an article)

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

Relevant identified uses:	Reinforcement for Glass Reinforced Plastic GRP Roofing. Contact the manufacturer for any other application.

1.3 Details of the Supplier of the safety data sheet

Manufacturer/Supplier:	The Glass Fibre Roofing Company Ltd.
Address:	Unit 33 Pontygwindy Industrial Estate, Caerphilly CF83 3HU
Telephone number:	02920 888020
E-mail:	sales@strongholdgrp.co.uk

This document is available online at http://www.strongholdgrp.co.uk

1.4 Emergency telephone numbers

UK Telephone number:	02920 888020 (Office hours only)
UK Urgent medical problem:	111 (NHS Direct)
UK Life-threatening emergency:	999

SECTION 2: Hazards Identification

2.1 Classification according to Regulation (EC) No 1272/2008 (CLP)

Continuous Filament Glass Fibre (CFGF) Products are not classified as a dangerous substance in accordance with regulations. They are not subject to notification under chemical regulations such as REACH, are not subject to classification and labelling according to GHS and do not technically require a Safety Data Sheet (SDS). An SDS is provided to ensure safe use and handling and use of CFGF products.

This substance does not have a workplace exposure limit.
This substance is not identified as a PBT substance.

Health Hazards

Irritating to skin:	Category 3
Eye irritation:	Category 2B
Acute toxicity:	Category 5

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008 [CLP]
Hazard pictograms:

Signal word:	Warning

Hazard statements:

May be harmful if swallowed.	H303
Causes mild skin irritation.	H316
Causes eye irritation.	H320
May be harmful if inhaled.	H333

Precautionary statements - Prevention:

Wash contaminated skin thoroughly after handling.	P264
Wear protective gloves/protective clothing/eye protection/face protection.	P280

Other hazards: No information available.

SECTION 3: Composition/Information on Ingredients

3.1 Substances

Product name	Glass %	Size %	Binder %	Water %
Woven roving	98.8 – 99.85	0.15 – 1.00	Nil	0 – 0.20
Emulsion chopped strand mat	93.5 - 96.65	0.35 – 1.35		0 – 0.20

Fibre glass: CAS No 65997-17-3

Size: Size is a mixture of chemicals applied to the glass strands. Most of this mixture is made up of basically non-reactive high molecular weight polymers, often natural ingredients (starches) with no reactive sites, which are not listed as substances in the EINECS nor in the ELINCS appendices.

Sometimes size also contains substances of organosilane family or other substances. The manufacturer considers this risk as negligible as, even though listed as dangerous products, the concentration is extremely low (under 0.1% of total weight) and they are polymerised during the production of glass fibres production.

SECTION 4: First Aid Measures

4.1 Description of first aid measures

Eye Contact:	Immediately flush eyes with clean water for at least 15 minutes. If irritation persists, get medical help.
Skin contact:	If irritation occurs to the skin, rinse with soap and water. Make sure to refrain from rinsing with warm water since warm water will make the skin pores open to allow fibreglass to penetrate more deeply. If fibreglass penetrates the skin, use a wash cloth to help pull out the fibreglass. To avoid further irritation, do not rub or scratch affected skin. If irritation persists, get medical help. Make sure to refrain from using compressed air to remove fibreglass from the skin.
Inhalation:	If inhaled, immediately remove the affected person to fresh air. If irritation persists, get medical help.
Ingestion:	Normally, ingestion of this material is unlikely. If it does occur, watch the person for several days to make sure that gastrointestinal disturbance does not occur. Do not let the person vomit unless required by medical personnel. If disturbance persists, get medical help.

4.2 Most important symptoms and effects, both acute and delayed

Inhalation:	Ingestion of the material is unlikely. However, ingestion of the material may cause gastrointestinal disturbance.
Ingestion:	Breathing fibreglass dusts and particulates may cause irritation of the nose, throat and respiratory tract.
Skin contact:	Fibreglass dusts and particulates may cause temporary irritation.
Eye Contact:	Fibreglass dusts and particulates may cause temporary irritation to the eyes.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician:	No information available.

SECTION 5: Firefighting Measures

5.1 Extinguishing media

Suitable extinguishing media:	Non-flammable. But the size and packing material may burn. Use dry chemical, foam, carbon dioxide and water as extinguishing media.

5.2 Special hazards arising from the substance or mixture

Hazardous combustion products:	Primary combustion products are carbon monoxide, hydrogen, carbon dioxide and water. Other undetermined compounds can be released in small quantities.

5.3 Advice for firefighters

Protective equipment for firefighters:	Fire fighters must use self-contained breathing apparatus and wear full protective gear.

SECTION 6: Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel:	Remove all sources of ignition, heat, flames and sparks. Take precautionary measures against static charges. Ensure adequate ventilation. Use personal protective equipment.
For emergency responders:	Avoid breathing vapours or mists. In the event of fire and/or explosion DO NOT breathe fumes. Use personal protective equipment.

6.2 Environmental precautions

Environmental precautions:	The product should not be allowed to enter drains, water courses or the soil. DO NOT flush into surface water or sanitary sewer system.

6.3 Methods and material for containment and cleaning up

Methods for cleaning up:	In case of release to land, the material should be scooped up as waste and put into a special container and stored in a designated area. In case of release of water, the material will sink and disperse along the bottom of waterways or ponds and cannot be easily removed after it is waterborne. However, the material is non-hazardous in water.

SECTION 7: Handling and Storage

7.1 Precautions for safe handling

Precautions for safe handling:	Try to prevent the packing material from be damaged and keep the product inside the packing material to minimize the generation of dusts. Maintain a clean work environment and avoid generation of fibreglass fragments from improper handling.

7.2 Conditions for safe storage, 3 including any incompatibilities

Storage conditions:	Keep product in its packaging until use to minimize potential dust generation.

7.3 Specific end use(s)

The identified uses for this product are detailed in Section 1.2.

SECTION 8: Exposure Controls / Personal Protection

8.1 Control parameters

National and international hygiene standards are as follows:

Component	Permissible Exposure Limit of OSHA (8-hr Average Weight)	Permissible Exposure Limit of ACGIH (8 hr Average Weight)
Total Dust	15 mg/m3	10 mg/m3
Respirable particulates	5 mg/m3	3 mg/m3
Respirable Fibre	Not available	1 fibre/ml

8.2 Exposure controls

Occupational exposure limits

Engineering measures:	Production areas are closed off and a required relative humidity is maintained.

Personal protective equipment

General Information:	Use personal protective equipment.
Respiratory protection:	Wear a suitable mask when working in an environment where dust concentration is high.
Eye protection:	Wear safety glasses and face shield.
Skin and body protection:	Normal loose working clothing (long-sleeved shirts and long pants) is recommended. Skin irritation occurs primarily at the contact areas such as around the neck and waist.
Hand protection:	Wear gloves. Skin irritation occurs primarily at the contact areas such as wrists and between the fingers.

Environmental exposure controls

Environmental exposure controls:	DO NOT allow material to contaminate ground water system.

SECTION 9: Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Property	Values	Remark
Appearance	White / off white	
Physical state	Solid	
Particle size	No data available	No data available
Odour	No odour	
Odour threshold	No data available	No data available
pH	No data available	No data available
Melting point/range	No data available	No data available
Freezing point	No data available	No data available
Boiling point	No data available	No data available
Flash point	No data available	No data available
Evaporation rate	No data available	No data available
Flammability limits in air		
Upper	>800°C	
Lower	No data available	No data available
Vapour pressure	No data available	No data available
Vapour density	No data available	No data available
Density	No data available	No data available
Water solubility	No data available	No data available
Partition coefficient	No data available	No data available
n-octanol/water	No data available	No data available
Solubility in other solvents	No data available	No data available
Auto ignition temperature	No data available	No data available
Decomposition temperature	No data available	No data available
Viscosity, kinematic	No data available	No data available
Viscosity, dynamic	No data available	No data available
Explosive properties	No data available	No data available
Oxidizing properties	No data available	No data available

SECTION 10: Stability and Reactivity

10.1 Reactivity

This is a non-reactive material.

10.2 Chemical stability

This is a stable material.

10.3 Possibility of hazardous reactions

None.

10.4 Conditions to avoid

None.

10.5 Incompatible materials

None.

10.6 Hazardous decomposition products

Hazardous polymerisation will not occur.

SECTION 11: Toxicological Information

11.1 Information on toxicological effects

Acute toxicity:	None.
Irritability:	Fibreglass dusts may cause irritation to skin and eye. Ingestion of fibreglass may cause irritation to the throat, stomach and gastrointestinal tract. Inhalation may cause coughing, sneezing and nose and throat irritation. Experience indicates that inhalation of a large amount of fibreglass may cause difficulty in breathing, congestion and chest tightness.
Carcinogenicity:	The International Agency for Research on Cancer (IARC), agency of the World Health Organization (WHO), has determined that fibreglass is a non-carcinogenic material because the evidence is inadequate to prove that fibreglass can cause humans and experimental animals to develop cancer.

SECTION 12: Ecological Information

12.1 Toxicity

No data available for this product. Fibreglass products are not listed as a material harmful to animals, plants and fish.

The product contains a substance or substances that will contribute to global warming (greenhouse effect). Not expected to have ozone depletion potential.

SECTION 13: Disposal Considerations

13.1 Waste treatment methods

RCRA Hazard Class:	Non-hazardous.
Disposal Instructions:	Dispose waste material according to local environmental regulations.

SECTION 14: Transport Information

Transport instructions:
Rolling and moisture should be avoided in transit.

14.1 UN Number

None.

14.2 UN proper shipping name

None.

14.3 Transport hazard class

None.

14.4 Packing group

None.

14.5 Environmental hazards

None.

SECTION 15: Regulatory Information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Continuous Filament Glass Fibre (CFGF) Products are not classified as a dangerous substance in accordance with regulations. They are not subject to notification under chemical regulations such as REACH, are not subject to classification and labelling according to GHS and do not technically require a Safety Data Sheet (SDS). An SDS is provided to ensure safe use and handling and use of CFGF products.

SECTION 16: Other Information

None.

Disclaimer

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End of Continuous Filament Glass Fibre Material Safety Data Sheet

STRONGHOLD
GRP ROOFING SYSTEM

STRONGHOLD GRP TOPCOAT

SAFETY DATA SHEET

In accordance with Regulation (EC) No 1907/2006

Revision date: 28th January 2022

SECTION 1: Identification of the Substance/Mixture and of the Company/Undertaking

1.1 Product identifier

Product name:	Stronghold Topcoat 202
Chemical name:	Unsaturated polyester resin
Product form:	Mixture

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

Relevant identified uses:	Topcoat for Glass Reinforced Plastic (GRP) Roofing. Contact the manufacturer for any other application.

1.3 Details of the Supplier of the safety data sheet

Manufacturer/Supplier:	The Glass Fibre Roofing Company Ltd.
Address:	Unit 33 Pontygwindy Industrial Estate, Caerphilly CF83 3HU
Telephone number:	02920 888020
E-mail:	sales@strongholdgrp.co.uk

This document is available online at http://www.strongholdgrp.co.uk

1.4 Emergency telephone numbers

UK Telephone number:	02920 888020 (Office hours only)
UK Urgent medical problem:	111 (NHS Direct)
UK Life-threatening emergency:	999

SECTION 2: Hazards Identification

2.1 Classification according to Regulation (EC) No 1272/2008 (CLP)

Skin corrosion/irritation:	Category 2
Serious eye damage/eye irritation:	Category 2
Acute toxicity (inhalation: dust, mist):	Category 4
Reproductive Toxicity:	Category 2
Specific Target Organ Toxicity (repeated exposure):	Category 1
Carcinogenicity:	Category 2
Chronic Aquatic Toxicity:	Category 1
Flammable liquids:	Category 3

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008 [CLP]

Hazard pictograms:

Signal word: Danger

Hazard statements:

Flammable liquid and vapour	H226
Causes skin irritation	H315
Causes serious eye irritation	H319
Suspected of damaging the unborn child	H361d
Causes damage to organs through prolonged or repeated exposure if inhaled	H372
Suspected of causing cancer	H351
Very toxic to aquatic life with long lasting effects	H410

Precautionary statements - Prevention:

Keep away from heat/sparks/open flames/ hot surfaces – no smoking	P210
Use explosion proof electrical equipment	P241
Wash hands thoroughly after handling	P264
Use only outdoors in a well ventilated area	P271
Avoid release to the environment	P273
Wear protective gloves/protective clothing/eye protection/face protection	P280

Precautionary statements - Response:

In case of fire: Use Water fog, foam, extinguishing powder, carbon dioxide (CO2) for extinction	P370+P378

Other hazards:	No information available.

SECTION 3: Composition/Information on Ingredients

3.1 Substances

Chemical name	CAS-No. EC-No. REACH Registration No.	% Weight	GHS Classification
Styrene	100-42-5 202-851-5 01-2119457861-32	25 – 50	Flam. Liq. 3 (H226) Repr. 2 (H361d) Acute Tox. 4 (Inhalation (H332) Skin Irrit. 2 (H315) Eye Irrit. 2 (H319) Asp. Tox. 1 (H304) STOT SE 3 (H335) STOT RE 1 (H372) Aquatic Chronic 3 (H412)

SECTION 4: First Aid Measures

4.1 Description of first aid measures

General advice:	Show this safety data sheet to the doctor in attendance. DO NOT breathe dust/fume/gas/mist/ vapours/spray.
Eye Contact:	Rinse thoroughly with plenty of water, also under the eyelids. Keep eye wide open while rinsing. If symptoms persist, call a physician.
Skin contact:	Wash off immediately with soap and plenty of water removing all contaminated clothes and shoes. If skin irritation persists, call a physician.
Inhalation:	Move to fresh air. If not breathing, give artificial respiration. Consult a physician.
Ingestion:	DO NOT induce vomiting. Rinse mouth. Consult a physician.

Protection of first-aiders:	Use personal protective equipment. See section 8 for more info.

4.2 Most important symptoms and effects, both acute and delayed

Eye Contact:	Irritating to eyes.
Skin contact:	Irritating to skin. May cause sensitisation by skin contact.
Inhalation:	Danger of serious damage to health by prolonged exposure through inhalation. Irritating to respiratory system.
Ingestion:	Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician:	No information available.

SECTION 5: Firefighting Measures

5.1 Extinguishing media

Suitable extinguishing media:	Dry chemical, Foam, Carbon dioxide (CO2), (closed systems).
Unsuitable extinguishing media:	DO NOT use a solid water stream as it may scatter and spread fire.

5.2 Special hazards arising from the substance or mixture

Fire hazard:	Special exposure hazards arising from the substance or preparation itself, combustion products, resulting gases
Explosion hazard:	Vapours may form explosive mixtures with air. Most vapours are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements. tanks). Heating or fire can release toxic gas: Carbon monoxide.

5.3 Advice for firefighters

Protective equipment for firefighters:	Wear self-contained breathing apparatus and protective suit.
Other information:	Cool containers/ tanks with water spray. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

SECTION 6: Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel:	Remove all sources of ignition, heat, flames and sparks. Take precautionary measures against static charges. Ensure adequate ventilation. Use personal protective equipment.
For emergency responders:	Avoid breathing vapours or mists. In the event of fire and/or explosion DO NOT breathe fumes. Use personal protective equipment.

6.2 Environmental precautions

Environmental precautions:	The product should not be allowed to enter drains, water courses or the soil. DO NOT flush into surface water or sanitary sewer system.

6.3 Methods and material for containment and cleaning up

Methods for cleaning up:	Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). Use clean non-sparking tools to collect absorbed material.

6.4 Reference to other sections

See section 8 and section 12 for more information.

SECTION 7: Handling and Storage

7.1 Precautions for safe handling

Precautions for safe handling:	Avoid static electricity build up with connection to earth. Use only in area provided with appropriate exhaust ventilation. In case of insufficient ventilation, wear suitable respiratory equipment. For personal protection see section 8.
Prevention of fire and explosion:	Keep away from open flames, hot surfaces and sources of ignition. Empty containers may contain flammable or explosive vapours.
Hygiene measures:	When using, DO NOT eat, drink or smoke. Wash hands before breaks and at the end of the workday. Provide regular cleaning of equipment, work area and clothing.

7.2 Conditions for safe storage, 3 including any incompatibilities

Technical measures & Storage conditions:	Keep in a dry, cool and well-ventilated place. Keep at temperature not exceeding 30°C. Keep away from heat and sources of ignition.
Materials to avoid:	Strong oxidizing agents, peroxides, reducing agents.
Packaging material:	Metallic GRP (Glass Reinforced Plastic) containers.

7.3 Specific end use(s)

The identified uses for this product are detailed in Section 1.2.

SECTION 8: Exposure Controls / Personal Protection

8.1 Control parameters

Occupational exposure limits

Chemical name	TWA – 8 hours	STEL – 15 mins
Styrene 100-42-5	100 ppm – 430 mg/m^3	250 ppm 1080 mg/m^3

8.2 Exposure controls

Occupational exposure limits

Engineering measures:	Apply technical measures to comply with the occupational exposure limits. When working in confined spaces (tanks, containers, etc.), ensure that there is a supply of air suitable for breathing and wear the recommended equipment.

Personal protective equipment

General Information:	Use personal protective equipment.
Respiratory protection:	Provide a good standard of ventilation (not less than 3 to 5 air changes per hour) If exposure limits are likely to be exceeded (in case of insufficient ventilation) wear suitable respiratory equipment: Breathing apparatus with filter Type A (Organic gases and vapours filler conforming lo EN 14387, APF40 < 1 hour. APF 200> 1 hour) I Type A(2)/P3 in combination with Particulates filler conforming to EN 143,if exposed to dust.
Eye protection:	Safety glasses with side-shields. DO NOT wear contact lenses.
Skin and body protection:	Wear fire flame resistant/retardant clothing. Antistatic/ protective shoes or boots.
Hand protection:	Wear chemically resistant gloves (tested to EN 374) in combination with "basic" employee training.

Environmental exposure controls

Environmental exposure controls:	DO NOT allow material to contaminate ground water system.

SECTION 9: Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Property	Values	Remark
Appearance	Grey	Dependent on pigment
Physical state	Liquid	
Particle size		No data available
Odour	Styrene	
Odour threshold	0.15 ppm	Values related to styrene
pH		No data available
Melting point/range	-30°C	Values related to styrene
Freezing point		No data available
Boiling point	145°C	Values related to styrene
Flash point	32°C	Values related to styrene
Evaporation rate		No data available
Flammability limits in air		
Upper	6.1 – 6.8 %	Values related to styrene
Lower	0.9 – 1.1 %	Values related to styrene
Vapour pressure	1 kPa @ 25°C	Values related to styrene
Vapour density	3.6	Values related to styrene
Density	1.03 – 1.10 g/cm³ @ 20°C	Values related to styrene

Water solubility	Insoluble in water	No data available
Partition coefficient	3	Values related to styrene
n-octanol/water		
Solubility in other solvents	Medium – Organic solvents Medium – Phthalates	Values related to styrene
Auto ignition temperature	490 °C	Values related to styrene
Decomposition temperature		No data available
Viscosity, kinematic	xxx – xxx mm^2/s @ 25°C	
Viscosity, dynamic	800 - 1,000 mPa s @ 25°C	
Explosive properties		No data available
Oxidizing properties		No data available

Other safety information

Property	Values	Remark
Solubility in other solvents	Soluble in most organic solvents	Values related to styrene

SECTION 10: Stability and Reactivity

10.1 Reactivity

Product may ignite and burn at temperatures exceeding the flash point.

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

In use, may form flammable/explosive vapour-air mixture.

10.4 Conditions to avoid

Heat, flames and sparks. Exposure to light. Take precautionary measures against static charges.

10.5 Incompatible materials

Strong oxidizing agents, peroxides, reducing agents.

10.6 Hazardous decomposition products

Incomplete combustion and thermolysis produces potentially toxic gases such as carbon monoxide and carbon dioxide.

SECTION 11: Toxicological Information

11.1 Information on toxicological effects

Acute toxicity

Inhalation:	Danger of serious damage to health by prolonged exposure through inhalation. Irritating to respiratory system.
Ingestion:	Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.

Chemical name	LD50 Oral	LD50 Dermal	ATE CLP (dust, mist)
Styrene 100-42-5	> 5000 mg/kg	> 5000 mg/kg	3,000 mg/L 4h

Skin corrosion/irritant:	Causes skin irritation.
Serious Eye Damage/Eye Irritation:	Causes serious eye irritation.
Respiratory or skin sensitisation:	Not classified
Mutagenic effects:	Not classified
Carcinogenicity:	Suspected of causing cancer.
Reproductive toxicity:	Suspected of damaging fertility or the unborn child.
Specific target organ toxicity (single exposure):	Not classified
Specific target organ toxicity (repeated exposure):	Causes damage to organs through prolonged or repeated exposure.
Aspiration hazard:	Due to the viscosity, this product does not present an aspiration hazard.
Other information:	None

SECTION 12: Ecological Information

12.1 Toxicity

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
DO NOT flush into surface water or sanitary system.

Acute aquatic toxicity – component information

Chemical name	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates	Toxicity to fish
Styrene 100-42-5	EC50 (72h) = 4.9 mg/L	EC50 (48h) = 4.7 mg/L	LC50 (96h) = 4.02 mg/L

12.2 Persistence and degradability

No additional information available

12.3 Bio accumulative potential

No additional information available

12.4 Mobility in soil

No additional information available

12.5 Results of PBT and vPvB assessment

No additional information available

12.6 Other adverse effects

None known

SECTION 13: Disposal Considerations

13.1 Waste treatment methods

Waste from residues / unused:	Dispose in accordance with the European Directives on waste and hazardous waste.
Products:	DO NOT flush into surface water or sanitary sewer system.
Contaminated packaging:	Empty containers should be taken to an approved hazardous or special waste handling site for recycling and disposal.
Other information:	According to the European Waste Catalogue, Waste Codes are not product specific, but application specific. Waste Codes should be assigned by the user based on the application for which the product was used.

SECTION 14: Transport Information

ADR/RID	IMDG/IMO	ICAO/IATA	ADN

14.1 UN Number

UN1866	UN1866	UN1866	UN1866

14.2 UN proper shipping name

UN1866, RESIN SOLUTION, 3, PG III, (D/E)	UN1866, RESIN SOLUTION, 3, PG III, (31 °C c.c.)	UN1866, RESIN SOLUTION, 3, PG III	UN1866, RESIN SOLUTION, 3, PG III

14.3 Transport hazard class

Hazard class 3	Hazard class 3	Hazard class 3	Hazard class 3

14.4 Packing group

III	III	III	III

14.5 Environmental hazards

No	No	No	No

Marine pollutant: No

14.6 Special precautions for user

ADR/RID	Classification code: Tunnel restriction code: Limited quantity:	F1 (D/E) 5L
IMDG/IMO	EmS: Limited quantity:	F-E, S-E 5L
ICAO/IATA	ERG Code: Limited quantity:	3L 10L
ADN	Classification code: Limited quantity: Ventilation:	F1 5L VE01
Special precautions for users:	No information available	

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable.

SECTION 15: Regulatory Information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Regulation (EC) No. 1907/2006 (REACH)

Regulation (EC) No. 1272/2008 (CLP)

Regulation (EU) No. 830/2015

Directive 88/642/EEC

Directive 98/24/EC

Directive 1999/92/EC

Directive 2012/18/EU

Contains no substances with REACH Annex XVII restrictions

Contains no substances on the REACH candidate list

SECTION 16: Other Information

None.

Disclaimer

The information provided in this Material Safety Data Sheet is correct to the best of our knowledge, in formation and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

End of Topcoat Material Safety Data Sheet