

Detailed Instruction Manual For *UPS* *11000 A Kit & UPS* *13000 C Kit – GRP* *Repairs*



UniquePolymerSystems.com

The Engineer's Choice

... for Solutions

Table of Contents



UniquePolymerSystems.com

*The Engineer's Choice**... for Solutions*

Chapter	Page Number
Description of Unique Polymer Systems LTD Repair Systems Materials	2
Accessories	4
Repairs Using Unique Marine Repair Kits	6
Method of Application of Unique, Low Pressure, Pipe Repair	9
Method of Application of Unique, High Pressure, Pipe Repair	11
Method of Application of a Unique Plate Repair	12
Method of Mixing and Application of UPS 19060 SG Stick Grade Metal & UPS 19060 SGUW Underwater stick Grade Metal	13
Method of Mixing and Application of UPS 19601/3/4/5/6 PR Emergency Pipe Repair Bandage	14
Chemical Resistance – UPS 19002/3 A&B Cement, UPS 19000 Standard Resin & Hardener and UPS 19060 SG Stick Grade Metal	16

Description of Unique Polymer Systems LTD Repair System Materials

UPS 19000 Standard Resin & Hardener - Resin

A liquid epoxide resin, which, when mixed with the appropriate amount of *UPS 19000 Hardener* produces the Resin & Hardener mix that will cure at normal ambient temperatures producing a strong homogeneous mass, having exceptional adhesive properties when applied to metals, wood, glass and synthetic materials.

UPS 19000 Standard Resin & Hardener - Hardener

A specially developed epoxide hardener, which ensures that the Resin mix not only cures at normal ambient temperatures but also attains maximum strength in a reasonable working time.

UPS 19000 Standard Resin & Hardener - Pack

A carton containing 10 units of *UPS 19000 Standard Resin & Hardener* (225gms or 300gms). Each unit consists of one container of Resin and one container of Hardener in the correct proportions for subsequent mixing. The Resin container is applied proportioned to facilitate its use as a mixing vessel.

UPS 19003 A&B Cement

A specially developed epoxide compound supplied in two separate packs marked A and B. when mixed together in equal portions by volume the Cement will cure to an extremely strong mass with a better adhesive bond than that produced by the *UPS 19000 Stand Resin & Hardener Mix*. Apart from its use as an adhesive for repairs it can be applied, prior to carrying out a *Unique* repair, where difficult adhesion conditions exist.

UPS 19065 RG Rapid Grade Metal Repair Paste

A specially developed urethane rapid repair compound supplied in a syringe which when mixed together in equal portions by volume the paste will cure to an extremely strong mass, having exceptional adhesive properties when applied to metals.

UPS 19060 SG Stick Grade Metal & UPS 19060 SGUW Underwater Stick Grade Metal

Both items are two part epoxide putty sticks which is coloured coded so that the user can see when it is thoroughly mixed. The mixed putty can be used for emergency repair to metal components. The *UPS 19060 SGUW* will also cure underwater.

UPS 19010 Glass Cloth

A specially treated glass fibre fabric that ensures that the *UPS 19000 Standard Resin & Hardener Mix* will fully permeate the fabric and give the resultant glass fibre resin laminate repair excellent mechanical properties. Glass Cloth is often used for 'Plate' repairs.

UPS 19007 GT Glass Tape

The Glass Tape is also a specially treated glass fabre fabric that ensures the *UPS 19000 Standard Resin & Hardener Mix* will fully permeate the fabric and give the resultant Glass Fibre resin laminate repair, excellent mechanical properties. Glass Tape is normally used from the roll for Pipe Repairs but can also be used in short lengths for repair where access is difficult.

UPS 19030 Contour Cloth

This is a resin-reinforced fabrics, which can be contoured to the surface o a pipe. Its main purpose is to bridge holes in pipes so that Glass Tape can be applied evenly to ensure the original contour is maintained.

UPS 19020 Glass Mat

A fabric consisting of a random collection of glass fibres, which will absorb a considerable quantity of the *UPS 19000 Standard Resin & Hardener Mix* and which, when the mixture is cured, will produce a mechanically strong mass. Glass Mat is often used as a backing for repairs where Glass Cloth or Glass Tape have already been used and I normally use Linen Scrim as a backing.

UPS 19031 Linen Scrim

An open weave linen fabric, used as a backing for Glass Mat, to make it easier to handle when being applied to the repair. Linen Scrim remains an integral part of the repair.

UPS Cellophane

Applied to the outside of a repair after the application of the Linen Scrim. Its purpose is to contain the *UPS 19000 Standard Resin & Hardener Mix* until it has cured. Cellophane, which also ensures a smooth surface finish, is held in-situ with masking tape.

UPS Masking Tape

A self-adhesive tape used to retain the Cellophane in position.

UPS 19043 Sealer Filler

Special non-asbestos filler, in powder form, for addition to the *UPS 19000 Standard Resin & Hardener Mix* after the initial mixing has taken place. The resultant Sealer Filler Resin Mix has two useful properties (See Chapter, '*Preparation and Application of Sealer Filler Resin Mix*').

UPS 19042 Fairing Compound

Filler, consisting of glass fibre strands, for addition to the *UPS 19000 Standard Resin & Hardener Mix* after the initial mixing has taken place. Fairing Compound Resin Mix is used for filling in undulations prior to, or in conjunction with, a *Unique* repair (See Chapter, '*Preparation and Application of Fairing Compound Resin Mix*').

UPS 190601 PR Emergency Pipe Repair Bandage

A specially treated woven glass fabric impregnated with a polyurethane resin which is activated by immersion in water. The base unit of *UPS 190601 PR* comprised 1 roll impregnated tape, 50mm wide X 1.7m long, wound on a plastic cone and vacuum packed in a fail bag.

Accessories

Instruction Manual

The *Marine Repair Kits Instruction Manual* gives ample information to enable you, safely to produce effective laminate repairs using the materials available from the *Unique* range of laminate repair systems. It is essential that you familiarize yourself with the Instructions that apply to the types of repair to be carried out.

UPS 19053 Barrier Cream

A vanishing type cream compounded with mineral oils and waxes to form a protective film to the skin against resin based components in the *Unique Marine Repair Kits*. It is recommended that the cream be applied to hands and bare arms. It can, if necessary, be applied to the face (See Chapter, 'Instructions for The Safe Handling of Unique Marine Repair Kits').

Gloves

Industrial gloves are supplied with all *Unique Marine Repair Kits*. Although the selection of materials for these kits takes account of possible skin irritation problems, it is impossible to be precise about this hazard since no two people react in the same way. *Unique Polymer Systems LTD* consider it prudent to recommend that when using the component materials of the *Unique Marine Repair Kits*, gloves should always be worn (See Chapter, 'Instructions for The Safe Handling of Unique Marine Repair Kits').

UPS 19052 Resin Removing Cream

This cream is specially formulated to remove deposits of resins and adhesives easily and quickly from the skin (See Chapter, 'Instructions for The Safe Handling of Unique Marine Repair Kits').

Stirring Tools

Wooden spatulas, those are included for mixing the *UPS 19000 Standard Resin & Hardener* in the resin container.

Brushes

Supplied for the easy application of the *UPS 19000 Standard Resin & Hardener Mix* to surfaces and also for stippling the mix into the various fabrics supplied with the it.

UPS Plastic Coated Paper

This paper is plastic coated on one surface and is used with the coated side uppermost. It is first of all recommended that this paper is spread out on the bench or on area adjacent to where the *Unique* repairs is to be carried out. It will catch any drips of *UPS 19000 Standard Resin Hardener Mix* which may fall and prevent the unsightly permanent disfiguration of the area involved. The Plastic Coated Paper can also be used as a working surface when stippling the *UPS 19000 Standard Resin Hardener Mix* into pieces of Glass Cloth, Glass Mat or Linen Scrim before they are applied to the repair. The plastic coating permits the easy removal of the materials before final application the repair.

Trowelling Tool

This is used for applying the *UPS 19000 Standard Resin Hardener Mixes* that have been filled with Fairing Compound or Sealer Filler.

Scissors

The scissors included in your *Unique Marine Repair Kits* have been selected because of their suitability for cutting glass fibre fabrics. They can also be used for the other sheet materials included in the kit.

Additional Products

Please refer to the current *Unique Polymer Systems LTD Price List* for full details of further Engineering, Marine Kits, Laminate repair, Adhesives and Accessories available.

REPAIR DON'T REPLACE

Repairs Using Unique Marine Repair Kits

The *Unique Marine Repair Kit* is a maintenance tool, which as the experience of the user broadens, can resolve an increasing number of the Maintenance Engineer's problems.

The instructions in this manual describes three types of 'standard' repairs as typical examples. Ultimately, the individual engineers who use the Kits will, through experience, establish the best designed of repairs for their particular maintenance problem. The fundamental principle involved in the *Unique Marine Repair Kit* system is to produce a glass fibre resin laminate and to bond effectively that laminate to the sound portions of the ideal being repairs – the parent body.

Invariably the problem area is the bond between the resin laminate and the parent body. Unique Polymer Systems LTD has achieved pressures of 56 – 112 kg/cm² (800 – 1600 psi) before failure of the resin laminate bond when testing High Pressure Pipe Repairs. 28 – 35 kg/cm² (400 – 500 psi) when testing Low Pressure Pipe Repairs.

The following primary points should be considered during or prior to carrying out a repair.

IS THE APPLICATION SUITABLE?

Before commencing a repair using *Unique Marine Repair Kit*, ensure that the repair systems materials are suitable for the intended application. Reference to the chemical resistance charts in this manual should be of assistance.

The physical demands on the repair when it is returned to operating conditions must also be taken into account. The hydraulic test pressures detailed above give a good indication of mechanical strengths achievable with a *Unique* repair. The question of operating temperatures must also be considered. This glass fibre reinforced resin laminate can give effective results up to a maximum of 170°C. it must be stressed however that the ultimate strength and performance of a *Unique* repair is very much dependent on the operating conditions and the correct repair procedure being adopted as indicated in this manual. The Unique Polymer Systems LTD Technical Department are pleased at any time to comment on particular applications that you may have in mind and to advise if similar repairs have been satisfactory been undertaken by other users. Ultimately, the individual Maintenance Engineer must use his/her own 'engineering judgment' as to the suitability of the application. It should also be stressed that *Unique Marine Repair Kits* have been marketed and sold for over 30 years and their success as a maintenance tool is well proven and established.

INITIAL PREPARATION

Before starting a repair, always ensure that all the required contents of the Kit are at the site of the repair, clean and serviceable. Once the *UPS 19000 Standard Resin & Hardener* have been mixed, there will be no time to look for the scissors, etc. The repair once started will have to be completed in one smooth continuous operation.

To ensure that the best possible repair can be achieved, it is recommended that the areas of repair be isolated and/or pressure reduced as much as possible.

CLEANING THE REPAIR SURFACE

The surface to which the repair is to be applied must be clean since, as has already been stated. It is the bond between the repair and the parent body, which dictates the ultimate strength of the repair. The Resin will adhere best to a clean, grease-free surface. It is essential that before applying

a repair to a surface it should be clean, free from paint, rust, scale and grease. It is also essential that the surface areas being repaired are solvent wiped with *UPS TAC 883 Universal Cleaner* before the repair commences.

APPLICATION OF THE UPS 19000 STANDARD RESIN & HARDENER MIX

To maximize the strength of the repair, it is essential that a complete coating of the *UPS 19000 Standard Resin & Hardener Mix* is applied prior to the laying u of each layer of Glass Fabric.

By doing so, a homogeneous glass fibre laminate will be achieved.

The principle strength of the glass fibre laminate lies in the Tape or Glass Cloth layers which are either wound or laid on the surface of the repair.

When using Tape, this should be wound on with a half overlap and care must be taken to ensure that it is applied evenly and flat. This will eliminate a possible cause of weakness in the laminate. When applying multiple layers of Tape, each subsequent layer should be applied in the reverse direction and the Tape should not be found difficult to keep the winding smooth. When the repair is on a pipe bend, it is better to cut short lengths of Tape and lap them one on the other.

The purpose of Glass Mat is to provide a rigid backing layer to a repair that has been affected using Glass Tape to achieve this result; it is essential that the Glass Mat be thoroughly saturated with the Resin Mix. This can best be achieved by working the Resin Mix into the Mat, by stippling with the brush supplied before applying it to the repair.

MIXING UPS 19000 STANDARD RESIN & HARDENER

Each unit consists of one container of *UPS 19000 Resin* and one container of *UPS 19000 Hardener*. The Resin container is slack filled to permit the addition of the complete contents of the *UPS 19000 Hardener* container. The quantities supplied in each container of the unit are exactly those required to produce the correct Resin Mix and should not be altered in any way. Immediately after the addition of the Hardener, the contents of the Resin container should be thoroughly mixed using the Stirring Tool supplied. The resultant Resin Mix has a useable life of approximately 12 minutes at an ambient temperature of 24°C before it starts to 'gel'. The gel time is approximate and can be affected by a variety of conditions. It should be noted that the reaction between the Resin and the Hardener produces heat and this in turn can reduce the time to gel. When the ambient temperature is high or when it is desired to increase the time to gel, then the Resin Mix should be transferred into a shallow tray prior to use. By this means, gel time will be slightly extended.

In cold weather conditions the Resin and Hardener may be found to be viscous and if this is the case, it is advisable to warm the containers prior to attempting mixing. Warming the containers can be achieved by placing them into hot water for a few minutes. Do not allow the materials to contaminate the materials since steam can be generated in the Resin Mix and will cause foaming.

It should be noted that the time for the mixed Resin to gel is not time taken for it to cure. The time to cure is dependent on many factors but is mainly affected by temperature. The higher the temperature, the quicker the cure. As a general guide, over 50% repair strength is developed in approximately 4 hours at 18 0 20°C. full mechanical cure is achieved under the above conditions in approximately 24 hours.

PREPRARTION AND APPLICATION OF SEALER FILLER RESIN MIX

Sealer Filler is a special, non-asbestos powder. It is supplied in a polythene bag containing sufficient material to add to the quantity of Resin Mix resulting form one unit of *UPS 19000 Standard Resin & Hardener*. It should be added to the Resin Mix, which should already have been transferred

to a suitable sized container. The Sealer Filler and Resin Mix should be stirred with a Stirring Tool in order to disperse the Filler uniformly through the Mix. The resultant Sealer Filler Resin Mix should be applied to the repair areas as required using the Trowelling Tool. The Sealer Filler Resin Mix has the following distinct properties, which are of great assistance in certain types of repairs;

The mix is thixotropic and can therefore be applied to vertical surface for filling in surface irregularities prior to or in conjunction with the *Unique* repair.

The mix can be applied to operate at temperatures up to approximately 180°C. when it is applied as a pre-coat, prior to carrying out a *Unique* repair. It will help to insulate the resin laminate from the operating temperature of the parent body.

The Sealer Filler Resin Mix can also be used on its own for certain types of repairs.

PREPARATION AND APPLICATION OF FAIRING COMPOUND RESIN MIX

Fairing Compound is a filler which consists of glass fibre strands. This is also supplied in a polythene bag containing sufficient materials to add to the quantity of Resin Mix resulting from one unit of *UPS 19000 Standard Resin & Hardener*. The methods of mixing and application are similar to those for the Sealer Filler Resin Mix.

The main purpose of the Fairing Compound Resin Mix is to fill in undulations prior to the application of a *Unique* repair.

WARNING: *The application of the Fairing Compound Resin Mix must always be followed by a further Resin Mix application incorporating Glass fabric or Lien Scrim. This will eliminate the possible hazard of single glass filaments reinforced with cured Resin Mix protruding from the surface of the finished repair and causing subsequent injury to personnel.*

METHOD OF MIXING AND APPLICATION OF UPS 19003 A&B CEMENT

Equal quantities by volume of the Resin and Hardener of this epoxide based cement are taken from the separate containers that are marked A and B. the resin and hardener should be thoroughly mixed. The different colours of the two constituents parts assist in showing when the cement is fully mixed as these will blend together to a uniform colour. Pre-warming the two containers in cold weather facilitates mixing. The use of a warm mixing container will also assist, but the container must be clean and dry. The application of gentle heat during the curing process will reduce the time taken to cure.

Apart from its use as an adhesive for repairs (it should be noted that its bond strength is greater than the of the *UPS 19000 Standard Resin & Hardener Mix*). *UPS 19003 A&B Cement* can also be used in the following applications.

Where it proves impossible to clean thoroughly the surface to which a *Unique* repair is to be applied, then pre-coating this surface with *UPS 19003 A&B Cement* to overlap the areas of the repair by 50mm (2") all round will greatly assist in obtaining the required bond strength between the resin laminate and the parent body. Once this pre-coating operation has been completed, then a conventional *Unique* repair as previously described can be carried out.

Where a *Unique* repair is to be carried out on a cracked pipe or plate, then *UPS 19003 A&B Cement* should be trowelled into the crack before proceeding with the repair. Where the crack is still leaking a little, it is recommended that the *UPS 19003 A&B Cement* should be left partially to cure before trowelled into the crack it is emphasized that in many instances, the problem of sealing off a crack prior to carrying out a *Unique* repair can be solved by the application of the *UPS 19060 SG Stick Grade Metal* which is included with each *Unique Marine Repair Kit*.

Method of application of a *Unique* Low Pressure, Pipe Repair

This repair method represents the standard approach, which should be adopted when repairing a damaged section of pipe. This type of repair has been tested and achieved pressures in excess of 35kg/cm² (500 psi) before failure. The following is the sequence of steps to be taken in the repair procedure.

1. Read through the whole of this procedure and ensure that all the Kit Contents required are available at the location of the repair and are clean and serviceable.
2. Read through the section of this manual entitled '*Instructions for the Safe Handling of Unique Marine Repair Kit System Materials*'.
3. The area beneath the repair and also that area where the *Unique* Resin Mix, etc. is to be prepared should be covered with the Plastic Coated Paper supplied. This will ensure areas of cleaning these areas on completion of the repair.
4. The overall size of the repair should extend at least 50mm (2") onto sound parent material on either end of the repair.
5. Thoroughly clean the surface to which the *Unique* repair is to be applied.
6. If contours of the surface to which the repair is to be applied are irregular or cracked, then apply *UPS 19003 A&B Cement*, Sealer Filler Resin Mix, Fairing Compound Resin Mix or *UPS 19065 RG Rapid Grade Metal Repair Paste* as appropriate.
7. If the repair is to bridge a hole in a pipe, then a piece of Contour Cloth of a suitable size should be prepared to retain the original contour.
8. Mix sufficient *UPS 19003 A&B Cement* to coat the area to which the Contour Cloth is to be applied. Once coated, the Contour Cloth should be positioned over the hole. In most applications *Unique* Resin Mix can be used instead of *UPS 19003 A&B Cement* and some users prefer to apply the Contour Cloth in this manner. The main requirement is to ensure that the Contour Cloth remains in contact with and therefore bonds to the surface of the repair whilst the Glass Tape is applied.
9. At this stage, the *Unique* Resin Mix for the repair should be prepared. See the section entitled '*Mixing Instructions for UPS 19000 Standard Resin & Hardener*'.
10. Thoroughly coat the surface of the repair area with the *Unique* Resin Mix.
11. When Glass Tape is being used for the repair, then this should be wound round the pipe directly from the roll. The Tape should be wound reasonably tight on to the Resin Mix coated surface of the repair area to ensure that the Mix permeates through the interstices of the Tape. The Tape should be wound to overlap by half its width. When applying multiple layers of Tape, do not cut the Tape at the end of each pass.
12. When Glass Cloth or pieces of Glass Tape are being used, then each piece of materials should overlap the adjacent pieces by approximately 12mm (½"). Resin Mix should be then stippled into the interstices of the Cloth or Tape.
13. A further coat of the *Unique* Resin Mix should now be applied to the first layer of Glass Cloth or Tape.
14. Two additional layers of Glass Cloth or Tape should now be placed or wound on to the first layer. When Tape is used, the winding of the second and third layers should each be in the reverse direction to that of the previous layer. A coating of Resin Mix is applied between each layer of Cloth or Tape.
15. Cut a piece of Cellophane a little larger than the length of the repair and at least 100mm (4") longer than the circumference.
16. This is applied to the surface of the repair and should be retained in position by means of Masking Tape. Masking Tape is applied to each end of the repair and also in an open spiral along its length.

17. The repair is now complete and the Resin Mix must be left to cure before returning the repaired item back into service. Curing time generally depend upon ambient temperature. For a general guide, in excess of 50% strength is developed in approximately 4 hours at 18 – 20°C. full mechanical cure is achieved under these conditions in approximately 24 hours from the of application.
18. Gloves, Trowelling Tools, etc., used during the repair should be cleaned thoroughly immediately after use.

Method of Application of a *Unique* High Pressure, Pipe Repair

This repair method represents the standard approach which should be adopted when repairing a damaged section of pipe which is going to be subject to pressure. This type of repair has been tested and achieved pressure of up to 112kg/cm² (1,600 psi) before failure.

The incorporation of Glass Mat into this type of repair improves the strength. It should be noted that larger volumes of Resin Mix are involved in this type of repair and with the greater mass of Mix the gel time will be reduced accordingly.

Proceed as steps 1 – 14 of the '*Method of Application of a Unique Low Pressure, Pipe Repair*'. With reference to step 4. Unique Polymer Systems LTD recommended the repair be extended at least 100mm (4").

15. Cut a piece of Glass Mat, so that it will fully cover the repair and overlap at the joint by approximately 100mm (4").
16. Cut a piece of Linen Scrim approximately 100mm (4") larger all round than the piece of Glass Mat.
17. Lay out an adequately piece of Plastic Coated Paper.
18. The piece of Linen Scrim should be laid out on the plastic coated side of the Plastic Coated Paper.
19. The piece of Glass Mat should be laid on the Linen Scrim. The Glass Mat should be well saturated with Resin Mix.
20. The combination of Linen Scrim and Glass Mat should now be removed from the Plastic Coated Paper and the Glass Mat side applied to the Glass Tape or Cloth surface of the repair. At the joint, the Glass Mat should be overlapped on to itself by peeling back the Linen Scrim, which is then replaced, and itself overlapped. By moulding the combination to the repair with gloved hands, the Resin Mix will satisfactorily permeate through the Linen Scrim.
21. Cut a piece of Cellophane a little longer than the length of the repair and at least 100mm (4") larger than the circumference.
22. Apply the piece of Cellophane to the Linen Scrim surface of the repair with a 50mm (2") overlap at the join. It should be moulded onto the repair with Gloved hands to expel as much air as possible.
23. The Cellophane is held in position by Masking Tape applied to each end of the repair. Masking Tape is also applied in an open spiral along its length.
24. The repair is now complete and the Resin Mix must be left to cure before returning the repaired item back into service. Curing time generally depend upon ambient temperature. For a general guide, in excess of 50% strength is developed in approximately 4 hours at 18 – 20°C. full mechanical cure is achieved under these conditions in approximately 24 hours from the of application. This type of repair, because of the larger volume of Resin Mix required, will gel more quickly, under given conditions because of the greater amount of heat generated during the curing process.
25. Gloves, Trowelling Tools, etc., used during the repair should be cleaned thoroughly immediately after use.

Method of Application of a *Unique* Plate Repair

In a *Unique* Pipe Repair, the resin laminate will be in the form of a complete cylinder around the circumference of the pipe. Where a repair is required on a flat surface, a very large diameter surface or a complex surface, this will not normally be possible and the repair will require to be in the form of a patch.

The sequences of steps involved in the High or Low Pressure types of Plate Repair are the same as those required for Pipe Repairs and the reasons for the choice of type are identical.

Normally Glass Cloth will be used in the repair instead of Glass Tape and this should be read into the sequences of steps indicated previously in this manual. The use of Lien Scrim, Cellophane, etc., will not necessarily be required in all cases as this is dependent upon the nature of the repair.

METHOD OF MIXING AND APPLICATION OF *UPS 19065 RAPID GRADE METAL REPAIR PASTE*

This adhesive has been included in the *Unique Marine Repair Kit* because there has been a consistent demand from engineer's for a quick curing urethane resin material for certain types of emergency repairs. Its inclusion broadens the scope of the *Unique Marine Repair Kit* as a maintenance tool. The adhesive can be applied, if required, prior to a standard *Unique* repair.

The method for mixing applying *UPS 1905 RG Rapid Metal Repair Paste* is as follows:

1. The precautions to be taken prior to handing this material are set out previously in this manual.
2. All surface to be bonded must be clean, dry and free from grease, oil etc. Metal surfaces should be abraded. Once all surfaces to be bonded have been cleaned they should not be touched.
3. Measure out equal amounts of Resin and Hardener onto a clean mixing surface. Mix thoroughly then apply a thin film on both surfaces to be bonded and unite immediately.
4. Maintain pressure on the bonded surfaces until the adhesive sets (approximately 5 minutes at 25°C). wipe off excess adhesive whilst still wet or scrape off with a razor blade before the material fully sets. Once set, the bond is permanent and at normal ambient temperatures the strength of the bond will continue to develop for about 7 days. This can if required be accelerated by the application of a gentle heat.
5. Most materials except thermoplastics can be bonded with *UPS 19065 RG Rapid Grade Metal Repair paste*. The flexibility of the cured resin permits the bonding of materials with different coefficients of thermal expansion with minimum stress in the bonded joint.

Method of Mixing and Application of UPS 19060 SG Stick Grade Metal & UPS 19060 SUGUW Underwater Stick Grade Metal

These *Unique 'twist stick'* grade products are specially formulated two part epoxy repair compounds in the form of a concentric coloured stick of putty consistency (so that the user can see when the materials are thoroughly mixed). *UPS 19060 SG and UPS 19060 SUGUW* incorporates a metal filler.

Sticks are packed in approximate weight/lengths of 125gms, 175mm long in clear plastic tubes, capped at the ends. They are easily applied after twisting off the required amount from the stick and mixed by kneading in a gloved hand to a uniform consistency.

UPS 19060 SG & UPS 19060 SUGUW set initially with approximately one hour and can be machined after about 30 minutes. One stick of *UPS 19060 SG & UPS 19060 SUGUW* are provided in the *UPS 11000 A Kit, UPS 13000 C Kit and UPS 19500 Small Pipe Repair Kit*.

Method of Mixing and Application of UPS 19601/3/4/5/6 PR Emergency Pipe Repair Bandage

UPS 19601/3/4/5/6 PR Emergency Pipe Repair Bandage is ideal for pipe repairs to low pressure systems. As a general guide, a repair built up to a thickness of approximately 12mm (½") will withstand a maximum service pressure of 10 bar (150 psi). Higher pressures, up to 50 bar (725 psi), can be achieved by first applying over the leak, a 'plug' of *UPS 19060 SG Stick Grade Metal*, metal-filled epoxy stick.

Pipes up to a nominal diameter of 65mm may be repaired using *UPS 19601/3/4/5/6 PR Emergency Pipe Repair Bandage* with holes approximately 3mm to 6mm diameter, although slightly larger pipes and holes can be effectively repaired using a plug of putty as described herein, always at users discretion.

Before proceeding, please read the following information carefully to ensure that the correct application procedure is fully understood.

All pressures within the pipe should be released. For leaks where pressure cannot be removed, holes should be stopped using a pipe repair clamp or *UPS 445 /456 TA Leak Stoppers*.

Remove all oil, grease, loose rust scale, sealant tape and paint from the repair area. Rough course a 10cm (4") patch around the pipe centering on the leak site.

If the pipe surface is pitted by rust, surface must be wire brushed to remove the loose scale. If the surface is smooth, as with copper or stainless steel surface should be roughened with a coarse file, rasp or saw blade.

For plastic pipe, the external mould release must be removed.

Abraded surfaces with a coarse grit sandpaper. A saw blade may also be used to create a cross hatch pattern. This is particularly useful on polypropylene and PVDF piping.

During mixing and during application, lightweight disposable gloves should be worn to protect hands.

UPS 19601/3/4/5/6 PR Emergency Pipe Repair Bandage should be immersed in water and squeezed two or three times for about 10 to 20 seconds prior to use.

Remove roll from water and wrap quickly and tightly as follows;

Centre tape over leak site, wrap from bottom of roll, pulling firmly throughout application. After 5 – 7 piles, resin foam will come through the tape, which is desirable and aided by pulling tightly. Continue until entire roll is applied, building to a minimum thickness of 12mm (½"), use a second roll if necessary. Firmly press and smooth end of roll into wrap direction of application. Wet gloves in water, smooth and firmly press the wet resin back into the wrap.

KEEP HANDS MOVING QUICKLY AND WET GLOVES FREQUENTLY TO AVOID STICKING.

Continue rapid hand movement pressing and polishing resin in motions around and parallel to the pipe. Continue process until resins are no longer tacky. The repair should now have smooth, hard surface and an enamel-like appearance with no fabric protruding through the surface.

When used in conjunction with a plug of *UPS 19060 SG Stick Grade Metal* repeat the above instructions but having first plugged the hole. Knead a small bead of putty in gloved hand and flatten into a disc centrally over the hole pressing gently and feathering out the edges.

Leave to semi-harden (full cure 30 minutes) before applying tape, although tape may be applied immediately if necessary.

After application dispose of gloves.

NOTE: If a thicker application is needed, spend a little less time finishing the first roll and immediately begin the application of the next. Finish the final roll as if a single roll application.

Chemical Resistance – UPS 19002/3 A&B Cement, UPS 19000 Standard Resin & Hardener and UPS 19060 SG

Key:

E	Excellent
G	Good
F	Fair
U	Unsuitable

Chemicals	UPS 19002/3 A&B	UPS 19000 RH	UPS 19060 SG
Acetic Acid (Greater than 10%)	P	P	P
Acetic Acid (Less than 10%)	G	G	F
Alum	E	E	G
NH ₄ Cl (10% Solution)	E	E	G
Ammonium Sulphate (10% Solution)	E	E	G
Ammonium Bisulphate	G	F	F
Ammonium Chloride	G	G	G
Ammonium Nitrate	G	G	G
Animal Fats	G	G	G
Aviation Sprits	U	U	U
Benzene	P	P	U
Butanol	P	P	U
Carbon Tetra-Chloride	U	U	U
Carbonic Acid	G	G	E
Chlorine Gas	U	U	U
Chromic Acid	U	U	U
Chrome Plating Solutions	U	U	U
Copper Sulphate	F	F	P
Creosote	U	U	U
Cyclohexanol	U	U	U
Detergent Solution (5%)	G	G	F
Ethylene Glycol	U	U	U
Ferric Chloride	F	F	P
Ferric Sulphate	G	G	G
Formic Acid (less than 10%)	P	P	U
Formaldehyde (37%)	G	G	P
Glucose	G	G	F
Glycerine	G	G	F
Hydrochloric Acid (10%)	E	E	G
Hydrochloric Acid (20%)	G	G	G
Hydrochloric Acid (30%)	F	F	F
Hydrofluoric Acid (less than 10%)	G	F	F
Lactic Acid (less than 5%)	F	P	U
Lead Nitrate	G	G	F
Magnesium Chloride	G	G	G
Mineral Oil	E	G	G
Nitric Acid (10%)	G	F	P
Nitric Acid (30%)	F	P	U
North Sea Oil	F	F	F
Paraffin (low grade)	G	G	G
Petrol	F	F	F

Chemicals	UPS 19002/3 A&B	UPS 19000 RH	UPS 19060 SG
Phenol	P	P	U
Phosphoric Acid (10%)	P	P	U
Potassium Cyanide	U	U	U
Potassium Dichromate	F	F	F
Potassium Hydroxide	E	G	G
Potassium Nitrate	G	G	G
Potassium Sulphate	G	G	G
Sea Water	E	E	E
Sewage	G	G	G
Sodium Bisulphate	G	G	F
Sodium Bisulphite	F	F	F
Sodium Dichomate	F	F	F
Sodium Cyanide	P	P	U
Sodium Hydroxide (40%)	E	E	G
Sodium Nitrate	G	G	G
Sodium Phosphate	G	G	G
Sodium Sulphite	F	F	F
Sulphuric Acid (10%)	G	G	G
Sulphuric Acid (30%)	G	G	G
Sulphuric Acid (Greater than 30%)	U	U	U
Toluene	F	P	U
Triethanolamine	E	G	G
Turpentine	P	P	P
Water	E	E	E
Zinc Chloride	F	F	F
Zinc Sulphate	F	F	F

Product	Size	UPS 11000 A Kit Quantity	UPS 13000 C Kit Quantity
UPS 19000 RH Standard Resin & Hardener	225gms	20	5
UPS 19002 A&B Cement	500gms	2	1
UPS 19605 RG Rapid Grade Metal Repair	127gms	2	2
UPS 19601 PR Pipe Repair Bandage	50mm X 1.7	1	1
UPS 19020 Glass Mat	0.5m	2	1
UPS 19043 Sealer Filler	50gm	2	1
UPS 19042 Fairing Compound	50gm	1	1
UPS Masking Tape	Roll	1	1
UPS Plastic Coated Paper	2m ²	1	1
UPS 19007 GT Glass Tape	50mm X 50m	2	1
UPS 19053 Barrier Cream	110gm	1	1
UPS 19052 Resin Removing Cream	100gm	1	1
UPS Cellophane	250mm X 25m	1	1
UPS 19030 Contour Cloth	250mm X 250mm	1	1
UPS 19031 Linen Scrim	0.5m ²	1	1
UPS 19010 Glass Cloth	1m ²	3	1
Disposable Gloves	Pair	10	1
Scissors	Pair	1	1
Brush	1" Width	3	1
Stirring Tool	-	10	1
Trowelling Tool	-	1	1
Detailed Application Booklet	-	1	1