

HYDROGEL™

APPLICATION

GUIDELINES

Ver. 1.216

KINGFIELD
CONSTRUCTION PRODUCTS

I. GENERAL

These pre-installation and application guidelines are intended as a guide to the products' safe and proper storage, handling and application.

HYDROGEL

Hydrogel is a polymer rubber gel material specially formulated from asphalt, rubber and resins.

Hydrogel is packaged in 44 pound (20 kg) totes wrapped inside nonstick plastic lining inside individual cardboard boxes.

Hydrogel is a component to the Gel-Flex waterproofing assembly. The Gel-Flex waterproofing assembly combines Hydrogel with a highly durable HDPE sheet. The combination of Hydrogel with HDPE sheet creates a high performance composite waterproofing system.

Hydrogel Gel-Flex waterproofing systems are suitable for typical positive side waterproofing and blindside waterproofing applications such as foundation walls, elevator pits, plaza decks, planters, tunnels and green roofs.

APPLICATION AND PERFORMANCE ADVANTAGES OF HYDROGEL

EASE OF APPLICATION

Hydrogel is a spray applied monolithic membrane. Application to the substrate is quick and controlled coverage for membrane thickness is easily attained.

SUPERIOR ADHESION

Hydrogel bonds to any properly prepared concrete, masonry, steel or wood surfaces, and conforms to surface irregularities including protrusions, corners, etc. Since the membrane is monolithically adhered to the substrate lateral water migration is prevented. Therefore, if the membrane is damaged, the source of water leakage is easily traced to the point of failure.

COMPOSITION

Hydrogel contains no solvents, there are no two-part systems to mix, therefore no on-site cure failures as with other products. Wet mil thickness is the same as dry mil thickness – there is no product volume loss through the flashing off of VOC content.

COLD WEATHER APPLICATION

Hydrogel can be readily applied in temperatures down to 0°F (-18°C) on a clean, dry, frost-free surface. Hydrogel exhibits excellent low-temperature flexibility and adhesion characteristics.

NO CURE TIME

After Hydrogel has been applied to the substrate, HDPE sheet can be applied immediately. Follow on trade work can begin immediately. Hydrogel is a single component, non-crosslinking polymer that remains flexible after application.

TIE-INS CONSTRUCTION SEQUENCING

Previously installed Hydrogel rebonds sufficiently when lapped with new material to form a monolithic bond enabling easy phased construction or accommodation of future tie-ins.

SELF HEALING

Self-seals minor construction damage for added margin of safety.

RELIABILITY

Polymer Rubber Gel waterproofing systems have over 15 years of proven protection against water intrusion on some of the most demanding applications worldwide

HYDROGEL PREPARATION

Before Hydrogel can be applied to an approved substrate, the material must first be melted, then further heated and mixed to develop its full physical properties. The rubber content of the membrane makes it necessary to use indirect heat in the melting. Therefore a double-jacketed melter (unlike a standard single-shell asphalt kettle) must be used.

Double-jacketed melters are typically equipped with temperature gauges so that the melter operator can continually monitor the temperature of the membrane – and in the case of oil-jacketed melters, the heat transfer oil. Hydrogel melting temperature range typically is between 275° F to 375° F. Optimum melt temperature will vary based on different pump manufacturer's product models, environmental conditions, hose length, amount of product in equipment, etc.

The spray application of Hydrogel must be utilized with equipment that is specifically and exclusively designed for the application of hot materials. Contact Kingfield Construction Products for a listing of recommended pump providers.

CONTINUOUS HEATING AND AGITATION OF THE SAME MATERIAL FOR 6 HOURS OR MORE, WITHOUT THE ADDITION OF FRESH MATERIAL, IS TO BE AVOIDED!

IN NO CASE SHOULD HYDROGEL BE HEATED TO TEMPERATURES IN EXCESS OF 400°F (204°C)!

KINGFIELD DOES NOT MANUFACTURE OR SUPPLY DOUBLE-JACKETED MELTERS. PROPER OPERATION OF A MELTER, AND FOR CONTROLLING THE MEMBRANE'S TEMPERATURE WITHIN THE PROPER LIMITS IS THE EXCLUSIVE RESPONSIBILITY OF APPLICATOR.

KINGFIELD DOES NOT MANUFACTURE OR SUPPLY PROGRESSIVE CAVITY PUMPS. PROPER OPERATION OF EQUIPMENT, AND SAFE APPLICATION OF MATERIAL IS THE EXCLUSIVE RESPONSIBILITY OF APPLICATOR.

ENVIRONMENTAL CONDITIONS

Hydrogel can be installed in a wide temperature range, including below freezing temperatures. Hydrogel should not be applied in rain to wet concrete. Snow and frost must be removed from the substrate prior to application of Hydrogel.

Hydrogel must be covered with HDPE sheet immediately after application to the substrate to protect Hydrogel from contamination.

II. PRODUCTS (DESCRIPTION AND USE)

The components of the waterproofing/roof assembly are to be products supplied by Kingfield or products acceptable to Kingfield.

POLYMER RUBBER GEL MEMBRANE

HYDROGEL: a fluid-applied, polymer rubber gel material, agitated and troweled or squeegeed on properly prepared substrates as a roofing or waterproofing membrane.

HDPE PROTECTION SHEET

GFG20X: a 16 mil high density, cross laminated polyethylene with geotextile reinforcement layer. GFG20X is embedded into Hydrogel as a flashing/reinforcement material and protection membrane. GFG20X combined with Hydrogel creates a high performance composite waterproofing membrane.

OTHER KINGFIELD SUPPLIED MATERIALS

FLASHING/REINFORCING

HDPE MESH: a high density extruded, lightweight structural netting. HDPE Mesh is used in blind side applications of Hydrogel Gel-Flex assemblies to add greater structural strength to the applied Hydrogel to minimize slumping.

DUROFLEX: an uncured neoprene rubber thermoset material used for transitions and reinforcement of the Hydrogel membrane.

GFG4: a polypropylene nonwoven fabric with a white polyethylene backing. GFG4 is used in blindside applications of the Hydrogel Gel-Flex assemblies as a protection layer for select applications. Check with a Kingfield technical representative before using GFG4.

SEAMING/DETAILING TAPE

DUROTAPE: a rubber based adhesive tape used to seam sheet membranes and detail penetrations.

III. PRECAUTIONS AND SAFETY

Common sense is your first line of defense against personal injury - USE IT ! BE PREPARED - THINK AHEAD !

- Know the telephone number and location of the nearest hospital and/or ambulance service in case of an emergency. Post the telephone numbers in a convenient location or carry them with you so you can access them quickly.
- Have a complete first aid kit on hand. Make sure everyone knows how to use it.
- Have within easy reach a properly rated, fully charged fire extinguisher.

KNOW HOW TO USE IT ! FIRE EXTINGUISHER RATINGS:

- "A" For use on ordinary combustibles (wood, paper and cloth)
- "B" For use on flammable liquids (oil, gasoline, paint and grease)
- "C" For use on electrical equipment (motors, controls, panels and wiring)
- "D" For use on combustible metals (magnesium, sodium and potassium)

WEAR THE PROPER CLOTHING

- High-top work shoes with thick rubber or composition soles.
- Properly fitting pants without cuffs.
- A long-sleeve shirt, buttoned at the cuffs and within one button of the collar.
- Gloves with snug fitting wristlets - no gauntlets.
- Goggles
- Hard hat - to be worn at all times when there is a hazard above.

MATERIAL SAFETY DATA SHEETS

- Material Safety Data Sheets are available on all products sold by Kingfield and are available upon request.

IV. TOOLS AND EQUIPMENT (REQUIRED/RECOMMENDED)

Melter: A double-jacketed, oil bath melter with mechanical agitation specifically designed for the preparation of hot, fluid-applied, rubberized asphalt materials **MUST** be used. Melter must be capable of maintaining a consistent temperature. Melter must also have a mechanical spray gun specifically designed for spraying hot materials. Consult the melter manufacturer for specific instructions covering the melters proper operating procedures, safety and maintenance. Consult Kingfield for a listing of recommended melter pump manufacturers.

- Gasoline (for gasoline powered agitator motor)
- Brooms and shovels
- Back-pack blower or air compressor (for blowing clean the deck)
- Screwdrivers, hammer, pliers, wrenches, utility knives, etc.
- Tape measure and chalk line (for gridding the deck)
- Paddles, brushes, trowels (for detail work)
- Thickness gauge capable of measuring to mils (0.001") and/or 32nds of an inch
- Propane tank and torch (for drying a concrete deck or heating seaming tape for better adhesion in cold temperatures).

V. SUBSTRATES

CONCRETE (CAST IN PLACE)

There are several different types of concrete (cast in place) used in construction. Most are acceptable substrates for Hydrogel, others are not. In general Kingfield is looking for a concrete substrate that has a compressive strength of 2,500 psi minimum with a density of no less than 90 pcf.

STRUCTURAL WEIGHT CONCRETE: Made with aggregates such as sand, gravel and crushed stone, structural weight concrete will have a density of 135-160 pcf, and will retain 3% to 5% moisture by volume when fully cured. An IDEAL substrate for Hydrogel recommends a cure/drying time of 28 days, 14 days minimum. Depending on conditions (i.e., ambient temperature, humidity) the concrete may be dry enough to receive application of the membrane in less than the 14 day minimum recommendation. Contact Kingfield's Technical Services Department for additional information.

LIGHTWEIGHT STRUCTURAL CONCRETE: Made with aggregates such as expanded shale, clay, slate or slag, lightweight structural concrete will have a density of 90-115 pcf, and will retain 5% to 20% moisture by volume when fully cured. An ACCEPTABLE substrate for Hydrogel with certain limitations. Due to the high moisture content of lightweight structural concrete, a cure/drying time of 60 days is recommended, with a 28 day minimum, before application of the membrane is to begin.

LIGHTWEIGHT INSULATING AND/OR CELLULAR CONCRETE: Made with aggregates such as vermiculite, perlite, pumice, scoria or diatomite, lightweight insulating concrete will have a density of 15-90 pcf and will retain more than 20% moisture by volume when fully cured. This high moisture content can create bonding and pinholing/blistering problems for the membrane and the low density (less than 110 pcf) may create bonding problems due to the weak, non-durable surface that results. These factors make lightweight insulating concretes UNACCEPTABLE substrates for Hydrogel.

CONCRETE SURFACE FINISH

A poured in place concrete surface (horizontal) should be finished to a rough texture to provide a "mechanical" bond for the membrane. The texture however, should not be so rough that the membrane cannot be applied at a continuous thickness across the surface. As a minimum, a woodfloat or

broom finish is required, with a wood-troweled finish preferred. A steel-troweled finish is NOT desirable. Excessive "bleeding" caused by over-troweling increases the water/cement ratio near the concrete surface, which can result in a weak top layer with poor durability. This layer is commonly referred to as LAITANCE. This is particularly likely to occur if finishing operations take place while bleed water is present. This weak concrete surface can inhibit the bond of Hydrogel to the concrete and must be removed. SEE SECTION VI (6) "SPECIAL CONCRETE SURFACE PREPARATION" FOR ADDITIONAL INFORMATION.

CONCRETE CURING TECHNIQUES

LIQUID MEMBRANE CURING COMPOUNDS

SODIUM SILICATE BASED CURING COMPOUNDS: These compounds are recommended above any other liquid membrane curing compound for use with Hydrogel because they leave no film or residue (when properly applied) which can interfere with Hydrogel's ability to bond to the concrete surface. These compounds react with the free lime and other materials in the concrete mix to form an insoluble gel within the pores of the concrete, which greatly retards the evaporation of the mix water and provides a hard, dust-proof surface.

ACCEPTABLE RESIN BASED CURING COMPOUNDS: (cure only) These compounds form a film which can take 45-60 days to oxidize and flake off when exposed to the elements and foot traffic. A questionable bond is achieved between Hydrogel and the concrete as long as the film is present. It can however, be removed by brushing down the surface with a wire brush, or washing the surface with a light solution of muriatic acid or trisodium phosphate (TSP). The surface should then be rinsed and allowed to dry. Provided the film is TOTALLY removed prior to the application of Hydrogel, resin based compounds MAY BE ACCEPTABLE.

WAX BASED CURING COMPOUNDS: (cure only) These compounds cease to be effective as curing agents after about 28 days, yet take from 90 to 120 days to dissipate when exposed to the elements and traffic. The wax residue or film is difficult to remove and will interfere with the bond of Hydrogel to the concrete. Wax based compounds ARE NOT ACCEPTABLE.

WAX/RESIN BASED CURING COMPOUNDS: (cure only) These compounds are not suitable for use on concrete that is to receive a subsequent application of Hydrogel. The wax component of this compound inhibits the adhesion of any future coating for the concrete. Wax/resin based compounds ARE NOT ACCEPTABLE.

ACRYLIC AND CHLORINATED RUBBER BASED CURING COMPOUNDS: These compounds leave a permanent film on the surface which may prevent Hydrogel from achieving an adequate bond with the concrete surface. Acrylic and chlorinated rubber based compounds ARE NOT ACCEPTABLE.

The use of any liquid membrane curing compound in conjunction with Hydrogel must be approved in advance and IN WRITING by Kingfield on a project by project basis.

Consult the Technical Services Department of Kingfield when a liquid membrane curing compound is intended for use.

FORM RELEASE AGENTS: Form release agents are used to prevent concrete form sticking to the form work and facilitates faster and cleaner stripping of the forms. Typically these release agents are spray applied to the forms prior to their erection. Form release agents over-applied to a form may transfer to the concrete's surface cast against it. This could cause

problems for Hydrogel from the standpoint of achieving a good bond to the concrete surface. Kingfield does not recommend the use of any petroleum, wax, resin or silicone-based form release agents, due to the potential adhesion problem if this agent should transfer to the concrete's surface. Some manufacturers of form release agents do claim, however, that their products will provide a concrete surface free of residue that would impair the bond of paint or other subsequent concrete coating materials, provided their product is applied according to their specifications. Strict compliance to the manufacturers' specified application rate is critical.

If a form release agent transfers to the concrete surface the agent MUST be removed, as recommended by the manufacturer of the agent, prior to the application of Hydrogel.

Frequent bond checks should be conducted initially and throughout the application of Hydrogel to verify that a good bond is being obtained.

PRECAST CONCRETE

Precast concrete is typically made of structural weight concrete and is generally an excellent substrate for the application of Hydrogel. Filling and/or reinforcing of the joints between individual precast panels is typically required.

CONCRETE MASONRY UNITS

Concrete masonry units (CMU) used in foundation walls, planter walls, parapets, etc., are an acceptable substrate for Hydrogel.

WOOD PLANK

An acceptable substrate for Hydrogel. Minimum thickness 3/4" (19mm). Adequate structural support is required to limit deflection and movement between planks. Tongue and groove joints are required. Wood must be free of any special chemical treatments or other applications which would affect Hydrogel's ability to bond to it.

PLYWOOD

An acceptable substrate for Hydrogel. Minimum thickness 1/2" (12.7mm). Adequate structural support is required to limit deflection and movement between plywood joints. Tongue and groove joints are required. Wood must be free of any special chemical treatments or other applications, which would affect Hydrogel's ability to bond to it. All plywood joints must be pretreated with an application of Hydrogel.

GYPSUM BOARD OVER METAL DECKING

An acceptable substrate for Hydrogel. Gypsum board must be fire rated type X board, minimum 5/8" (16 mm) thickness. Both traditional paper-faced and newer fiberglass-faced products with treated cores are acceptable.

The board must be mechanically fastened to minimum 22 gauge metal decking with appropriate screw type fasteners as directed by project specifications or local building codes. At a minimum there should be 1 fastener per 2 square feet of board (4'X8' board would have 16 fasteners). Adequate structural support is required to limit deflection and movement.

Joints must be pretreated with an application of Hydrogel.

POURED IN PLACE GYPSUM

Not Acceptable.

TECTUM

Not Acceptable.

METAL

An acceptable substrate (flat metal sections not ribbed decking) for Hydrogel. Metal must be free of oil, rust, paint or coatings which may inhibit the bond of the membrane.

VI. SPECIAL CONCRETE SURFACE PREPARATION

Typically, the cleaning of a new concrete surface will consist of thoroughly sweeping the surface of all dirt and construction debris and then blow-cleaning to provide a surface acceptable for the application of Hydrogel.

There are several instances when the typical simple cleaning is not adequate and additional preparation time and materials are required. This additional surface prep is typically required when the one or more of the following conditions is encountered:

- After the tear-off of existing roofing/waterproofing materials
- If laitance is encountered on the concrete surface
- When certain liquid membrane curing compounds have been used
- When certain form release agents have been used
- If there has been a spill or leak of oil and/or other surface contaminants

The following information has been adapted from procedures developed by the American Concrete Institute and compiled from Kingfield's experience with respect to the cleaning, preparation and repair of concrete.

CLEANING

CHEMICAL CLEANING

Chemical cleaning may be necessary as a preliminary step to other methods of cleaning to remove substances such as oil, grease, dirt and some surface treatments. This method typically requires a vigorous scrubbing with solutions of caustic soda, trisodium phosphate or detergents especially formulated for use on concrete. Flush with water (not solvent) to rinse away all traces of the cleaning material as well as the contaminant. Solvents should not be used in the flushing as they tend to dissolve the contaminant and spread it over the deck.

BLAST CLEANING

Blast cleaning - whether using a high pressure water jet with or without an abrasive like sand or just a dry abrasive like sand, is one of the more effective ways of removing dirt, concrete laitance or other weak surface material and some residue of existing roofing/waterproofing materials. High pressure washing without abrasives alone may not be adequate for the removal of some of these materials since it removes little surface material as compared to the wet or dry abrasive blast methods. Oil or grease that has soaked into the concrete should first be removed with a chemical cleaning process before blast cleaning. A blasting method should be selected (in accordance with local environmental restrictions and codes) which best does the job resulting in the surface of the concrete being abraded to the extent that small aggregate particles are exposed and a SOUND, STRONG SUBSTRATE remains. The air compressor used in the blasting process must have efficient oil and water traps to make sure that the air it supplies is clean. Clean water must be used in wet blast cleaning. Wet blast cleaning offers a clean-up advantage over dry methods as dust collection is typically more time consuming and difficult than water removal.

SCARIFICATION/SHOTBLASTING/GRINDING

These and other mechanical methods are probably the most efficient methods of removing weakened layers of concrete (i.e. laitance) and residues of pre-existing roofing/waterproofing materials such as asphalt, urethanes, adhesives, etc.

SCARIFIERS typically employ a drum that has a series of blades attached. The drum spins at high speeds thus allowing the blades to tear into the surface of the concrete or coating. Scarifiers can be particularly useful on

rubber-type and asphaltic materials that may "gum" up when other machines are used.

SHOTBLASTERS much like a sand blasting, utilizes metal shot or pellets, of various sizes, that are shot at high speed at the decks surface thus breaking up the concrete or coating. The surface texture required and type of material being removed determines what size shot is used. Shotblasters may not be as effective on rubber-type materials and in some cases asphalt products, as scarifiers would be, since the shot would tend to simply bounce off the surface. Shotblasters also offer a clean-up advantage in that the shot is recovered into the machine and in some cases the dust and debris can be vacuumed up by the machine or attachments.

GRINDING machines typically employ a simple wheel that spins a series of blades that cut up or grind a surface. Grinding is usually only appropriate to further prepare concrete surfaces to remove weak areas or to grind down high spots and ridges. Grinders typically cannot do an adequate job on removing existing roofing/waterproofing materials as most would simply "gum" up due to the heat generated by the friction of the grinding wheel. One or more of the above techniques may also be required for removal of the following:

LAITANCE

Laitance is a layer of weak, non-durable cement and fine elements of aggregate that has been brought to the surface by overworking or improper finishing of the concrete surface. Usually lighter in color than the rest of the concrete surface, one can easily check for the presence of laitance by scraping the surface of the concrete with a putty knife or any other hard metal object. The surface will easily break away from the sound concrete below or grooves will easily be made in the surface. Laitance must be totally removed prior to the application of Hydrogel.

TEAR-OFF OF EXISTING ROOFING/WATERPROOFING MATERIALS

Every effort should be made to remove all existing solid material from the deck. The use of spud bars and/or scarifiers and/or shotblasters is typically recommended. In no case should any loose, blistered, wet or damaged material be left on the deck. There must be no areas where water is left trapped underneath or within plies of any existing material. If some existing materials remain on the deck after thorough cleaning as described above, they may be acceptable according to the following guidelines. Consult Kingfield's Technical Services Department for a review of exact conditions.

LIQUID-APPLIED MEMBRANES OR COATINGS

All loose, blistered and damaged areas must be removed completely. Any trapped moisture must be located and exposed to facilitate drying. Scarifiers work very well with the thicker (60+ mils, 1.5+ mm) membranes and some shotblaster manufacturers claim the same for their equipment. Both machines typically work equally well on the thinner deck coating materials. More consideration can be exercised for leaving solid asphalt material on the deck that is firmly bonded to the concrete since asphalt is compatible with Hydrogel.

PEEL and STICK MEMBRANES

All loose, blistered and damaged material must be removed. Any areas where water or moisture is trapped beneath the membrane must be located and exposed.

If the entire membrane cannot be removed from the deck, at a minimum, a torch must be used to burn off the layer of polyethylene on the existing membrane.

IS IT CLEAN?

One final check to determine if the concrete has been properly cleaned is to apply test patches of Hydrogel to the concrete surface. Several test patches should be applied to different areas of the deck. The patches should be no less than 12" (305mm) square and be applied at no less than 90 mils (2.3mm) thick.

The bond to the substrate can be checked immediately after application and then should be checked again the next day.

If a sound bond is achieved the application can typically proceed. However, it is good practice to do frequent bond checks during the application of the membrane to ensure the integrity of the overall installation.

If a sound bond is not achieved, further deck preparation is typically required.

IS IT DRY?

The same test patch procedures, outlined under "IS IT CLEAN?" above can be used to determine whether the concrete is dry enough to receive the Hydrogel. Excessive moisture within the concrete can be drawn to the surface during application by the heat of the membrane on a hot day in direct sun.

The result of excessive moisture on the Hydrogel would be seen in the form of pinholing and or blistering. However, since Hydrogel does not cure, these pinholes and blisters are eradicated without loss of coverage by embedding and applying pressure to the GFG20X HDPE sheet into the applied Hydrogel membrane.

SEE SECTION VIII. "HYDROGEL APPLICATION" FOR ADDITIONAL INFORMATION.

REPAIR OF SURFACE DEFECTS

Honeycombed and other defective concrete areas must be chipped away or removed down to sound concrete. Edges should be perpendicular or slightly undercut; NEVER feathered. After chipping, the area must be dampened with water to prevent absorption of moisture from the patching mortar. A bond coat is brushed into the surface, and when it begins to lose its water sheen, is followed by the premixed patching mortar. Leave the mortar slightly higher than the surrounding surface. Let an hour pass for initial shrinkage before finishing, then keep the patch damp so that it will properly cure as recommended by the manufacturer of the mortar. Using proprietary patching materials such as those containing polymers, can improve the adherence of the patch, but first must be approved for use by Kingfield.

Latex or epoxy modified repair mortars have been found to be acceptable provided they can be finished per Kingfield's recommendations.

Tie-holes, after a thorough cleaning and dampening with water, should be completely filled with patching mortar.

Fins, protrusions or other irregular projections from the surface of the concrete, should be removed by chipping, jackhammering, grinding or wire brushing. A reasonably flat surface is required so that Hydrogel can be applied in a continuous monolithic coat. Smooth and gradual transitions between offset surfaces must be provided.

VII. DETAILING

Kingfield has developed a set of guideline details for installing Hydrogel in waterproofing/roofing applications, which address standard and common detailing conditions. If conditions arise which cannot be handled by these standard guideline details, consult Kingfield for assistance. All surfaces to

which Hydrogel and flashing is to be applied must be clean and dry. All transitions must be sharply formed having no irregular surfaces or edges. In both waterproofing and roofing applications, all critical detailing conditions are typically double protected utilizing a reinforcing layer embedded into and top coated with Hydrogel membrane. The GFG20X reinforcing material must be firmly embedded into the initial coat of membrane before the second coat of membrane is applied to ensure positive adhesion, free of trapped air.

SPECIFIC DETAILING CONDITIONS

All detailing, flashings and terminations shall be done in accordance with Kingfield's standard installation guidelines and details. Refer to Kingfield's standard guideline details for drawings depicting the following:

SHRINKAGE CRACKS

For cracks over 1/16" (1.6mm) but less than 1/4" (6.4mm) in width, apply membrane, 90 mils (2.3mm) thick, over the crack area. Center a 6" (152.4mm) wide strip of reinforcing (GFG20X) over the crack and embed firmly into the applied membrane. Apply another coat of membrane, 90 mils (2.3mm) thick, over the reinforcing sheet, totally encapsulating it in membrane.

CONSTRUCTION OR CONTROL JOINTS

Apply membrane, 90 mils (2.3 mm) thick, over the joint area. Center a 6" (152.4mm) wide strip of reinforcing (GFG20X – see Kingfield's Guideline Details) over the joint and embed firmly into the applied membrane. Apply another coat of membrane, 90 mils (2.3 mm) thick, over the reinforcing sheet totally encapsulating it in membrane.

PRECAST JOINTS

Side Joints:

Fill the joints between precast panels with concrete or an acceptable repair mortar.

Apply membrane, 90 mils (2.3mm) thick, over the joint area. Center a strip of reinforcing (GFG20X) over the joint, extending 3" (76.2mm) beyond both sides of the joint, and embed firmly into the applied membrane. Apply another coat of membrane, 90 mils (2.3mm) thick, over the reinforcing sheet totally encapsulating it in membrane.

End Joints:

Fill the joints between precast panels with concrete or an acceptable repair mortar. Apply membrane, 90 mils (2.3mm) thick, over the joint area. Center a strip of reinforcing (GFG20X) over the joint, extending 9" (228.6mm) beyond both sides of the joint, and embed firmly into the applied membrane. Apply another coat of membrane, 90 mils (2.3mm) thick, over the reinforcing sheet totally encapsulating it in membrane.

EXPANSION JOINTS

Expansion joints can be detailed a number of different ways, depending on the various structural and/or design considerations for each project. The descriptions below outline typical methods of how a typical expansion joint may be detailed using GFG20X and Hydrogel. Specific project requirements may dictate that these details be modified or abandoned altogether in favor of proprietary expansion joint materials and systems.

Expansion Joints < 1" (25.4 mm) In Width: (50% total designed movement)
Apply membrane, 90 mils (2.3mm) thick, over the joint area. Center a strip of reinforcing (GFG20X only) over the joint, extending 3" (76.2mm) beyond both sides of the joint, and embed firmly into the applied membrane. Apply another coat of membrane, 90 mils (2.3mm) thick, over the reinforcing sheet totally encapsulating it in membrane.

Expansion Joints > 1" (25.4 mm) but < 2" (50.8mm) In Width: (50% total designed movement) Lay a foam rod or tube (1" (25.4mm) larger in diameter than the joint width) over the opening of the joint. Apply Hydrogel membrane, 90 mils (2.3mm) thick, up to the joint area. Embed a strip of reinforcing (GFG20X) firmly into the applied membrane extending 6" (152.4mm) beyond one side of the joint. The GFG20X should then be laid over the foam rod and extend another 6" (152.4mm) beyond the other side of the joint, again embedded into Hydrogel. Apply additional Hydrogel over the GFG20X and install another strip of GFG20X, extending a minimum of 9" beyond both edges of the first layer. Finally coat over the GFG20X except where it is looped up and over the foam rod, totally encapsulating the sheet edges.

The anticipated movement of the deck at expansion joints is designed to be taken by the excess looped material (GFG20X). The detail should never be designed or constructed so that stress occurs within the flashing sheet itself. In roofing applications it is advisable to curb the expansion joint detailing above the finished surface of the roof whenever possible. In waterproofing applications, the foam rod may be inserted slightly into the joint leaving at least half of the rod "proud" of the surface of the deck to provide a hump/water shed. Additional protection must be provided over the completed joint assembly to protect the detailing from subsequent backfilling and/or topping material installation.

PROPER DETAILING IS ESSENTIAL FOR SUCCESSFUL WATERPROOFING. THESE DETAILS ARE NOT INTENDED TO BE USED TO ACCOMMODATE FOR MOVEMENT IN EXCESS OF THE JOINT WIDTH OR SEISMIC STRESS.

ROOF DRAINS

With the clamping ring removed, apply membrane, 90 mils (2.3mm) thick, around the drain, extending it from the edge of the drain bowl to a point 12" (304.8mm) out onto the deck beyond the edge of the deck flange, in all directions.

Embed a sheet of reinforcing (GFG20X) firmly into the membrane, centered over the drain bowl. The reinforcing should extend a minimum of 6" (152.4mm) beyond the edge of the deck flange in all directions. Slits should be cut to accommodate for the clamping ring bolts and the center of the reinforcing must be cut out. Re-install the drain clamping ring, making sure that the bolts are all properly tightened. Finish by coating over all the reinforcing, exposed beyond the clamping ring, with a 90 mil (2.3mm) thick coat of Hydrogel totally encapsulating it.

PENETRATIONS

Flash all penetrations (pipes, angles, vents, etc.) passing through the membrane. All penetrations must be properly secured to the deck or cast into the deck. The flashing seal must be made directly to the penetration passing through the membrane. The flashing should not be terminated to an intermediate element (metal flashing, insulation, surface treatment, etc.) which itself could fail and allow moisture to bypass the flashing and membrane. Flexible penetrations (i.e. lightning cable) must be enclosed in a stable "goose neck" vent secured to the deck and properly flashed with GFG20X. As the performance of the Hydrogel is jeopardized by temperatures greater than 90 degrees F (82.2C), hot pipes must first be surrounded by an intermediate "cold" sleeve pipe that allows the flashing to be applied to it instead of directly to the hot pipe itself.

EXPOSED FLASHINGS (i.e. CURBS, PARAPETS, WALLS, ETC.)

Hydrogel is not intended to be left exposed. For all exposed flashing conditions, GFG20X must be used and subsequent cladding (stone, metal, etc.) installed.

VIII. HYDROGEL APPLICATION GENERAL

The proper application of Hydrogel is important to the success of any installation. This success is partly insured by the proper preparation of the substrate and membrane. The substrate must be dry and clean of all surface contaminants, such as unapproved curing compounds, form release agents, oil, dirt, etc. Any surface irregularities likely to inhibit Hydrogel from being applied as a continuous, monolithic membrane should be eliminated. Any areas of the substrate which are defective should be removed and either replaced or properly repaired. The applicator should thoroughly inspect all surfaces to be waterproofed and flashed BEFORE commencing with the application. Any deficiencies found should be reported to the General Contractor on site, so that they can be corrected. No work should begin until all deficiencies noted and reported have been corrected. If the pump and materials are to be placed on the roof or plaza, care must be exercised. Consult with the General Contractor, Architect and/or Project Engineer, to insure that the weight of the equipment and material is safely placed so as to pose no threat to the structural integrity of the deck and building Hydrogel must be mixed in a suitable progressive cavity pump.

Clean an area slightly larger than what is expected to be waterproofed each day. This area should first be swept thoroughly with a push broom to remove any loose dirt and debris, then blown clean using an air compressor or gasoline powered, back pack-type blowers. Blowing the area clean is the final step in removing as much of the fine dust and dirt as possible - BLOWING THE DECK CLEAN IS A REQUIRED STEP!

All detail work is typically completed before the membrane is applied to the field of the deck.

SEE SECTION VII. (7) "DETAILING" FOR ADDITIONAL INFORMATION.

HORIZONTAL APPLICATION - STANDARD ASSEMBLY

Hydrogel is typically applied at an average thickness of 90 mils (2.3 mm) in a continuous, monolithic coating. The application of the membrane should be conducted in a carefully planned, methodical manner. There are several application methods which can be employed to assist with the proper control of the membrane's thickness.

Immediately following the application of the Hydrogel membrane, embed the GFG20X sheet geo-textile side down into the Hydrogel membrane. Overlap seams of the GFG20X sheet 6", solvent wiping seams to ensure proper adhesion of the Durotape seaming tape. Apply Durotape over seams and roll seams with a heavy lead roller to ensure complete adhesion of the Durotape to the GFG20X sheet. Cut fish mouths and ensure continuous adhesion of the Durotape to the GFG20X sheet.

VERTICAL APPLICATION – STANDARD ASSEMBLY

Hydrogel is typically applied at an average thickness of 90 mils (2.3 mm) in a continuous, monolithic coating. The application of the membrane should be conducted in a carefully planned, methodical manner. There are several application methods which can be employed to assist with the proper control of the membrane's thickness.

Immediately following the application of the Hydrogel membrane, embed the GFG20X sheet geo-textile side down into the Hydrogel membrane. Overlap seams of the GFG20X sheet 6", solvent wiping seams to ensure proper adhesion of the Durotape seaming tape. Apply Durotape over seams and roll seams with a heavy lead roller to ensure complete adhesion of the

Durotape to the GFG20X sheet. Cut fish mouths and ensure continuous adhesion of the Durotape to the GFG20X sheet.

Ensure membrane is properly terminated utilizing a mechanically fastened termination bar.

VERTICAL APPLICATION – BLIND SIDE ASSEMBLY

Substrates for blind side application must be relatively smooth, free from protrusions and cavitations. Acceptable substrates include shotcrete smooth surfaces or plywood. For plywood substrates applied onto sheet pile walls, all positive side flutes must be filled with sand or some other suitable material to prevent deflection of the plywood and installed blind side waterproofing membrane at the time of concrete pour.

Mechanically fasten GFG20X sheet with geo-textile facing the support of excavation and seam with Durotape seaming tape overlapping seams by 6". Solvent wipe seams to ensure a strong bond for the Durotape to the GFG20X sheet. Mechanically fasten HDPE Mesh to GFG20X sheet butting edges. Secure in such a way as to eliminate bubbling or warping of the HDPE Mesh.

Apply Hydrogel at an even 90 mil thickness. Embed GFG16 Protection Sheet into Hydrogel membrane immediately after application of Hydrogel. Install with geo-textile facing outward toward the applicator. Lap GFG16 sheet seams a minimum of 1". Secure seams so as to prevent wind lift or tearing from environmental conditions prior to concrete pour.

Protect installed blindside assembly from construction site water runoff and other jobsite environmental factors.

IX. BOND/ADHESION CHECKS

Once a small area of membrane has been applied and cooled, a bond check should be made to ensure that the Hydrogel is well adhered to the substrate. If the membrane is not well bonded remedial steps, typically additional deck preparation, are required to improve the bond. The bond can typically be affected if one or more of the following conditions exist:

- Substrate surface is weak (i.e. over-troweled, laitance, had been rained on before fully cured, etc.)
- Substrate is not dry enough (i.e. concrete has not fully cured or is wet from rain, snow, frost, dew or condensation, etc.)
- Substrate is not clean (i.e. dirt, dust, oil, curing compounds, from release agents, etc.)

If Hydrogel attains a good bond to the substrate, initially or after corrective remedial steps have been implemented, the application of the balance of the membrane can begin. Frequent bond checks throughout the application of the membrane should be conducted to ensure adequate adhesion is being maintained. If adhesion problems persist after corrective action has been done, contact Kingfield's Technical Service Department.

X. SEPARATION/PROTECTION LAYER INSTALLATION

For all applications, whether roofing or waterproofing, a separation and/or protection layer is required to be embedded into the Hydrogel to protect it from traffic by subsequent trades, backfilling operations, installation of topping materials, etc. It is strongly advisable that the application of the membrane commences as late in the construction stage as possible to minimize damage to the membrane installation from other trades and operations.

HORIZONTAL WATERPROOFING APPLICATIONS

On horizontal deck waterproofing applications (plazas, planters, reflecting pools, fountains, etc.) the following protection layer products are acceptable:

- Kingfield's GFG20X sheet (additional protection may be required where wheeled traffic or excessive abuse is anticipated)
- Other protection materials approved by Kingfield

The protection course should be embedded into the membrane while the membrane immediately following the application of Hydrogel. Overlap adjoining edges (dry) a minimum of 6" to ensure complete coverage of the membrane. Seam the laps with Durotape seaming tape. Seams must be properly taped ensuring continuous adhesion without fish mouths or gaps. Solvent wipe GFG20X sheet seams to ensure bond when taping the seams with Durotape.

VERTICAL WATERPROOFING APPLICATIONS

On vertical waterproofing applications (foundation walls, tunnel walls, planter walls) the weight of the protection course must be considered. The product should not be so heavy that it threatens to pull itself off the vertical surface, taking membrane with it. The following protection layer products are acceptable:

- GFG20X Sheet
- Other protection materials approved by Kingfield

The protection course should be embedded into the membrane immediately after application of Hydrogel.

VERTICAL BLINDSIDE WATERPROOFING APPLICATIONS

On vertical blindside applications the GFG20X sheet must be mechanically fastened to the support of excavation. Lap seams by 6". Solvent wipe GFG20X sheet seams to ensure bond when taping the seams with Durotape. Install with geo-textile facing outward toward the support of excavation.

XI. WATER TESTING

Kingfield recommends that prior to the installation of the topping materials, the membrane installation, or sections thereof, be water tested with 2" (50.8mm) of standing water for 48 hours. For sloped areas, soaker hoses and/or sprinklers can be used for water testing purposes.

Alternatively, electronic leak tests can be conducted. Any leaks detected should be located, repaired and the area re-tested.

XII. REPAIR OF DAMAGED MEMBRANE DURING CONSTRUCTION

Hydrogel which has been damaged during construction can be easily repaired. The separation/protection layer should first be carefully removed, exposing not only the damaged area of membrane but also an area 6-12" (152.4-304.8mm) all around the damage. Apply Hydrogel to the damaged area extending it out to the surrounding area over the existing Hydrogel. Since Hydrogel is a non-curing membrane, the new material will bond and maintain the monolithic membrane. If the damage was caused by another substance contaminating the Hydrogel, all contaminated material must be completely removed and all traces of the contaminant eliminated prior to the repair being made.

New separation/protection layer material must then be installed over the repair area.

COMPLETED INSTALLATIONS

In instances where the topping materials have already been installed, the membrane is still very easily repaired once the leak source is located and the topping materials are removed. The source of the leak should be easy to

find since the Hydrogel is adhered directly and fully to the substrate meaning that water is not able to travel between the membrane and the substrate.

The same repair procedures as outlined above should be followed for repair of the membrane.

XIII. TOPPING MATERIALS

Depending on the project design, any number of materials can be installed over the separation/protection layer that has been embedded into the membrane. The following gives several examples of common topping materials that may be installed in various applications.

VERTICAL WATERPROOFING

Vertical waterproofing applications (foundation, tunnel or planter walls) typically are covered with earth and/or gravel backfill directly against the protection layer. Adequate protection materials are essential to protect the membrane from possible damage from the backfilling operation. SEE SECTION X. "SEPARATION/PROTECTION LAYER INSTALLATION" FOR MORE INFORMATION".

HORIZONTAL WATERPROOFING

Horizontal waterproofing applications (plaza decks, parking decks, etc.) can be covered with a variety of materials (earth, concrete, asphalt paving, insulated pavers assemblies, etc.). Adequate protection materials are essential to protect the membrane from possible damage from the installation of these materials.

SEE SECTION X. "SEPARATION/PROTECTION LAYER INSTALLATION" FOR MORE INFORMATION".

PAVERS

Concrete or clay pavers can be installed directly on top of the protection layer or insulation. Pavers are typically installed on setting beds of sand, mortar or bituminous paving or with pedestals. If a sand setting bed is to be used directly over the insulation, an appropriate geotextile filter fabric should be laid over the STYROFOAM.

XIV. CAUTION

DO NOT APPLY HYDROGEL UNDER THE FOLLOWING CONDITIONS:

- To surfaces contaminated with dirt, dust, oil, grease or laitance.
- To concrete holding enough moisture to cause blistering or pin-holing of the membrane.
- Over concrete curing compounds, form release agents or surface coatings that are not approved by Kingfield.
- To surfaces with ridges, swirls, etc. high enough to prevent application of a monolithic coating with membrane.
- At less than the minimum thickness prescribed by Kingfield or as specified in the Contract Documents.

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