LAVA-LINER

5000FRA

ULTRA-FLEX™ 5000FRA
Is a two component, industrial organic polyurethane that cures to form an elastomeric membrane which is impermeable to water and many aqueous, alkaline or acid compositions. ULTRA-FLEX 5000FRA will guard against corrosion, prevent the intrusion of water, can qualify for containment of potable water and is extremely effective in many, if not all, industrial requirements for a flexible barrier against vapor or moisture.
Applications of ULTRA-FLEX 5000FRA span the range from reservoir and sewage treatment, pipeline protection, coatings for the wire and cable industry, potting for electrical connections, and cooling tower and evaporative cooling equipment rehabilitation and preservation. Its remarkable flexibility and adhesion give it outstanding performance and durability especially when paired with ULTRA-FLEX surface preparations.
ULTRA-FLEX 5000FRA is black in color, and is sold in one gallon size containers and five gallon metal pails with activator provided in proportionately sized containers. ULTRA-FLEX 5000FRA can be delivered in 55 gallon drum quantities for large plural component spray applications and insitu spray booths.

ULTRA-FLEX 5000FRA can be used to meet LEED standards. See the table below for specifics.

LEED Category & Section	**Section (Points)**	**Description**	**ULTRA-FLEX 5000FRA, 5000FRATG**
Recycled Content	MR 4.1 (1)	Post-Consumer	**>20%**
Local Regional Materials	MR 5.1 (1)	Final Assembly Point	Hayward, CA 94545
Low Emitting Materials	EQ 4.1 (1) EQ 4.2 (1) EQ 4.4 (1)	VOC Content of Adhesives/Paint below Defined Limits Free of Added Urea-Formaldehyde Resins	Yes Yes

ULTRA-FLEX 5000FRA also comes in a trowel grade and is ordered as ULTRA-FLEX 5000FRA-TG.

Physical Property	Result	Test Method
Density, pcf	63	ASTM D1474
Tensile Strength, psi	>3100	ASTM D412
Elongation, %	130	ASTM D412
Tensile Modulus, psi	1321	ASTM D412
Shore D Hardness	40-50	ASTM D2240
Moisture Vapor Transmission	0.02	ASTM E96
Volatile Organic Content	94 g/l	ASTM D3960

GENERAL APPLICATION SPECIFICATIONS – ULTRA-FLEX 5000FRA
Description

1. ULTRA-FLEX 5000FRA can be applied as a waterproofing, damp proofing or vapor barrier membrane over new or existing, flat concrete surfaces, concrete block construction, Celotex, polystyrene insulation, Dens Glass® sheathing or Dens Deck®, metal decking and most clean construction surfaces.

2. ULTRA-FLEX 5000FRA is a cold applied, two component, liquid urethane. It cures to form a tough, durable, seamless, water impermeable barrier. ULTRA-FLEX 5000FRA may be applied by spray, squeegee roller or brush, and retains its flexibility in hot or cold environments. (165°F to -60°F)

3. ULTRA-FLEX 5000FRA is self-flashing and adheres to most clean construction materials.

4. ULTRA-FLEX 5000FRA may be used to bridge hairline cracks (up to 1/8” or 3mm) in the substrate without compromising the integrity of the membrane when fully cured.

Safety
1. Construction should be done with equipment and procedures designed to minimize danger to personnel and materials.
2. Protective equipment including safety glasses should be worn when applying liquid products to prevent accidental splash or spray into the eyes.
3. Smoking, welding or metal grinding should not be allowed on or near the spray application of ULTRA-FLEX to avoid potential flashing or ignition during the application process.

SURFACE PREPARATION
SPECIAL SURFACES
All surfaces are different and require specific attention to details that are not covered in a general application

instruction. Please read the sections following this section for the type of surface you intend coating.

1. Coating Concrete Surfaces
2. Coating Synthetic Surfaces (e.g. EPDM, PVC, Fiberglass, etc.)
3. Coating Metal Surfaces

General

1. ULTRA-FLEX 5000FRA is applied on a clean, dry, and structurally sound substrate. Any oil and/or grease spots must be thoroughly cleaned. If paint or a previous coating has been applied, the surface must be lightly sanded. All release agents, previous paint or coatings that are loose or flaking must be removed.

2. The following is a list of normal practices used in surface preparation:

a. Inspect and clean the surface thoroughly.
b. Correct water drainage as necessary.
c. Repair structural defects (i.e., cut out blisters, secure any loose sections).
d. Repair or replace vents, drains, protrusions, tie-backs, hooks, loose nuts, bolts, eyes, supports, etc.
e. Mask and protect surrounding structures which are not to be covered with ULTRA-FLEX 5000FRA.

3. Surface Pretreatments

Individual surfaces have performance characteristics that may require a specific pretreatment. For individual substrate solutions, please refer to the section on the specific substrate described later.

Vertical or Sloping Surfaces

Vertical or sloping surfaces should be coated in two applications. Each application will be approximately 20 mils thick to prevent running and an uneven surface coating. A second coat should be applied after 30 minutes and within 4 hours, and only when the surface of the first coat is tacky but not completely cured.

Horizontal Surfaces

ULTRA-FLEX 5000FRA is self-leveling and therefore horizontal surfaces can be rolled, squeegeed, brushed or sprayed. Single coat applications are possible where the surface is level and the chance for run off is minimal.

Materials

ULTRA-FLEX Part A (Black Prepolymer in a 1 or 5-gallon metal bucket.)

ULTRA-FLEX Part B (Light brown to golden liquid in a ½ gallon or 16 ounce plastic jug.)

Surface Pretreatment as set forth in the section on a specific substrate described below.

MANUAL APPLICATION AND MIXING

Equipment

½ inch Drill (Milwaukee ½" D Handle Drill 500 RPM's or equivalent.)

Polyester Fabric

Reinforcement fabric is a stitch-bonded heat-set polyester high-performance reinforcement fabric.
TYPICAL SPECIFICATIONS:
Tensile Strength: 57-74 lbs. (ASTM D-1682)
Trapezoidal Tear Strength (16 lbs. ASTM D-1117)
Elongation: 61-63% (ASTM D-1682)
Mullen Burst (Ball) 176 lbs. (ASTM D-3786)
Weight of Fabric: 3 oz. / sq. yard
Thread Count/Gauge: 12 threads per inch (commonly called 14 gauge)
Color: White to off-white with printed alignment stripe.

Authorized Mixers – Manual

Miscellaneous Materials

1. Disposable Short-Nap Rollers (nap of ¼" or less) and/or paint brushes
2. Clean Up and Masking Materials
3. Mineral Spirits or solvent
4. Rags
5. 2-3 empty ea. - 5 gallon HDPE or metal buckets
6. Wall Clock or timed electrical outlet or watch
7. Cleaning / Solvent brushes
8. Razor knife for cutting fabric
9. Inexpensive Poly/plastic sheeting
10. Masking tape - 2 inch or wider
11. Vacuum or air nozzle
12. Absorbent paper towels, shop rags or clean cloth rags

MANUAL & HOT POT MIXING

ULTRA-FLEX 5000FRA IS MIXED IN THE FOLLOWING MANNER:

1. Open the 1 or 5-gallon Prepolymer Part A can. This will contain 0.9 or 4.5 gallons of material and when mixed with the appropriate sized premeasured Part B, will provide 1 or 5 mixed gallons and a liner approximately 60 mils thick for a 25 or125 square foot area (respectively) when cured (Approximately 55 wet mils).
2. Pour the ½ gallon of Part B activator into the five gallon pail of Part A or the 16 oz. bottle of Part B into the one gallon pail of Part A, and begin to mix immediately with the paddle mixer for a minimum of 3.5-4 minutes to insure a homogenous mix.
3. Prevent air bubbles from forming by mixing at approximately 500 rpm, and do not fold or force the system to entrap air by causing a deep vortex in the can while mixing.
4. Once the Part A and Part B are mixed, it has a pot life of approximately 40 to 60 minutes within which the application can take place without substantial hardening of the mixture making it impossible to obtain an adequate coat to the substrate.
5. The premixed ULTRA-FLEX 5000FRA will begin to set immediately. When spraying, keep a 5 gallon bucket of mineral spirits or other solvent on hand to purge the pump and spray lines at least every 2-3 five gallon cans used. Do not allow ULTRA-FLEX 5000FRA to remain in the lines or the pump for more than 5 minutes without continued spraying or cleaning the lines with solvent.

Brush or Roller Application

Due to the pot life of ULTRA-FLEX 5000FRA of only 40-60 minutes for workability at a temperature of 75°F, it is suggested that once a five gallon can is mixed, two or three persons should be used to apply the product. Hotter surfaces or ambient temperatures will cause the material to set up faster. Colder surfaces and ambient may take longer to cure and should not be applied at low temperatures (without adding the Cold Weather Catalyst) unless adequate curing time is given prior to placing the liner into use. It is not suggested that the liner be applied at temperatures below 45°F-50°F or at temperatures where the dew point may effectively cause the formation of moisture on the surface without prior consulting with the ULTRA-FLEX representative.

When rollers are used, they can be dipped directly into the can and applied. Avoid excessive back rolling of the material as it will tend to create bubbles and fisheyes that can remain in the ULTRA-FLEX 5000FRA, and will undermine the impermeability of the membrane.

When brushes are used, it is preferable to pour the contents in the five-gallon bucket into smaller one-gallon containers. These are more easily handled by an applicator and can be less problematic for the application. Again, try not to back-brush excessively as it will cause bubbles and fisheyes that will be hard to eliminate and can affect the impermeability of the membrane when cured.

When the brush or roller becomes thick, stiff and will not hold much material, discard the brush and begin with a new brush or roller.

SPRAYING

HOT POT SPRAY APPLICATION:

Hot pot spraying is defined by the pre-mixing of the two components in the general manner prior to application using air assisted spray equipment. Equipment with pumps capable of handling high viscosity material and maintaining a 40:1 or 54:1 pressure ratio is typical. Manufacturers of pump and spray set-ups such as Binks, Devilbliss or GRACO should be consulted for the proper equipment given viscosity, temperatures and tip requirements for their particular equipment. Tip sizes guidelines prescribe 0.29-0.39.

HOT POT SPRAYING

To set up the spray equipment, set the air pressure to the air dispersion portion of the nozzle first and then the pump in accordance with the equipment manufacturer's instructions.

Follow all recommended procedures as are provided by the spray equipment manufacturer or representative. It is of particular importance is to make sure that the air assist dispersion line is the first line to have air pressure applied when preparing to start-up the equipment and the last one to be turned off at the shut-down of the equipment. This will avoid any back flushing of mixed material into the gun and air dispersion lines.

We recommend that you first spray coat the vertical surfaces first with a light (25 - 30 mils) coat of 5000FRA. Thicker coating in one pass will increase the possibility of runs in the material. After completing the first passes on vertical surfaces, a second coat can then be applied to obtain the desired thickness. This coat should then be applied approximately ½ hour to 2 hours after the application of the prior coat. This will help to insure that inter-coat adhesion will be accomplished and that the finished coat is monolithic.

During the spraying of 5000FRA, the material will begin to set up chemically. As you continue to apply the material, it will have a tendency to set up in the hoses and in the pump. It is suggested that you maintain a 5-gallon bucket near the pump that is about ½ full of mineral spirits or solvent and that the entire system be flushed after every 10 or 15 gallons of material has been sprayed. When the temperature is 75°F or above, the increased ambient temperature can cause 5000FRA to set up more rapidly and you may have to flush more often. You can flush by placing the pump into the mineral spirits in the can and then spraying the nozzle directly back into the can. This will avoid waste and the waste material can be used several times for flushing before having to be discarded.

Once you have completed the spraying of each coat you should immediately follow the recommended procedures for cleaning the pump, hose and gun assemblies with mineral spirits, solvent or MEK.

Upon completion of the above procedure, you should proceed to the touch-up process of areas which have been incompletely or improperly covered during the initial spraying and to smooth any areas sagging due to excessive coverage on vertical surfaces.

This stage of the operation is critical as the 5000FRA will begin to set up rapidly and any imperfections not corrected will remain on the finished product.

PLURAL COMPONENT SPRAYING:

Lava-Liner has identified several plural component spray machines that are compatible with the spraying of ULTRA-FLEX 2 component products. The Xtreme® spray machine has been tested and used by Lava-Liner at the International Technology Center in Minneapolis, MN.

LAVA-LINER TWO COMPONENT SPRAY EQUIPMENT

A Proprietary spray machine has been developed by Lava-Liner that is much more efficient and less expensive than standard plural component machines.

Lava-Liner's plural component equipment is now available in a portable profile weighing only 70 lbs. (35kg) and can spray 5 gallons at a time without refilling. Requirements are 110v AC and air pressure of 100psi @ 10-12 CFM capable of being achieved by portable compressors. A Proprietary spray machine has been developed by Lava-Liner that is much more efficient and less expensive. Pictured Below and illustrated at https://www.youtube.com/watch?v=tZ45-k52t80 .

Plural component spray equipment will result in added savings in time, reduced product waste and ease of application. The two components are kept separate until mixed in line within a static mixer. The proportions are easily set and all controls are electronic and digitally viewed. No mixing is required when using plural component machine and therefore pot life is also not an issue.

PATCHING AND REPAIRING ULTRA-FLEX™ 5000FRA

1. When it is necessary to repair or patch 5000FRA the procedure for surface preparation should be followed as is set forth above. Additional steps should be taken before applying a new coat to the exposed surface to be repaired.
2. Clean the surface with mineral spirits or solvent.
3. Rough up the 5000FRA surface surrounding the breach or area to be repaired by about 2 inches beyond the area to be patched with 60-80 grit sand paper or a clean, oil free wire brush.
4. Wipe the roughened surface again with mineral spirits (naphtha solvent) to clean all of the debris that will form from sanding leaving the surface clean and dry.
5. Apply ULTRA-FLEX AP (Adhesion Promoter) to the rough surface and allow to dry for about 15 minutes.
6. Apply a freshly mixed coat of ULTRA-FLEX 5000FRA to the area to be treated and all the way around the roughened area surrounding the surface to be coated.

COATING CONCRETE SURFACES

Cured Surfaces:

A curing period is necessary for all concrete surfaces to be coated with ULTRA-FLEX 5000FRA. Portland Cement Concrete shall be dry and cured at the time of application of ULTRA-FLEX 5000FRA. This curing period is needed for the concrete to attain proper hardness and for evaporation of excess water to prevent blistering which could be caused by vapor pressure underneath the applied coating membrane. Recommended curing of concrete varies from 28 days to six months depending upon service conditions and coating used Recommended procedure for new concrete is to moisture cure, using plastic film, wet burlap or water spray; pre-coat with a float finish to Class "B" tolerances and then surface with ULTRA-FLEX 5000FRA.

If the concrete is not sufficiently cured or contains water, it is recommended to prepare the surface of the concrete with ULTRA-FLEX EP-990C (Concrete Penetrating Epoxy). ULTRA-FLEX EP-990C will bond concrete surface to form a water proof and solid surface to which ULTRA-FLEX can adhere. ULTRA-FLEX EP-990C draws on the moisture and water in the atmosphere and concrete to hydrolyze certain molecules and bond with the cementitious materials. This will render a surface that is hardened and dried providing superior adhesion and less likelihood of bubble defects in the top coating (see following section on Out-Gassing).

Clean and Dry

All concrete, whether new or old must be clean and dry, and free of loose powder, release agents, curing compounds, laitance or debris. It is highly recommended to remove the existing cement paste (effervescence) on the surface and expose the tops of the underlying aggregate.

Surface Preparation

1. The surface should be prepared to a CSP of 4 to 6 using the following methods:
   - 1.1. Abrasive blasting (ASTM D 4259-88),
   - 1.2. Water blasting (generally at 2500 psi minimum), allow concrete to dry (ASTM D 4259-88),
   - 1.3. Shot blast (ASTM D 4259-88), horizontal surfaces.
   - 1.4. Mechanical grinding.

2. Pretreated with ULTRA-FLEX EP-990C (Concrete Penetrating Epoxy)

Out-Gassing

1. If the concrete surface is porous, or wet, a surface curing agent or sealer may be required to prevent out-gassing or the formation of bubbles as a result of entrapped air or moisture. See the use of ULTRA-FLEX EP-990C for moisture curing and sealing.
2. Out-gassing is generally the result of retained moisture or the result of expansion of entrapped air on the surface of porous concrete.
3. Out-gassing from moisture can be prevented by making sure that the surface to be coated is dry and there is no moisture retained below the immediate surface that can react with the ULTRA-FLEX coating as it is applied.
4. Out-gassing from entrapped air can be prevented in most instances by coating the surface with ULTRA-FLEX when the temperature of the surface to be coated is in a temperature declining mode. ULTRA-FLEX is black, and as such acts as an absorber of solar energy. The accumulation of heat under a dark surface can increase the temperature of the concrete by as much as 9O°F. This absorbing effect causes the air trapped within the concrete's pores to heat and expand. The air expands and tries to push its way out of the concrete (out-gassing), creating hundreds of bubbles in the surface of the ULTRA-FLEX, as it cures. As a result, it is common that out-gassing will occur when concrete is coated in direct sun light.

Methods to Prevent Out-Gassing

Out-gassing can be minimized or prevented by using ULTRA-FLEX EP-990C and following the above rules or alternatively by:

Pre-coating the surface with an epoxy primer to prevent the out-gassing from having an effect on the surface while being coated with ULTRA-FLEX 5000FRA. The use of an epoxy coating seals the surface with a hard and impenetrable barrier that generally presents no problem downstream. .

Precautions

Application of ULTRA-FLEX 5000FRA over concrete surfaces should not take place if:

1. Material temperature is below 60^{o}F at time of application.
2. Surface temperature is below 50^{o}F.
3. Surface moisture is present or rain is imminent and will affect area to be coated.
4. Surface temperature drops below the dew point.
5. Concrete is curing or in a temperature rising mode.
6. Other conditions are obviously unsuitable.

COATING METAL SURFACES

When coating any metal surface it is important that an applicator take into consideration all of the following circumstances.

Surface Preparation

All surfaces must be clean and dry. All oil, paint, scale, oxidation (rust), dirt, and grease must be removed. Surfaces should be cleaned with pressure washing and the use of an industrial cleaner or acid etching agent and thoroughly rinsed before application to the surface. ULTRA-FLEX 5000FRA is are self-flashing. However, in most circumstances it may be advisable to prime and or pre-treat the surface in a more effective manner to prepare for coating. Specific applications of surface pretreatments are described below.

Acid Etching

New metal surfaces are generally pre-coated at the manufacturing facility with fine oil or other protective grease or light paint that will inhibit water and moisture from penetrating and resulting in corrosion. This coating must first be removed prior to applying any coating or surface treatment. Depending upon the type of oil or protective coating, the method for removing the film will vary. Acid etching with a dilute solution (approx. 2% acid in water) muriatic acid will clean most surfaces and etch the metal to provide a clean surface to which most coatings will adhere. Not to be used for galvanized metal (see galvanized metal section below). Vinegar, Citric acid, oxalic and phosphoric acids are other acids that are effective cleaners; however, some should be avoided unless applied by trained personnel. Vinegar in many cases is a good, safe cleaner to remove

oils and grease residue and will easily rinse off. It is not as reactive as other acids are with certain metals and is generally not harmful to the environment.
Another very safe method for removing grease and oil is the use of TSP (trisodium phosphate).

Once the surface is cleaned and dry, using one of the above methods the surface is prepared for priming.

If the surface is metal, Lava-Liner recommends the use of the **Rust Converting Inhibitor –Alkyd (RCI-A)**. This is a zinc phosphorous based primer tht improves adhesion and aids in the long term prevention of recurring corrosion. If the surface is a prior coating of a urethane or polyurea that cannot be removed completely, the portions that cannot be removed must be primed with a very thin application of **ULTRA-FLEX Adhesion Promoter (AP 174).** Refer to the Technical Data Sheets for the above products for specifications of application and surface preparation.

Oils and grease removed by etching or by washing should be contained and removed in a safe manner consistent with good practices and in accordance with Federal, State and local ordinances.

Sand Blasting
In coating a metal surface, the greater the surface area that is covered, the greater the adhesion. If possible, it will usually be best to sand blast a metal surface prior to coating. Sand blasting increases the surface area to which a coating can adhere. The surface must be either blown clean using a compressed air or wiped down using a non-greasy volatile solvent. After sand blasting the surface of metal, some types may be subject to immediate oxidation (i.e. mild steel). You should not leave the surface exposed to the atmosphere without a coating for any lengthy period to avoid the condensation of moisture or flash rusting to occur. Therefore, if the surface is not to be coated within a reasonably short period of time, it is recommended that the metal that has been blasted be coated with a primer, preferably ULTRA-FLEX AP or ULTRA-FLEX RCI-A.

Abrading
Any number of methods may accomplish manual or mechanical roughening of the surface. The use of sand/emery paper, wire brushes sander, grinder or other mechanical device can be used to aid in cleaning and abrading the surface. As in above, after the surface has been abraded, the residual dust and metal filings should be removed either by using compressed air or by wiping the surface with a highly volatile solvent prior to coating.

Mechanical scoring or acid etching are but two methods for preparing a surface prior to coating. Both mechanical and chemical cleaning processes increase the surface area to which a coating may attach.

COATING SYNTHETIC SURFACES AND/OR PREPARATION FOR ULTRA-FLEX™ CHEMICAL BONDING

ULTRA-FLEX AP
Over the years, Ultra Flex 5000FRA has been used to coat many different surfaces. Although well known for its ability to physically bond to metal surfaces, concrete and wood, the use of ULTRA-FLEX AP (Adhesion Promoter) will provide a chemical bond between 5000FRA and the substrate. The following surfaces are compatible with ULTRA-FLEX AP.

Fiberglass
1. New Fiberglass: Degrease with mineral spirits, MEK solvent or TSP
2. Old Fiberglass: Power wash and scrub thoroughly with a solution of TSP and water. Rinse thoroughly and let dry
3. Abrade smooth surfaces with sandpaper or other abrasive medium.
4. Remove dust with tack rag.
5. Do not wipe with acetone.
6. Spray a fog coat at the rate of approximately 600 $ft.^2$ per gallon or a 5-7 mil coat of ULTRA-FLEX RCI-A.
7. Glass, Ceramics
8. Degrease with solvent-type degreaser or TSP
9. If possible, frost with wet / dry sandpaper and water
10. Rinse and allow to dry.
11. Spray a fog coat or wipe with a very light coat of ULTRA-FLEX AP

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ULTRA-FLEX 5000FRA CHEMICAL RESISTANCE CHART

The adjacent will provide general exposure guidelines as to the resistance of ULTRA-FLEX 5000FRA against certain chemicals and combinations. Although this information is believed to be reliable. LAVA-LINER, LTD., may not have any particular application, installation, or exposure experience of ULTRA-FLEX 5000FRA and suitable tests should be carried out by the user.

Where concentrations of chemicals are listed, the rating applies to all concentrations up to and including the concentration indicated. Maximum temperature for continuous service in some specific atmospheres is 1400 F (600C). For most applications, however, maximum service temperature is much higher. Consult your LAVA-LINER representative for actual use recommendations.

FOOTNOTE
R - Recommended
CR - Conditionally Recommended for splash/spill conditions
1 - Max. Service temp. Limited to 100^0 F
2 - Max. Service temp. Limited to 150^0 F.
NC – Not Compatible

Acetic Acid, Glacial <5% <10% >15% ≤30%	 R CR CR1
Ammonium Hydroxide,> 50%	NC
Ammonium Hydroxide, < 15%	CR1
Biological Oxidation Ponds	R
Bromine, Saturated	R
Chromatic Acid 7%	CR
Sulfuric Acid 6%	CR
Chlorine, Saturated	R
Citric Acid, > 15%	R
Copper Sulfate (Sat.) Solution in Water	R
Crude Oil	NC
Deionized Water	R
Diesel Fuel	NC
Ethylene Glycol (Antifreeze)	R
Ferric Chloride ≤53% >53%	CR1 CR2
Hydrochloric Acid < 15% (Solution in H_2O)	R
H20, Fresh	
Hydrogen Sulfide, Vapor (to 37%) Over Saturated Solution	R CR
Methanol	CR
Nitric Acid, 10%	R
Phosphoric Acid, 10%	R
Sewage Disposal Plant (Activated Sludge) Primary Secondary	 R R R
Salt (NaCl) All Concentrations	R
Sodium Dichromate 12%	R
Sodium Hydroxide 10% 40% 48 hrs. 50% 72 hrs.	CR1 CR1 CR2
Sodium Hypochlorite, ≤5.25%	R
Soil, Buried Underground	R
Sodium Silicate, < 41 %	R
Sulfuric Acid, 5%-40%	R
Trisodium Phosphate< 10%	R
H20	R