

SECTION 07.14.19

FLUID APPLIED REINFORCED MEMBRANE WATERPROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for furnishing and installing fully reinforced, liquid applied, membrane system designated on the drawings WP - 5 for concrete tanks, reservoirs, pits, for containment of water and wastewater.
- B. Partially reinforced liquid applied membrane system for non-immersed areas. System is similar to A with reinforcing limited to cold joints, cracks and protrusions.

1.02 SUBMITTALS

- A. Comply with requirements of Section 01.33.00 - Submittal Procedures (Submittal Procedures).
- B. Product Data: Submit manufacturer's product data, including surface preparation, application, and curing.
- C. Samples: Submit 3-inch by 1-inch samples for approval by the Engineer.
 - 1. Cured high-performance coating, 60 mils thick.
 - 2. Reinforcing fabric and joint cover sheet.
- D. Applicator's Project References: Submit list of completed project references.
- E. Certification of Applicator: Submit for applicator a certificate indicating completion of manufacturer's contractor training program or 2 year history of application of equivalent 2 component systems.
- F. Warranty: Submit manufacturer's standard warranty.

1.03 LEED SUBMITTALS

- A. LEED Certification Product Data: Submit LEED Certification Product Data as specified in SECTION 018113 "SUSTAINABLE DESIGN REQUIREMENTS".
- B. LEED Material Buyout Form: Complete and submit LEED Material Buyout Form, attached at the end of SECTION 01 81 13 "SUSTAINABLE DESIGN REQUIREMENTS" for the applicable LEED credit(s) specified hereinbefore.
- C. Prohibited Content Installer Certification: Following completion of installation, complete and submit the certification form specified in SECTION 01 3329.07 "PROHIBITED CONTENT INSTALLER CERTIFICATION."

1.04 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Applicator: Use applicator experienced in the application of the specified high performance coating for a minimum of 2-years on projects of similar size and complexity. Provide a list of completed projects including project name and location, name of

engineer, name of coating manufacturer, and approximate quantity of coating applied.

2. Applicator's Supervisor: Employ a supervisor during all phases of the work that had successfully completed manufacturer's contractor training program.

3. Applicator's Personnel: Employ persons trained for the application of high-performance coating.

B. Regulatory Requirements: Comply with environmental regulations. Specific attention should be given the potential for the requirement of a Confined Space Permit.

C. Pre-Application Meeting:

1. Convene a pre-application meeting 2 weeks before the start of application of the high performance coating.

2. Require attendance of parties directly affecting work of this section, including the contractor, sub-contractor, engineer, applicator, and manufacturer's representative.

3. Review environmental requirements, materials, and protection of adjacent work, surface preparation, application, curing, field quality control, cleaning, and coordination with other work.

D. Manufacturer required inspections:

1. Inspection of surface preparation prior to application of the concrete penetrating epoxy.

2. Inspection of the concrete penetrating epoxy prior to application of the high-performance coating

3. Final inspection of the coating after the completion of testing and warranty issuance.

E. LEED Requirements:

1. To the greatest extent practicable, furnish products containing recycled materials in compliance with requirements of LEED 2009 Rating System to achieve points for 20 percent] under MR Credit 4 Recycled Content.

2. LEED MR Credit 5 (MR 5.1 and MR 5.2) Regional Materials: Provide products that are extracted, processed, and manufactured regionally in compliance with requirements of LEED 2009 Rating System to achieve 2 points for 20 percent under MR Credit 5 Regional Materials.

3. Provide materials extracted, harvested, recovered and manufactured within 500 miles of the project site. Materials shall comply with LEED credit MR 5 to the extent possible.

4. LEED Credits: materials extracted, harvested, recovered and manufactured within 500 miles of the project site. Materials shall comply with LEED credit MR 5 to the extent possible.

5. Adhesives and sealants for use on the Interior of the Building shall be in compliance with requirements of LEED 2009 Rating System to achieve IEQ Credit 4.1 for low-emitting materials.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Delivery:

1. Deliver materials to the site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.
2. Do not deliver material to site more than one month before use.

B. Storage:

1. Store the material in accordance with manufacturer's instructions.
2. Store materials indoor in an area well ventilated and protected from damage.
3. Do not store material near open flame, sparks, or hot surfaces.
4. Store materials on raised platforms and covered by waterproof covers.
5. Keep material containers closed.

C. Handling: Protect materials during handling and application to prevent damage.

1.05 ENVIRONMENTAL REQUIREMENTS

A. Do not apply in wet weather or when rain is imminent.

B. Apply when the surface is a minimum 50 degrees F (10 degrees C) and a minimum of 5 degrees F (3 degrees C) above dew point. Consult manufacturer for application instructions if the ambient or surface temperature is below 50 degrees F (10 degrees F).

C. Do not apply to porous substrates when substrate or ambient temperatures are rising.

D. Do not apply to porous substrates when substrate is in direct sunlight.

E. Do not apply over substrates that are frozen or contain frost.

1.06 WARRANTY

A. Provide a 10 year material and 1-year labor warranty. Obtain material warranty from manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Lava-Liner, Ltd., 1550 Tiburon Blvd., Suite G-418, Tiburon, CA 94920 Ph. 415-829-9114 Fax 415-829-9203.

2.02 FLUID APPLIED REINFORCED MEMBRANE WATERPROOFING

A. High-performance coating: ULTRA-FLEX ECO 5000. Two-component, high solids, elastomeric asphalt modified urethane. Designed for spray, squeegee, or roller application.

1. Elastomeric Waterproofing, ASTM C836 and C957: Exceeds all criteria.
2. Solids by volume: >94 percent.
3. Volatile Organic Compounds (VOC): 0.76 pounds per gallon (94 g/L).
4. Tensile Strength, ASTM 0412, 100-mil sheet: >3000 pounds per square inch.
5. Extension to Break, ASTM 0412: 130 percent.
6. Recovery from 100 Percent Extension:
 - a. After 5-minutes: 98 percent.
 - b. After 24-hours: 100 percent.
7. Coating Performance, Crack Bridging:
 - a. 10 Cycles at minus 15 degrees F (minus 26 degrees C): Greater than 1/8-inch.
 - b. After Heat Aging: Greater than 1/4-inch.
8. Coating Performance, Weathering, ASTM 0822: 5000 hours: no cracking.
9. Softening Point, ASTM 036: Greater than 350 degrees F (177 degrees C).
10. Deflection Temperature, ASTM 0648: below minus 60 degrees (minus 50 degrees C).
11. Service Temperature: minus 60 degrees F to 220 degrees F (minus 50 degrees C to 105 degrees C).
12. Hardness, ASTM D2240, Shore D, 77 degrees F (25 degrees C): 45.
13. Permeability to Water Vapor, ASTM E96, Method E, 100 degrees F (38 degrees C), 100- mil sheet: 0.02 perms.
14. Abrasion Resistance, Weight Loss, ASTM D4060: <1.0 mg.
15. Adhesion to Concrete, Dry, Elcomeler: 350 pounds per square inch.
16. Color: Black.

B. Primer: Ultra-Flex EP-990C Two-component, medium solids, concrete penetrating epoxy primer.

1. Solids by Volume: 65 percent mixed.
2. Volatile Organic Compounds (VOC): 2.81 pounds per gallon (340170 *giL*).

C. Adhesion Promoter: Ultra-Flex AP174. Adhesion promoter: Bi-functional organosilane compound dispersed in isopropyl alcohol. Ensures a continuous and uniform bond between surfaces. Use the bonding agent over non-porous surfaces such as steel, except where primer has been installed. Do not use where solvent cleaners are prohibited.

1. Solids by Volume: Less than 1 percent.

2. Volatile Organic Compounds (VOC): 6.4 pounds per gallon (743 *giL*). Where required, Ultra-Flex AP-174 may be blended to specifications requiring less than 100 g/l, contact your Ultra-Flex representative.

D. Patching Material: ULTRA-FLEX ECO 5000 Trowel Grade, Liquid applied, chemical and corrosion resistant urethane elastomer, chemically thickened to allow trowel application with minimum sag, Use as a crack filler and for application to vertical surfaces and cold joints,

1. Elastomeric Waterproofing, ASTM C836 and C957: Exceeds all criteria,

2. Solids by volume: 94 percent.

3. Volatile Organic Compounds (VOC): 0.74 pounds per gallon (88 *giL*).

4. Tear Strength, ASTM624, Die C: 150 pounds per inch.

5. Tensile Strength, ASTM D412, 1 ~O-mil sheet: >3000 pounds per square inch.

6. Extension to Break, ASTM D412: 130 percent.

7. Recovery from 100 Percent Extension:

a. After 5-minutes: 98 percent.

b. After 24-hours: 100 percent.

8. Coating Performance, Crack Bridging:

a. 10 Cycles at minus 15 degrees F (minus 26 degrees C): Greater than 1/8-inch.

b. After Heat Aging: Greater than 1/4-inch.

9. Coating Performance, Weathering, ASTM D 822: 5000 hours: no cracking,

10. Softening Point, ASTM D36: Greater than 325 degrees F (160 degrees C).

11. Deflection Temperature, ASTM D648: below minus 60 degrees (minus 50 degrees C).

12. Service Temperature: minus 60 degrees F to 220 degrees F (minus 50 degrees C to 105 degrees C).

13. Hardness, ASTM 02240, Shore D, 77 degrees F (25 degrees C): 45.

14. Permeability to Water Vapor, ASTM E96, Method E, 100 degrees F (38 degrees C), 100- mil sheet: 0.02 perms.

15. Abrasion Resistance, Weight Loss, ASTM 04060: >1 mg.

16. Adhesion to Concrete, Dry, Elcometer: 350 pounds per square inch.

17. Color: Black.

O. Reinforcing Fabric and Joint Cover Sheet: Tietex T272 or equivalent. Stitch bonded polyester. Compatible with coating materials.

1. Weight: 3 ounces per square yard (100 g/m²).

2. Tensile Strength, ASTM 01682: 57.1 pounds (30 kg).

3. Elongation, ASTM 01682: 62 percent.

4. Mullen Burst Strength, ASTM 03726: 177 pounds per square inch

5. Trapezoid Tear Strength, ASTM 01117: 16.1 pounds (7.2 kg).

E. Pipe Protrusion Cover and Sealing Gaskets: polyester fabric, waterproofed, rubber boot gaskets. Compatible with Coating materials.

1. Manufacturer: Jaeger TTC,

2. Size: Various to fit tightly around pipes and circular protrusions as required.

F. Protection Board-2 - Pro Cover Waterproofing Protection Course or equal. For use at Wetland cells only.

PART 3 EXECUTION

3.01 INSPECT

A. Inspect substrate and adjacent areas where high-performance coating will be applied. Notify the Engineer of conditions that would adversely affect the application or subsequent utilization of the high-performance coating. Do not proceed with application until unsatisfactory conditions are corrected.

3.02 PROTECTION

A. Protect adjacent work and surrounding areas from contact with high-performance coating.

3.03 SURFACE PREPARATION

A. Surface Preparation shall be in accordance with ICRI CSP1 at a minimum.

B. Provide clean, dry, and structurally sound concrete surface.

C. New Concrete:

1. Ensure concrete has a minimum compressive strength of 3,000 psi, is dry, and is free of release agents and curing compounds before application of high-performance coating.
2. Remove surface laitance and release agents.

O. Steel Surfaces:

1. Steel surfaces shall be lightly abraded and cleaned prior to application. At concrete to steel transitions any gaps or cracks shall be filled UF ECO 5000 -Trowel Grade.

E. Condition Survey: If required by site Engineer, perform a condition survey of existing concrete in accordance with ACI 201.1 R.

F. Abrasive Blasting: (Water blasting may be used as an alternative)

1. Prepare concrete surface to receive high-performance coating by abrasive blasting.
2. Remove dirt, soil, grease, oil, paint, coatings, form release agents, curing compounds, laitance, loose material, unsound concrete, and other foreign materials that would inhibit performance of high-performance coating in accordance with ASTM 04258 and by abrasive blasting .
3. Obtain a firm, sound concrete surface in which bug holes are fully opened or repaired.
4. Remove sharp concrete edges and projections.
5. Perform abrasive blasting in accordance with ASTM 04259-88.
6. Receive approval by Engineer of blasting media.
7. Maintain air supply for abrasive blasting free of oil and water in accordance with ASTM D4285.
8. Prepare surface to obtain a profile of ICRI CSP 1 to 3 in accordance with ICRI 03732.

G. Repair concrete surface to be free of holes. Fully open bug holes before repair. Repair defects in the concrete surface, such as bug holes, air pockets, and honeycomb by filling and smoothing off with patching material, epoxy patching compound, or grout. Abrasive blast repaired surfaces.

H. Ensure substrate is clean and dry in accordance with manufacturer's instructions. Remove surface laitance from concrete surface to expose aggregate to obtain a profile of ICRI CSP 1 to 2 in accordance with ICRI 03732.

I. Repair cracks in concrete surface with material suitable for type and width of crack, compatible with substrate and high-performance coating, and approved by the Engineer.

J. Moisture Tests: 00 no apply primer or high-performance coating to concrete surface unless one of the flowing moisture tests confirm appropriate moisture levels for properly prepared substrates:

1. Plastic Sheet Method (ASTM D4263): Pass/Fail.
2. Relative Humidity Test: Less than 75 percent relative humidity at 70 degrees F.
3. Calcium Chloride Test: Less than 5 pounds per 1,000 square feet per 24 hours.
4. Radio Frequency Test: Less than 5 percent moisture.

3.06 APPLICATION

A. Locations:

1. Reservoir, Storm water Dewatering Reservoir and the Fire Water Storage Tank, Sump Pits, the Fully Reinforced WP-5 shall be used to 1.0 feet above the maximum water level. The surfaces above that shall use the partially reinforced system.
2. For Tidal Flow and Vertical Flow Wetland Cells, Elevator Dry Pits, Permanent Dewatering Wells, Sump Pits, Sewage Ejector Pits and Sand Trap, the Fully Reinforced WP-5 shall be used to the top edge of the enclosure or as indicated in drawings.
3. Terminations on vertical surfaces shall be sealed and protected with a bead of UF ECO 5000- Trowel grade. The bead shall be tooled smooth.

B. Apply Ultra-Flex EP-990C (Concrete Penetrating Epoxy) as a primer to concrete surface a minimum of 10-mils wet thickness (200 – 250 sq. ft/gal). A Uniform coating free of holidays or pinholes is necessary to minimize out gassing effects curing the application of the high-performance coating to porous surfaces such as concrete. Surfaces may require additional coats to obtain a pinhole free finish.

C. Allow primer to cure in accordance with manufacturer's instructions before over coating with the high-performance coating.

D. Apply high-performance coating in accordance with manufacturer's instructions for a fully reinforced elastomeric membrane system.

E. Keep material containers tightly closed until ready for use.

F. Keep equipment, air supplies, and application surfaces dry.

G. Mix and apply when high-performance coating is above 60 degrees F (15 degrees C).

H. Do not use adulterants, thinners, or cutback solutions.

I. Blend and mix 2-component materials in accordance with manufacturer's instructions. Do not hand mix components.

J. Maintain air supply for material spray application free of oil and water in accordance with ASTM D4285.

K. Apply high-performance coating directly to a clean and dry epoxy prepared surface as a tack coat of approximately 20 mils wet film thickness.

L. Imbed reinforcing fabric into tack coat taking care not to entrain air and to keep surface free of folds and wrinkles.

M. Apply a 3 to 6-inch wide strip of polyester reinforcing fabric over cracks over 1/8-inch wide, nonworking joints, and edges by imbedding into a tack coat.

N. When the polyester fabric can be recoated without movement and the underlying tack coat has 1-4 hours, recoat with high-performance coating.

O. Apply sufficient high-performance coating to achieve an additional 40-mils wet film thickness for containment.

P. Joint Lines:

1. Prepare for joint lines should rain or other conditions require work stoppage or extended delay.
2. Install joint lines clean and straight. Install overlap 6-inches minimum to ensure an impervious joint.
3. Severely abrade with wire brush or sandpaper and apply bonding agent to all areas where the high-performance coating has cured beyond its recoat window.

Q. Recoating:

1. Recoat the high-performance coating system within the recoat window to obtain maximum interlayer adhesion to build specific thickness.
2. Immersion Service: Minimize areas to be recoated outside the recoat window, except at joint lines.
3. Non-Immersion Service: Severely abrade with wire brush or surface grinder, apply bonding agent, and recoat, if high-performance coating has cured more than the recoat window. Acceptable adhesion can only be achieved through aggressive abrading.

3.07 CURING

A. Cure high-performance coating in accordance with manufacturer's instructions.

B. Curing Time:

1. Allow minimum time of 24-hours to 48-hours at 60 degrees F (15 degrees C) for a 60-wet mil coating thickness.

C. Receive approval of cured coating by Engineer.

3.08 FIELD QUALITY CONTROL

A. Provide inspection services by an independent inspection firm throughout all phases of surface preparation, application, and curing of the high-performance coating.

B. Prior to placing into service, the applicator shall test the containment areas using electric field vector mapping or an equivalent method for testing for breaches in the high-performance coating system. If breaches are identified, the coating in the affected area shall be abraded and repaired in accordance with the manufacturer's instructions.

C. Flood testing by hydrostatic means shall be used after successful testing by the foregoing electric field vector mapping to identify potential additional leak problems but shall not be used as an alternative. See Section 22 10 00 "Wastewater Treatment System for specific flood testing procedures

D. Final inspection prior to warranty release shall be made by the High-performance coating manufacturer or their representative.

3.09 CLEANING

A. Remove and dispose of all temporary materials used to protect adjacent work and surrounding areas.

B. Immediately remove and clean high-performance coating materials from surfaces not intended to receive the materials.

END OF SECTION

Lava-Liner, Ltd. Ultra-Flex ECO 5000

SECTION 09960 (09 96 00)

HIGH-PERFORMANCE COATINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Environmentally friendly, high-performance coatings for concrete tanks and lagoons used for the containment of wastewater. High-performance coating rapidly cures to form a seamless, abrasion resistant, and chemical resistant waterproof liner. Contains reclaimed polymer from recycled rubber tires and re-refined oils from recycled lubrication oil.

1.2 RELATED SECTIONS

- A. Section 03300 (03 30 00) – Cast-in-Place Concrete (Cast-in-Place Concrete).
- B. Section 09880 (09 97 23) – Coatings for Concrete and Masonry (Concrete and Masonry Coating).
- C. Section 13200 (33 16 00) – Storage Tanks (Water Utility Storage Tank).

1.3 REFERENCES

- A. ACI 201.1R – Guide for Making a Condition Survey of Concrete in Service.
- B. ASTM C836 – High-Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.
- C. ASTM C957 – High Solids Content, Cold-Liquid-Applied Elastomeric Waterproofing Membrane with Integral Wearing Surface.
- D. ASTM D36 – Softening Point of Bitumen (Ring-and-Ball Apparatus).
- E. ASTM D412 – Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers – Tension.
- F. ASTM D751 – Coated Fabrics.
- G. ASTM D1117 – Evaluation Nonwoven Fabric.
- H. ASTM D1682 – Breaking Load and Elongation of Textile Fabric.

- I. ASTM D2240 – Rubber Property – Durometer Hardness.
- J. ASTM D3786 – Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics: Diaphragm Bursting Strength Tester Method.
- K. ASTM D4060 – Abrasion Resistance of Organic Coatings by the Taber Abraser.
- L. ASTM D4258 – Surface Cleaning Concrete for Coating.
- M. ASTM D4259-88 – Abrading Concrete.
- N. ASTM D4263 – Indicating Moisture in Concrete by the Plastic Sheet Method.
- O. ASTM D4285 – Indicating Oil or Water in Compressed Air.
- P. ASTM E96 – Water Vapor Transmission of Materials.
- Q. ICRI 03732 – Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymers Overlays.
- R. ICRI CSP2 – Grinding
- S. ICRI CSP1- Acid Etched
- T. OSHA Regulations Permit-required confined spaces. 29 CFR 1910.146

1.4 SUBMITTALS

- A. Comply with requirements of Section 01330 (01 33 00) – Submittal Procedures (Submittal Procedures).
- B. Product Data: Submit manufacturer's product data, including surface preparation, application, and curing.
- C. Samples: Submit 3-inch by 1-inch samples for approval by the Engineer.
 - 1. Cured high-performance coating, 60 mils thick.
 - 2. Reinforcing fabric and joint cover sheet.
- D. Applicator's Project References: Submit list of completed project references.
- E. Certification of Applicator: Submit for applicator a certificate indicating completion of manufacturer's contractor training program or 2 year history of application of equivalent 2 component systems.
- F. Warranty: Submit manufacturer's standard warranty.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Applicator: Use applicator experienced in the application of the specified high-performance coating for a minimum of 2-years on projects of similar size and complexity. Provide a list of completed projects including project name and location, name of engineer, name of coating manufacturer, and approximate quantity of coating applied.
2. Applicator's Supervisor: Employ a supervisor during all phases of the work that had successfully completed manufacturer's contractor training program.
3. Applicator's Personnel: Employ persons trained for the application of high-performance coating.

B. Regulatory Requirements: Comply with environmental regulations. Specific attention should be given the potential for the requirement of a Confined Space Permit.

C. Pre-Application Meeting:

1. Convene a pre-application meeting 2 weeks before the start of application of the high-performance coating.
2. Require attendance of parties directly affecting work of this section, including the contractor, sub-contractor, engineer, applicator, and manufacturer's representative.
3. Review environmental requirements, materials, protection of adjacent work, surface preparation, application, curing, field quality control, cleaning, and coordination with other work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery:

1. Deliver materials to the site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.
2. Do not deliver material to site more than one month before use.

B. Storage:

1. Store the material in accordance with manufacturer's instructions.
2. Store materials indoor in an area well ventilated and protected from damage.
3. Do not store material near open flame, sparks, or hot surfaces.
4. Store materials on raised platforms and covered by waterproof covers.
5. Keep material containers closed.

C. Handling: Protect materials during handling and application to prevent damage.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply in wet weather or when rain is imminent.
- B. Apply when the surface is a minimum 50 degrees F (10 degrees C) and a minimum of 5 degrees F (3 degrees C) above dew point. Consult manufacturer for application instructions if the ambient or surface temperature is below 50 degrees F (10 degrees F).
- C. Do not apply to porous substrates when substrate or ambient temperatures are rising.
- D. Do not apply to porous substrates when substrate is in direct sunlight.
- E. Do not apply over substrates that are frozen or contain frost.

1.8 WARRANTY

- A. Provide a 10 year material and 1-year labor warranty. Obtain material warranty from manufacturer.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Lava-Liner, Ltd., 1550 Tiburon Blvd., Suite G-418, Tiburon, CA 94920 Ph. 415-829-9114, Fax 415-829-9203

2.2 HIGH-PERFORMANCE COATINGS

- A. High-performance coating: ULTRA-FLEX ECO 5000. Two-component, high solids, elastomeric asphalt modified urethane. Designed for spray, squeegee, or roller application.
 - 1. Elastomeric Waterproofing, ASTM C836 and C957: Exceeds all criteria.
 - 2. Solids by volume: 92 percent.
 - 3. Volatile Organic Compounds (VOC): 0.76 pounds per gallon (92 g/L).
 - 4. Tensile Strength, ASTM D412, 100-mil sheet: >3000 pounds per square inch.
 - 5. Extension to Break, ASTM D412: 130 percent.
 - 6. Recovery from 100 Percent Extension:
 - a. After 5-minutes: 98 percent.
 - b. After 24-hours: 100 percent.
 - 7. Coating Performance, Crack Bridging:
 - a. 10 Cycles at minus 15 degrees F (minus 26 degrees C): Greater than 1/8-inch.

- b. After Heat Aging: Greater than 1/4-inch.
 8. Coating Performance, Weathering, ASTM D822: 5000 hours: no cracking.
 9. Softening Point, ASTM D36: Greater than 350 degrees F (177 degrees C).
 10. Deflection Temperature, ASTM D648: below minus 60 degrees (minus 50 degrees C).
 11. Service Temperature: minus 60 degrees F to 220 degrees F (minus 50 degrees C to 105 degrees C).
 12. Hardness, ASTM D2240, Shore A, 77 degrees F (25 degrees C): 60.
 13. Permeability to Water Vapor, ASTM E96, Method E, 100 degrees F (38 degrees C), 100-mil sheet: 0.03 perms.
 14. Abrasion Resistance, Weight Loss, ASTM D4060: <1.0 mg.
 15. Adhesion to Concrete, Dry, Elcometer: 350 pounds per square inch.
 16. Color: Black.
- B. Primer: Ultra-Flex EP-990C Two-component, medium solids, concrete penetrating epoxy primer.
1. Solids by Volume: 65 percent mixed.
 2. Volatile Organic Compounds (VOC): 2.81 pounds per gallon (340170 g/L).
- C. Adhesion Promoter: Ultra-Flex AP174. Adhesion promoter. Bifunctional/Trifunctional organosilane compound dispersed in isopropyl alcohol. Ensures a continuous and uniform bond between surfaces. Use the bonding agent over non-porous surfaces such as steel, except where primer has been installed. Do not use where solvent cleaners are prohibited.
1. Solids by Volume: Less than 1 percent.
 2. Volatile Organic Compounds (VOC): 6.4 pounds per gallon (743 g/L). Where required, Ultra-Flex AP-174 may be blended to specifications requiring less than 100 g/l, contact Ultra-Flex representative.
- D. Patching Material: ULTRA-FLEX ECO 5000 Trowel Grade. Liquid applied, chemical and corrosion resistant urethane elastomer, chemically thickened to allow trowel application with minimum sag. Use as a crack filler and for application to vertical surfaces and cold joints.
1. Elastomeric Waterproofing, ASTM C836 and C957: Exceeds all criteria.
 2. Solids by volume: >94 percent.
 3. Volatile Organic Compounds (VOC): 0.74 pounds per gallon (88 g/L).
 4. Tear Strength, ASTM624, Die C: 150 pounds per inch.
 5. Tensile Strength, ASTM D412, 100-mil sheet: >3000 pounds per square inch.
 6. Extension to Break, ASTM D412: 130 percent.
 7. Recovery from 100 Percent Extension:
 - a. After 5-minutes: 98 percent.
 - b. After 24-hours: 100 percent.
 8. Coating Performance, Crack Bridging:
 - a. 10 Cycles at minus 15 degrees F (minus 26 degrees C): Greater than 1/8-inch.

- b. After Heat Aging: Greater than 1/4-inch.
 - 9. Coating Performance, Weathering, ASTM D 822: 5000 hours: no cracking.
 - 10. Softening Point, ASTM D36: Greater than 325 degrees F (160 degrees C).
 - 11. Deflection Temperature, ASTM D648: below minus 60 degrees (minus 50 degrees C).
 - 12. Service Temperature: minus 60 degrees F to 220 degrees F (minus 50 degrees C to 105 degrees C).
 - 13. Hardness, ASTM D2240, Shore A, 77 degrees F (25 degrees C): 60.
 - 14. Permeability to Water Vapor, ASTM E96, Method E, 100 degrees F (38 degrees C), 100-mil sheet: 0.03 perms.
 - 15. Abrasion Resistance, Weight Loss, ASTM D4060: 1.2 mg.
 - 16. Adhesion to Concrete, Dry, Elcometer: 350 pounds per square inch.
 - 17. Color: Black.
- E. Reinforcing Fabric and Joint Cover Sheet: Tietex T272 or equivalent. Stitch bonded polyester. Compatible with coating materials.
- 1. Weight: 3 ounces per square yard (100 g/m²).
 - 2. Tensile Strength, ASTM D1682: 57.1 pounds (30 kg).
 - 3. Elongation, ASTM D1682: 62 percent.
 - 4. Mullen Burst Strength, ASTM D3726: 177 pounds per square inch
 - 5. Trapezoid Tear Strength, ASTM D1117: 16.1 pounds (7.2 kg).
- F. Pipe Protrusion Cover and Sealing Gaskets: Jaeger TTC, polyester fabric waterproofed, rubber boot gaskets. Compatible with Coating materials.
- 1. Size: Various to fit tightly around pipes and circular protrusions as required.

PART 3 EXECUTION

3.1 INSPECT

- A. Inspect substrate and adjacent areas where high-performance coating will be applied. Notify the Engineer of conditions that would adversely affect the application or subsequent utilization of the high-performance coating. Do not proceed with application until unsatisfactory conditions are corrected.

3.2 PROTECTION

- A. Protect adjacent work and surrounding areas from contact with high-performance coating.

3.3 SURFACE PREPARATION FOR CONCRETE TANKS AND LAGOONS

- A. Surface Preparation shall be in accordance with ICRI CSP 1 at a minimum
- B. Provide clean, dry, and structurally sound concrete surface.

C. New Concrete:

1. Ensure concrete has a minimum compressive strength of 3,000 psi, is dry, and is free of release agents and curing compounds before application of high-performance coating.
2. Remove surface laitance and release agents.

D. Existing Concrete: Remove existing coating unless adhesion of existing coating will serve as support for the high-performance coating. Patch existing coating as approved by the manufacturer of the high-performance coating. Abrade the existing coating, and apply sample patch in accordance with Manufacturer's specifications to test for suitability and adhesion.

E. Condition Survey: If required by site Engineer, perform a condition survey of existing concrete in accordance with ACI 201.1R.

F. Abrasive Blasting: (Water blasting may be used as an alternative)

1. Prepare concrete surface to receive high-performance coating in accordance with ICRI 03732.
2. Remove dirt, soil, grease, oil, paint, coatings, form release agents, curing compounds, laitance, loose material, unsound concrete, and other foreign materials that would inhibit performance of high-performance coating in accordance with ASTM D4258 and by abrasive blasting.
3. Obtain a firm, sound concrete surface in which bug holes are fully opened or repaired.
4. Remove sharp concrete edges and projections.
5. Perform abrasive blasting in accordance with ASTM D4259-88.
6. Receive approval by Engineer of blasting media.
7. Maintain air supply for abrasive blasting free of oil and water in accordance with ASTM D4285.
8. Abrade surface to obtain a profile of ICRI CSP 1 to 3 in accordance with ICRI 03732.

G. Repair concrete surface to be free of holes. Fully open Bug/B holes before repair. Repair defects in the concrete surface, such as bug holes, air pockets, and honeycomb by filling and smoothing off with patching material, epoxy patching compound, or grout. Abrasive blast repaired surfaces.

H. Ensure substrate is clean and dry in accordance with manufacturer's instructions. Remove surface laitance from concrete surface to obtain a profile of ICRI CSP 1 to 3 in accordance with ICRI 03732.

I. Repair cracks in concrete surface with material suitable for type and width of crack, compatible with substrate and high-performance coating, and approved by the Engineer.

- J. Moisture Tests: Do not apply primer or high-performance coating to concrete surface unless one of the following moisture tests confirm appropriate moisture levels for properly prepared substrates:
1. Plastic Sheet Method (ASTM D4263): Pass/Fail.
 2. Relative Humidity Test: Less than 75 percent relative humidity at 70 degrees F.
 3. Calcium Chloride Test: Less than 5 pounds per 1,000 square feet per 24 hours.
 4. Radio Frequency Test: Less than 5 percent moisture.

3.6 APPLICATION

- A. Apply Ultra-Flex EP-990C (Concrete Penetrating Epoxy) as a primer to concrete surface a minimum of 10-mils wet thickness (200 Sq. ft./gal. A Uniform coating free of holidays or pinholes is necessary to minimize out gassing effects curing the application of the high-performance coating to porous surfaces such as concrete. Surfaces may require additional coats to obtain a pinhole free finish.
- B. Allow primer to cure in accordance with manufacturer's instructions before over coating with the high-performance coating.
- C. Apply high-performance coating in accordance with manufacturer's instructions for a fully reinforced elastomeric membrane system.
- D. Keep material containers tightly closed until ready for use.
- E. Keep equipment, air supplies, and application surfaces dry.
- F. Mix and apply when high-performance coating is above 60 degrees F (15 degrees C).
- G. Do not use adulterants, thinners, or cutback solutions.
- H. Blend and mix 2-component materials in accordance with manufacturer's instructions. Do not hand mix components.
- I. Maintain air supply for material spray application free of oil and water in accordance with ASTM D4285.
- J. Apply high-performance coating directly to a clean and dry epoxy prepared surface as a tack coat of approximately 20 mils wet film thickness.
- K. Imbed reinforcing fabric into tack coat taking care not to entrain air and to keep surface free of folds and wrinkles.

- L. Apply a 3 to 6-inch wide strip of polyester reinforcing fabric over cracks over 1/8-inch wide, non-working joints, and edges by imbedding into a tack coat.
- M. When the polyester fabric can be recoated without movement and the underlying tack coat has 1-4 hours, recoat with high-performance coating.
- N. Apply sufficient high-performance coating to achieve an additional 40-mils wet film thickness for containment.
- O. Joint Lines:
 - 1. Prepare for joint lines should rain or other conditions require work stoppage or extended delay.
 - 2. Install joint lines clean and straight. Install overlap 6-inches minimum to ensure an impervious joint.
 - 3. Severely abrade with wire brush or sandpaper and apply bonding agent to all areas where the high-performance coating has cured beyond its recoat window.
- P. Recoating:
 - 1. Recoat the high-performance coating system within the recoat window to obtain maximum interlayer adhesion to build specific thickness.
 - 2. Immersion Service: Minimize areas to be recoated outside the recoat window, except at joint lines.
 - 3. Non-Immersion Service: Severely abrade with wire brush or surface grinder, apply bonding agent, and recoat, if high-performance coating has cured more than the recoat window. Acceptable adhesion can only be achieved through aggressive abrading.

3.7 CURING

- A. Cure high-performance coating in accordance with manufacturer's instructions.
- B. Curing Time:
 - 1. Allow minimum time of 24-hours to 48-hours at 60 degrees F (15 degrees C) for a 60-wet mil coating thickness.
- C. Receive approval of cured coating by Engineer.

3.8 FIELD QUALITY CONTROL

- A. Provide inspection services by an independent inspection firm throughout all phases of surface preparation, application, and curing of the high-performance coating.
- B. Prior to placing into service, the applicator shall test the containment areas using electric field vector mapping or an equivalent method for testing for breaches in the high-performance coating system. If breaches are identified, the coating in

the affected area shall be abraded and repaired in accordance with the manufacturer's instructions.

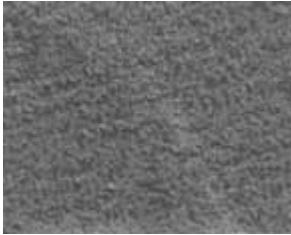
- C. Flood testing may also be used in addition to the foregoing electric field vector mapping to identify potential leak problems but shall not be used as an alternative.

3.9 CLEANING

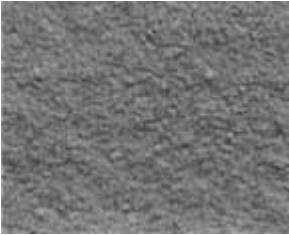
- A. Remove and dispose of all temporary materials used to protect adjacent work and surrounding areas.
- B. Immediately remove and clean high-performance coating materials from surfaces not intended to receive the materials.

END OF SECTION

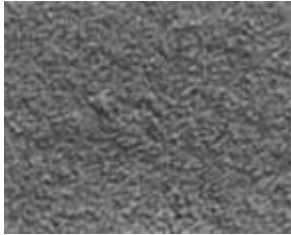
International Concrete Repair Institute (ICRI) Concrete Surface Profile (CSP) Scale



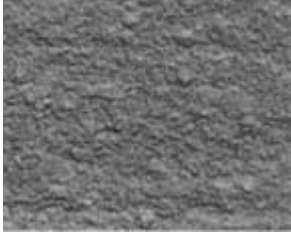
**CSP 1
(acid etched)**



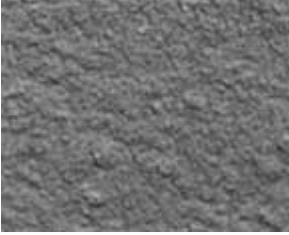
**CSP 2
(grinding)**



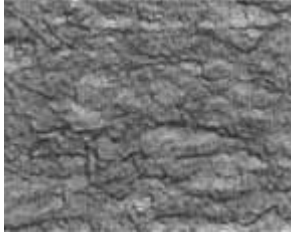
**CSP 3
(light shotblast)**



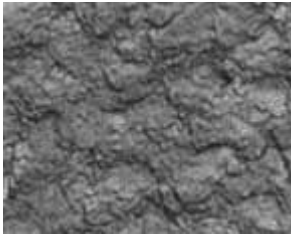
**CSP 4
(medium shotblast)**



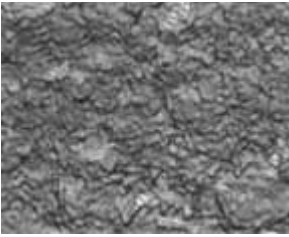
**CSP 5
(medium-heavy shotblast)**



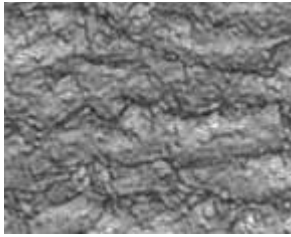
**CSP 6
(heavy shotblast)**



**CSP 7
(heavy shotblast)**



**CSP 8
(extreme shotblast)**



CSP 9

Waterproofing Application For Vehicular and Pedestrian Traffic Areas

1) GENERAL

- A) This is a guide specification for the application of the ULTRA-FLEX ECO 5000 system as a waterproofing and protective membrane over retrofitted concrete decks, slabs walkways and roof areas.
- B) The waterproofing system will include the method of surface preparation; inter layering of fabric or metal flashing where indicated, and the application of a colored wear and top course.

2) QUALITY ASSURANCE

- A) LAVA-LINER, LTD. requires that this system must be installed by an Authorized Applicator and shall be in compliance with all specifications herein and approved by LAVA-LINER, LTD. or its duly authorized representative.
- B) Requisite Paperwork and Submittals to LAVA-LINER, LTD.
- C) To ensure that the requisite minimum standards for warranties are met, compliance with the following must be completed and forwarded to LAVA-LINER, LTD. for review and approval.

- i) Project specifications must be verified as complied with, signed and dated by the approved applicator and submitted with the request for warranty.
- ii) Work orders and change orders deviating from the specifications must be submitted and accompany the verified project specifications.
- iii) LAVA-LINER, LTD. and/or its authorized representative must submit request for Warranty Issuance to LAVA-LINER, LTD. within 10 working days from the final inspection.

3) DESCRIPTION

- A) The ULTRA-FLEX ECO 5000 membrane system is a combination of a pretreatment of the concrete substrate with a penetrating epoxy, Cracks, spalling and honeycombs with a fast setting concrete repairing polyurethane, and application of the flexible liquid membrane and the use of Jaeger-ttc reinforcement fabric where necessary. Type and weight to be determined by discussions of particular application with Lava-Liner technical officer.
- B) ULTRA-FLEX ECO 5000 is a cold applied, two-component,

- liquid urethane. It cures to form a tough, durable, seamless, water impermeable barrier. ULTRA-FLEX ECO 5000 may be brushed, rolled, spray or squeegee applied and retains its flexibility in hot or cold environments (-60°F to +165°F).
- C) ULTRA-FLEX ECO 5000 will be applied as a membrane over newly cured or existing, concrete surfaces. All surfaces shall be clean and shall have been prepared using ULTRA-FLEX EP-990C (Concrete Penetrating Epoxy).
- D) This system provides for a polyester fabric reinforced membrane system. The base fabric will be a waterproofing comprised of a polyester fabric material such as Tietex T202 or equal.
- vi) ULTRA-FLEX EP-990C Part A (Concrete Penetrating Epoxy) and ULTRA-FLEX EP-990C Part A (Concrete Penetrating Epoxy), 2:1 ratio for mixing.
- vii) ULTRA-FLEX AP/AP174 is an organosilane based adhesion promoter for inter coat adhesion between polyurethane coatings and cold joint applications.
- viii) ULTRA-FLEX 6800 a 2 component liquid flexible aliphatic urethane (3:1 mixing ratio) topcoat for wear course and color applications.

4) MATERIALS

- i) ULTRA-FLEX ECO 5000 PART "A"
- ii) ULTRA-FLEX PART "B"
- iii) ULTRA-FLEX AP/AP174 (Adhesion Promoter)
- iv) Polyester fabric tape approximately 5-6" in width (for cracks, joints and flashing walkway edges)
- v) Polyester fabric in widths up to 40 inches for larger reinforced system areas. See Lava-Liner technical officer for particular application.

5) SAFETY

- A) Construction should be done with equipment and procedures designed to minimize danger to personnel and materials. It is recommended that good safety practices be followed when installing the ULTRA-FLEX ECO 5000 membrane system.
- B) All safety standards and recommendations for safety and handling hazardous materials issued by OSHA, EPA and other appropriate federal and state governmental and regulatory agencies must be followed.
- C) All Material Safety Data Sheets must be complied with and maintained on site or readily available to the personnel working the site.
- D) The LAVA-LINER INDUSTRIAL APPLICATION MANUAL shall be maintained on site and

readily available to personnel working with ULTRA-FLEX products.

6) CONCRETE CURING

- A) NEW CONCRETE: A curing period is necessary for all concrete surfaces to be coated with ULTRA-FLEX EP-990C. Portland Cement Concrete shall appear dry at the time of application of ULTRA-FLEX EP-990C. 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 membrane film.
- B) Refer to the ULTRA-FLEX INDUSTRIAL APPLICATIONS MANUAL for methods to determine moisture and content.

7) PREPARATION OF SUBSTRATE

- A) ULTRA-FLEX ECO 5000 is applied on a clean, dry, and structurally sound concrete base.
- B) 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, abraded or pressure washed. All paint or previous coatings that are loose or flaking must be removed.
- C) The following is a list of normal practices used in surface preparation:
 - i) Inspect and clean the surface thoroughly.

- ii) Repair structural defects (i.e., cut out blisters in prior coatings and secure any loose sections, fill in voids, bug holes, honeycombs, and repair structural defects).
- iii) Repair or replace flashings, counter flashings, gravel stops, vents, drains, etc.
- iv) All weak spots should be reinforced and repaired, checking particularly for damage at the weakest points.
- v) Mask and protect surrounding structures, which are not to be covered with ULTRA-FLEX ECO 5000 or subsequent topcoat.

- D) Where the concrete substrate is cracked, spalled or deteriorating but not an engineering problem, the cracks, spalls and deterioration must be repaired using ULTRA-FLEX PC2500. All concrete surfaces must also be prime coated with ULTRA-FLEX EP-990C, an epoxy sealer is required to prevent out gassing and the formation of bubbles and the interaction of the urethane membrane with POTENTIAL moisture in the substrate. The foregoing will be mitigated through the application of ULTRA-FLEX EP-990C (Concrete Penetrating Epoxy) at least 4 hours prior to coating with ULTRA-FLEX ECO 5000.

8) INCOMPATIBLE SUBSTRATES

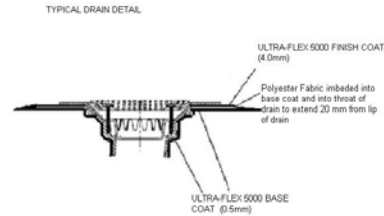
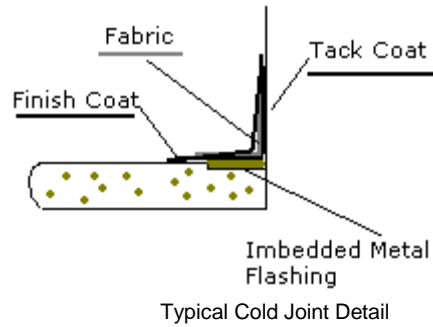
A) Coal Tar products or solvent borne caulks or pastes are **not** compatible with ULTRA-FLEX ECO 5000.

9) DETAILS AND SPECIAL CONSTRUCTION

A) All details and special construction such as vents, edges, flashings, counter flashings, parapets, curbed systems, equipment and sign supports, protrusions, drains and similar functions shall be consistent with the construction details set forth in the ULTRA-FLEX INDUSTRIAL APPLICATION MANUAL unless specifically provided for herein.

B) The above sections shall be sealed in the following manner.

- i) STEP-1 Apply a tack coat of ULTRA-FLEX ECO 5000 around a protrusion, flashing, drain, etc to an area approximately 2.5 inches on each of the horizontal and vertical surfaces.
- ii) STEP-2 Evenly imbed a 4.7" wide piece of Jaeger 28445 fabric into the tack coat.
- iii) STEP-3 Coat the imbedded fabric and tack coated area with ULTRA-FLEX ECO 5000.



10) PHASE CONSTRUCTION

A) No phase construction should take place if:

- i) Material temperature is below 50°F at time of application.
- ii) Surface temperature is below 40°F.
- iii) Surface moisture is present or rain is imminent.
- iv) Surface temperature drops below the dew point.
- v) Other conditions are obviously unsuitable.
- vi) Concrete is in a temperature rising/curing mode.

B) Consult your Lava-Liner, Ltd. representative for applications under conditions included in the above. The use of a cold weather catalyst may assist in the application of ULTRA-FLEX ECO 5000 in lower

Typical Walkway Edge Detail

temperatures listed in i) and ii) above.

11) JOINTS

- A) Treatment of non working cracks exceeding 1/8 inch and expansion joints with ULTRA-FLEX ECO 5000 should be consistent with the ULTRA-FLEX INDUSTRIAL APPLICATION MANUAL and Architectural Drawings included therein. These cracks should first be filled with sand and filled with ULTRA-FLEX PC2500. Bridging should then be accomplished through the use of reinforced membrane over the repaired area extending at least 3 inches beyond each side of the repair. See B below for manner of fabric reinforcing.
- B) Hairline cracks (non-working) up to 1/8 inch may be bridged with ULTRA-FLEX ECO 5000. If cracks exceed 1/8 inch but are less than 1/4 inch and do not impair the structural integrity of the substrate, they may be in the following manner:
- i) STEP 1 – Clean the crack of all accumulated dirt and debris with pressure wash or compressed air.
 - ii) STEP 2 - Apply a tack coat of ULTRA-FLEX ECO 5000 directly into the crack allowing it to seep into and fill the crack and spread excess material to a width of 4 inches on each side of the crack.
 - iii) STEP 3 - Center and imbed strip of polyester fabric tape

directly over the crack and imbed into the wet ULTRA-FLEX ECO 5000.

- iv) STEP 4 – Coat over the polyester fabric tape with ULTRA-FLEX ECO 5000.
 - v) STEP 5 – Recoat over tack coat and polyester fabric during final application of ULTRA-FLEX ECO 5000.
- C) Nonworking cracks greater than 1/4 inch should be “V” routed to a minimum of 1/4 to each side of the crack and to a dept not greater than 1/2 of the distance across the crack. Routed cracks should then be treated in the following manner as Steps 1 through 5 in Paragraph A and B above.

12) PROPORTIONING AND MIXING ULTRA-FLEX ECO 5000

- A) MIXING FOR BRUSH, ROLLER, SQUEEGEE OR “HOT POT” SPRAYING - Mix ULTRA-FLEX ECO 5000 components with a "Plasterer's Mixer" or other similar mixer approved by Lava-Liner, Ltd. for a FULL THREE MINUTES. (ULTRA-FLEX ECO 5000 is packaged in pre-proportioned mixing containers and should not be mixed in proportions other than that specifically prepackaged by LAVA-LINER, LTD.)
- B) Hand mixing of the two components shall not be used except for small quantities of less than one gallon. (Components shall be proportionately reduced from original packaging.)

- C) Plural component spray mixing shall be preset at a ratio or prepolymer (Part A) to activator (Part B) of 7:1 by weight or 9:1 by volume.
- D) See the ULTRA-FLEX INDUSTRIAL APPLICATION MANUAL for specific details for spraying either air-assisted or plural component spray equipment.

13) APPLICATION OF ULTRA-FLEX ECO 5000

- A) ULTRA-FLEX ECO 5000 may be applied by brush, roller, spray or squeegee on horizontal surfaces in one pass to a maximum thickness of 120 mils dry film thickness. When spray, brush or roller applied on vertical surfaces, two or more passes are required to achieve a 65-75 mil dry film thickness. Squeegee application is not recommended on vertical surfaces. Wet coverage rate is approximately 3.2 gallons per 100 square feet.

14) REINFORCED MEMBRANE SYSTEM

- A) Where it is required to reinforce the membrane system such as at all wall flashings, walkway edges, and scuppers and drains, ULTRA-FLEX ECO 5000 will be applied in two coats using an imbedded fabric. This is especially advantageous when applying a membrane system to steep embankments or walls to insure a minimum thickness and coverage. The

application of ULTRA-FLEX ECO 5000 in this reinforced system is accomplished in the following manner:

- i) STEP 1 Apply a coat of ULTRA-FLEX ECO 5000 to an area approximately 2-4 inches greater than the width of the Jaeger fabric roll.
- ii) STEP 2 Center and imbed the Jaeger fabric into the wet ULTRA-FLEX ECO 5000.
- iii) STEP 3 Recoat over Jaeger fabric with ULTRA-FLEX ECO 5000.
- iv) STEP 4 Apply a second tack coat on the concrete surface adjacent to the prior application of reinforced ULTRA-FLEX ECO 5000.
- v) STEP 5 Center and imbed a new layer of Jaeger fabric into the new coat of ULTRA-FLEX ECO 5000 insuring that the new fabric layer overlaps the previously imbedded polyester fabric by 2 inches.
- vi) STEP 6 – Recoat over the new polyester fabric with ULTRA-FLEX ECO 5000.

15) RECOATING

- A) ULTRA-FLEX ECO 5000 must be recoated within four hours to obtain maximum interlayer adhesion. If the membrane has cured for more than four hours, it must be lightly abraded with a wire brush or sandpaper and pretreated with ULTRA-FLEX AP (Adhesion Promoter).

16) JOINT OVERLAP

- A) Should rain or other conditions require work stoppage, prepare for joint lines.
- B) Joint lines shall be clean and straight. The overlap shall be six inches minimum to assure an impervious joint.
- C) When the membrane has cured for more than four hours, all areas to be coated shall be lightly abraded with a wire brush or sandpaper. The abraded surface shall be treated with ULTRA-FLEX AP/AP174 (Adhesion Promoter) at least 30 minutes and no more than four hours before applying the new ULTRA-FLEX ECO 5000.

17) TOP COAT

- A) This waterproofing application provides for an aesthetic topcoat to be applied.
- B) The topcoat will be applied separately from the ULTRA-FLEX ECO 5000 membrane system and will require an adhesion promoter to insure that there is adequate covalent bonding to the membrane substrate.
- C) The Ultra-Flex surface is then coated with two coats of ULTRA-FLEX 6800 of 10-15 wet mills per application.
- D) In some instances, the walkways will be treated by broadcasting an aggregate into the first application of ULTRA-FLEX 6800 and then recoating with the second coat.
- E) Aggregate is required only in the pedestrian traffic areas and

shall be clean and dry. Montana white, Monterey or Uniman sand are approved aggregates for this application. Talk to your Lava-Liner representative about the use of other aggregates such as oxides or various grits before proceeding and for approval of alternative aggregates.

18) REQUIREMENTS FOR WARRANTY AND GUARANTEE:

- A) Within 10 working days after the completion of each specification for the application of ULTRA-FLEX products, the approved/certified contractor shall deliver to LAVA-LINER the following information in the form of the completed and signed LAVA-LINER WARRANTY AND GUARANTEE.
 - i) Property owners name,
 - ii) The address of the property,
 - iii) A description of the specification used
 - iv) Certification that the application was completed within the parameters of the specification.
 - v) Signature of the property owner.
- B) The WARRANTY shall then be registered with LAVA-LINER and a signed and registered copy shall be returned to the property owner and the contractor.
- C) No WARRANTY AND GUARANTEE shall be effective until received and registered in the archives of LAVA-LINER.

D) Warranty is a limited 10 year product warranty.

Metal Surfaces and Containment UFST-1
LAVA-LINER SPECIFICATION UFST-1
APPLICATION OF ULTRA FLEX ECO 5000 POLYURETHANE MEMBRANE
TO METAL SURFACES FOR CONTAINMENT

1) GENERAL

A) This is a guide specification for the application of the ULTRA-FLEX ECO 5000 waterproofing system over metal surfaces.

2) QUALITY ASSURANCE

A) LAVA-LINER, LTD. requires that this system must be installed by an Authorized Applicator and shall be in compliance with all specifications herein and approved by LAVA-LINER, LTD. or its duly authorized representative.

B) Requisite Paperwork and Submittals to LAVA-LINER, LTD.

C) To ensure that the requisite minimum standards for warranties are met, compliance with the following must be completed and forwarded to LAVA-LINER, LTD. for review and approval:

- i) Project specifications must be verified as complied with, signed and dated by the approved applicator and submitted with the request for warranty.
- ii) Work orders and change orders deviating from the specifications must be submitted and accompany the verified project specifications.
- iii) LAVA-LINER, LTD. and/or its authorized representative must submit request for Warranty Issuance to LAVA-LINER, LTD. within 10 working days from the final inspection.

D) The following projects must obtain prior approval by LAVA-LINER, LTD. before specifications are requested, contract is let or work is begun:

- i) Projects involving freezer or cold storage facilities.
- ii) Projects where ULTRA-FLEX ECO 5000 membranes are to come into contact with chemicals in excess of those concentrations as set forth in the Chemical Resistance Charts for ULTRA-FLEX ECO 5000, petroleum distillates, or chemicals not listed in the Chemical Resistance Charts.

3) DESCRIPTION

A) The UFST-1 Polyurethane Membrane System consists of ULTRA-FLEX ECO 5000 and a primer as set forth in MATERIALS below.

B) ULTRA-FLEX ECO 5000 is a cold applied, liquid urethane. It cures to form a tough, durable, seamless, water impermeable barrier. ULTRA-FLEX ECO 5000 may be applied by spray, squeegee, brush or roller. ULTRA-FLEX ECO 5000 retains its flexibility in hot or cold environments.

C) The ULTRA -FLEX membrane system shall be a complete system of compatible materials as required herein. Substitutions are not authorized and shall void any warranty express or implied.

4) MATERIALS

- i) ULTRA-FLEX ECO 5000 PART "A"
- ii) ULTRA-FLEX PART "B"
- iii) PRIMER consisting of ULTRA-FLEX AP (Adhesion Promoter) and/or ULTRA-FLEX AP-RCI (Adhesion Promoter-Rust Converting Inhibitor) and/or ULTRA-FLEX RCI (Rust Converting Corrosion Inhibiting Primer)
- iv) Polyester Fabric, 6 Inch Width (For Joints)

5) SAFETY

- A) Construction should be done with equipment and procedures designed to minimize danger to personnel and materials.
- B) All safety standards and recommendations for safety and handling hazardous materials issued by OSHA, EPA and other appropriate federal and state governmental and regulatory agencies must be followed.
- C) All Material Safety Data Sheets (MSDS) must be complied with and maintained on site or readily available to the personnel working the site.
- D) The LAVA-LINER INDUSTRIAL APPLICATION MANUAL shall be maintained on site and readily available to personnel working with ULTRA-FLEX products.

6) PREPARATION OF SUBSTRATE

- A) ULTRA-FLEX ECO 5000 is applied on a clean, dry, and structurally sound base.
- B) Any oil and/or grease spots must be thoroughly cleaned. All paint or previous coatings that are loose or flaking must be removed.
- C) The following is a list of normal practices used in surface preparation:
 - i) Inspect and clean the surface thoroughly.
 - ii) Repair structural defects (i.e., cut out blisters in prior coatings and secure any loose sections).
 - iii) Repair or replace vents, drains, braces, equipment braces, etc.
 - iv) Tighten or replace all fasteners.
 - v) All weak spots should be reinforced and repaired, checking particularly for damage at the weakest points.

Metal Surfaces and Containment UFST-1

- vi) Mask and protect surrounding structures, which are not to be covered with ULTRA-FLEX ECO 5000.

- B) Sand or hydro blast all surfaces to be coated. It is preferable to obtain a near white metal surface. However, in cases where this impractical, cleaning with TSP or acid etching solutions and thorough rinsing is required.

7) INCOMPATIBLE SUBSTRATES

- A) Coal Tar products or solvent borne caulks or pastes are **not** compatible with ULTRA-FLEX ECO 5000.

8) DETAILS AND SPECIAL CONSTRUCTION

- A) All details and special construction such as edges, equipment, sign supports, protrusions, drains and similar functions shall be consistent with the construction details set forth in the ULTRA-FLEX INDUSTRIAL APPLICATIONS MANUAL.
- B) The above details and special construction shall be sealed in the following manner.

- i) STEP-1 Apply a tack coat of ULTRA-FLEX ECO 5000 around each protrusion, flashing, drain, etc to an area approximately 4 inches on each of the horizontal and vertical surfaces.
- ii) STEP-2 Evenly imbed a 6" wide piece of polyester fabric into the tack coat.
- iii) STEP-3 Coat the imbedded fabric and tack coated area with ULTRA-FLEX ECO 5000.

9) PHASE CONSTRUCTION

- A) No phase construction should take place if:
 - i) Material temperature is below 50^oF at time of application.
 - ii) Surface temperature is below 40^oF.

- iii) Surface moisture is present or rain is imminent.
- iv) Surface temperature drops below the dew point.
- v) Other conditions are obviously unsuitable.

10) PRIMER

- A) Prime all metal surfaces to be coated with ULTRA-FLEX AP-RCI (Adhesion Promoting Rust Converting Inhibitor) or ULTRA-FLEX AP (Adhesion Promoter) or ULTRA-FLEX RCI-A. For detailed instructions on which primer to use and the application procedures, refer to the ULTRA-FLEX INDUSTRIAL APPLICATION MANUAL.

11) PROPORTIONING AND MIXING ULTRA-FLEX ECO 5000

- A) MIXING FOR BRUSH, ROLLER, SQUEEGEE OR "HOT POT" SPRAYING - Mix ULTRA-FLEX ECO 5000 components with a "Jiffy Mixer" or other similar mixer approved by LAVA-LINER, LTD. for a FULL THREE MINUTES. (ULTRA-FLEX ECO 5000 is packaged in pre-proportioned mixing containers and should not be mixed in proportions other than that specifically prepackaged by LAVA-LINER, LTD.)
- B) Hand mixing of the two components shall not be used except for small quantities of less than one gallon. (Components shall be proportionately reduced from original packaging.)
- C) Plural component spray mixing shall be preset at a ratio of prepolymer (Part A) to activator (Part B) of 7:1 by weight or 9:1 by volume.
- D) See the ULTRA-FLEX INDUSTRIAL APPLICATION MANUAL for specific details for spraying either air-

Metal Surfaces and Containment UFST-1 assisted or plural component spray equipment.

12) APPLICATION OF ULTRA-FLEX ECO 5000

- A) ULTRA-FLEX ECO 5000 is applied by brush, roller, spray or squeegee on horizontal surfaces in one pass to a minimum thickness of 55 mils dry film thickness. When spray, brush or roller applied on vertical surfaces, two or more passes are required to achieve a 55-mil or greater dry film thickness. Squeegee application is not recommended on vertical surfaces. Wet coverage is applied at the rate of approximately 3.9 gallons per 100 square feet.

13) RECOATING

- A) ULTRA-FLEX ECO 5000 must be recoated within four hours to obtain maximum interlayer adhesion. If the membrane has cured for more than four hours, it must be lightly abraded with a wire brush or sandpaper and pretreated with ULTRA-FLEX AP (Adhesion Promoter).

14) JOINT OVERLAP

- A) Should rain or other conditions require work stoppage, prepare for joint lines.
- B) Joint lines shall be clean and straight. The overlap shall be six inches minimum to assure an impervious joint.
- C) When the membrane has cured for more than four hours, all areas to be coated shall be lightly abraded with a wire brush or sandpaper. The abraded surface shall be treated with ULTRA-FLEX AP (Adhesion Promoter) at least 30 minutes and no more than four hours before applying the new ULTRA-FLEX ECO 5000.

15) REQUIREMENTS FOR WARRANTY AND GUARANTEE:

- A) Within 10 working days after the completion of each specification for the application ULTRA-FLEX products, the

- approved/certified contractor shall deliver to LAVA-LINER the following information in the form of the completed and signed LAVA-LINER WARRANTY AND GUARANTEE.
- i) Property owners name,
 - ii) The address of the property,
 - iii) A description of the specification used
 - iv) Certification that the application was completed within the parameters of the specification.
 - v) Signature of the property owner.
- B) The WARRANTY AND GUARANTEE shall then be registered with LAVA-LINER, LTD. and a signed and registered copy shall be returned to the property owner and the contractor.
- C) No WARRANTY AND GUARANTEE shall be effective until received and registered in the archives of LAVA-LINER, LTD.