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ROOF INSPECTION REPORT

PREPARED EXCLUSIVELY
FOR

Submitted by Know-Fault Ltd., Inc.
Prepared For: 

Property Address: 

Property Type: Industrial 

Description: 1-Story Office & Industrial Building 

Date/s of Inspection: 08/27/2014 & 09/12/2014 

Inspected By: 

Date of Report: September 18, 2014 

Prepared By: 

Submitted To: 

Submitted by: Know-Fault Ltd. 

(224) 678-8316
Introduction

Inspection Authorization And Scope

This report represents an opinion based upon our observations in conducting a Roof Inspection at the property known as 27W230 Beecher Street, Winfield, IL for and authorized by David Yamin, acting attorney for Winfield Industrial Condo Association, according to a Letter of Engagement dated August 15, 2014 and specifically excludes evaluation of the roof structure beneath.

The Roof Inspection Report as presented herein outlines the inspector's observations and opinions regarding the installation and apparent physical condition of the visible FFR-K1 liquid membrane roof coating as observed from on the roof and specifically excludes invasive testing or thermal imaging of any kind. The report also includes digital photos taken during our inspection of the roof whereby said photos are considered to be an integral part of this report.

The Roof Inspection Report is not intended as a warranty or guarantee of any kind with regard to the physical condition or performance of the existing FFR-K1 liquid membrane or roof substrate beneath.

The Roof Inspection Report is prepared exclusively for the party named herein in which event Know-Fault Ltd. nor its agents shall bear any responsibility for use of information contained in this report by other than the party for whom it is intended.

The Roof Inspection was conducted by Martin Potokar of Know-Fault Ltd on the days of August 27, 2014 and September 12, 2014 from on the roof. Access to the roof was provided using an extension ladder supplied by Phil Finney, President of Winfield Commercial/Industrial Condominiums Inc., on the day/s of the inspection. Weather conditions were as follows: 83 degrees and sunny on the 27th of August, and 50 degrees with intermittent rain on September 12, 2014.
Design Build
Flat/low slope consisting of an upper/lower roof elevation totaling approximately 27,000 S.F.

Roof Surface
A 2-year old FFR-K1 liquid membrane roof coating with reinforcing scrim (Refer to FFR-K1 Technical Manual Rev 1.3 – 11/2012 for further details) applied directly over an existing roof substrate consisting of what is believed to be silicone based rubber according to Phil Finney, President of Winfield Industrial Condo Association. According to a copy of the FFR-K1 roof warranty provided by David Yamin, acting attorney for the Winfield Industrial Condo Association, the FFR-K1 liquid membrane with scrim provides for a 20-year warranty (Note: A sample of the underlaying roof substrate provided by the inspector on September 12, 2014 per the request of has since been submitted to an independent testing facility for analysis to confirm the presence of silicone based rubber).

Roof Drainage
Contingent upon the design slope of the roof to divert surface water run-off toward a number of interior roof drains and wall scuppers.

Flashings
Same as roof coating material including preform metal fascia/roof edge flashing.

Parapet Walls
None

Roof Accessories
None

Prepared and Submitted by Know-Fault Ltd.
Breeches present in FFR-K1 liquid membrane roof coating characterized by loose/torn FFR-K1 at numerous locations across the entire roof allowing for water penetration beneath.

What appears to be a failed FFR-K1 liquid membrane roof coating attributed to lack of adhesion between the FFR-K1 roof coating and underlying substrate beneath at numerous locations across the entire roof.

According to the FFR-K1 technical manual (a copy of which is attached hereto) under section 17.1 entitled 'System Limitations', it clearly states that FFR-K1 will not fully adhere to silicone based products or sealants.

FFR-K1 peels clean leaving no traces of FFR-K1 on the roof substrate beneath would appear to confirm the lack of adhesion cited above.

Open/torn FFR-K1 at numerous areas that appear to be without reinforcing scrim required for a properly installed FFR-K1-20 system.

Grace Ice & Water Shield HT present/observed at isolated areas beneath loose/torn FFR-K1 liquid membrane roof coating denotes an improper application/usage of Grace Ice & Water Shield HT not to mention that it will not bond to FFR-K1 or other roofing material (Refer to Grace Ice & Water Shield HT Product Data Sheet).

Several active/ongoing roof leaks present/observed inside vacant units 2, 3 and 4 on the 27th day of August, 2014 (Note: Mentioned since the whole purpose of the FFR-K1 roof coating was to provide a weather tight seal to prevent water penetration/roof leaks)

Numerous bumps and irregularities present beneath the FFR-K1 roof membrane coating that act to impede drainage flow resulting in standing water on the roof, a condition that can predispose to roof leaks in the presence of a failed FFR-K1 roof membrane coating.
**Observations/Comments**

- The plane of the roof appears to be relatively level and uniform in slope showing no signs of abnormal deflection at this time.

**Limitations/Exclusions**

- Test the watertight integrity of the roof covering by running a hose on the roof.
- Perform invasive testing of any kind such as cutting, coring or drilling holes in the roof.
- Inspection/evaluation of interior roof drains.
- Perform any kind of thermal imaging to determine/verify the presence or amount of water intrusion beneath the FFR-K1 liquid membrane roof coating.
- List/identify all prior/active reoccurring roof leaks inside the office condos.
- Perform load, roof drainage or any other related roof calculations.
- Inspect/evaluate the integrity of roof system components hidden beneath the roof surface.
- Determine/verify type and thickness of roof insulation present beneath the roof covering.
- Determine/verify the overall thickness of the FFR-K1 liquid membrane roof coating.
- List and identify all existing roofing deficiencies present at the time of inspection.
## Roof

**Recommendations/Cost to Remedy Deficiencies**

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Budget Cost</th>
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<tbody>
<tr>
<td>Tear-off and replace the entire roof covering down to the precast concrete roof deck beneath and install a new single-ply roofing system, i.e., EPDM, TPO or PVC. †</td>
<td>$162,000</td>
</tr>
</tbody>
</table>

† Denotes a worse case scenario based upon approximately 270 square of roofing.
The information contained herein and any other advice are given in good faith based on FFR’s current knowledge and experience of the products when properly stored, handled and applied under normal conditions in accordance with FFR’s recommendations. The information only applies to the application(s) and product(s) expressly referred to herein. In case of changes in the parameters of the application, such as changes in substrates, etc., or in case of a different application, consult FFR’s Technical Service prior to using FFR products. The information contained herein does not relieve the user of the products from testing them for the intended application and purpose. All orders are subject to our current terms of sale and delivery. Users must always refer to the most recent issue of the local Product Technical Data Sheet for the product concerned, copies of which will be supplied.
<table>
<thead>
<tr>
<th>Section #</th>
<th>Table of Contents</th>
<th>Page #</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Intentionally Left Blank</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td><strong>System Build-Up</strong></td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td><strong>Product Description</strong></td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>3.1 FFR-K1 Uses</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>3.2 FFR-K1 Advantages and Characteristics</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td><strong>Product Data and Information</strong></td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td><strong>Product Technical Data</strong></td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>5.1 Product Technical Data (continued)</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td><strong>FFR-K1 Reinforcing Scrim Technical Data</strong></td>
<td>10</td>
</tr>
<tr>
<td>7</td>
<td><strong>Substrate Inspection and Testing Procedure</strong></td>
<td>11</td>
</tr>
<tr>
<td>8</td>
<td><strong>Substrate Cleaning and Preparation</strong></td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>8.1 General Roof Preparation</td>
<td>13</td>
</tr>
<tr>
<td>9</td>
<td><strong>Substrate Condition Inspection</strong></td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>9.1 Wooden Substrates</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>9.2 Metal Substrates</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>9.3 Cementitious Substrates</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>9.4 Hard-finished Concrete</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>9.5 Brick, Stone, Slates and Tiles</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>9.6 Asphalt Substrates</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>9.7 Bituminous Felt Substrates</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>9.8 Butyl Rubber, EPDM Rubber/TPO, PVC Membrane Substrates</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>9.9 Paints and Existing Coatings</td>
<td>15</td>
</tr>
<tr>
<td>10</td>
<td><strong>Substrate Priming Requirements</strong></td>
<td>16</td>
</tr>
<tr>
<td>11</td>
<td><strong>Application Preparation</strong></td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>11.1 Repairs and Preparation</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>11.2 System Application</td>
<td>17</td>
</tr>
<tr>
<td>12</td>
<td><strong>Application Procedure</strong></td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>12.1 Final Flat Roof (Without FFR-K1 Reinforcing Scrim)</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>12.2 Final Flat Roof (With FFR-K1 Reinforcing Scrim)</td>
<td>18</td>
</tr>
<tr>
<td>13</td>
<td><strong>FFR-K1 System Product Consumption Rates</strong></td>
<td>20</td>
</tr>
<tr>
<td>Section</td>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>---------</td>
<td>--------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>14</td>
<td>Application Tools</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>14.1 Clean-Up of Product and Tools</td>
<td>21</td>
</tr>
<tr>
<td>15</td>
<td>System Typical Detail Drawings</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>15.1 Change in Level</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>15.2 Pipe Penetration</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>15.3 Roof Drain</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>15.4 Repair to Damaged Substrate</td>
<td>24</td>
</tr>
<tr>
<td>16</td>
<td>System Warranty Information</td>
<td>26</td>
</tr>
<tr>
<td>17</td>
<td>System Limitations and Safety Information</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>17.1 System Limitations</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>17.2 Safety Information</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>17.3 System Safety Information</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>17.4 Disposal of Materials</td>
<td>28</td>
</tr>
<tr>
<td>18</td>
<td>Technical Manual Information/ Disclaimer</td>
<td>28</td>
</tr>
</tbody>
</table>
Section 3 - Product Description

FFR-K1 is a single pot, highly flexible, multi-purpose, Kevlar-reinforced, Thermo-Set, and Liquid Applied Membrane. It is designed for the seamless water-proofing and long-term protection of roofing system surfaces from harsh environments.

3.1 FFR-K1 Uses
The use and application of FFR-K1 Liquid Membrane is reserved for Final Flat Roof Accredited and Fully Trained Applicators only.

- Designed to protect a variety of roofing system surfaces including: Asphalt, Concrete, Foam, Wood, Metal, PVC, TPO and EPDM Rubber. (Substrate suitability must meet all requirements under section 7 of this Technical Manual).
- Highly suitable for waterproofing solutions in roof restoration projects.
- Excellent for applications over Single or Multi-layer sheet membranes.
- Ideal for complex roofing details with limited accessibility.
- FFR-K1 is especially suited to applications where surface movement may defeat protection of a rigid, non-reinforced coating.

3.2 FFR-K1 Advantages and Characteristics

- Instantly waterproof from initial application.
- High reflective and emissive qualities.
- Permanently withstands ponding water.
- High impact resistance provides superior protection from hail.
- Moisture and UV cured single component aliphatic low VOC coating.
- Does not yellow when exposed to the atmosphere.
- The flexibility retained by FFR-K1 allows for surface movement caused by thermal shock sustained by most structures.
- FFR-K1 is a self-terminating material reducing the requirement for flashing details in many areas.
Section 4 - Product Data and Information

Manufacture Details
- FFR-K1 is Exclusively Produced and Supplied by Fielco Adhesives
- 1957 Pioneer Road, Huntingdon Valley, PA 19006
- (800)825-7156   (215)674-8700   Fax: (215)674-1712
- Email c/o: info@ffrwestern.com

Packaging
- Supplied in 5 US Gallon/ 18.9 Liter Units (30 Kg Approx.)
- Smaller unit sizes are available upon request

Appearance
- Low Gloss/Satin White - Viscous Liquid

Odor
- Mainly Sweet Ethereal Distinct

Mixing
- No component mixing is required (Stir thoroughly before initial use)

Storage and Shelf Life
- When stored at temperatures between -35°F and 80°F, FFR-K1 is fit for use up to 12 months from the date of production when stored in the original unopened and undamaged packaging. Higher storage temperatures may reduce the shelf life of FFR-K1. Opened units may begin to solidify within a few days.

Curing Times - (Approximate when exposed to UV or Moisture)
- Pot Life - 5 hours @ 80°F
- Set to touch time - 3 hours @ 80°F
- Tack Free - 5 hours @ 80°F
- Open To Light Traffic - 16 hours @ 80°F
- Complete System Cure - Between 7 to 30 days @ 80°F
Section 5 - Product Technical Data

Density
- 1.32 Kg/Liter

Solids Content
- 95% Solids

Specific Gravity
- 1.30-1.50

Viscosity
- Thixotropic - 75,000 cps

Shore Hardness (ASTM D2240)
- Circa 70A

Water Vapor Transmission (ASTM E-96)
- Permeance 19.7 MNs/g

Salt-Fog Testing (ASTM B-117)
- 500 hrs - Pass

VOC - Title 24 Low VOC (ASTM E1826-11)
- <0.4 pounds per gallon
- <50 g/liter (VOC exempt list)

Chemical Resistance
- FFR-K1 is highly resistant to many chemicals.
  Please contact Final Flat Roof Technical Services for specific information.
Kevlar Resin Tensile Strength (ASTM D638-10)
  ● 525,000 psi

Kevlar Breaking Tenacity (ASTM D3217-07)
  ● 424,000 psi

Kevlar Thermal Conductivity (ASTM E1530)
  ● 0.03 (BTU x in./(ht x ft x °F))
    Shows no embrittlement or degradation at temperatures as low as -320°F

Mold/Fungal Resistance (ASTM D3273/D3274)
  ● Highly resistant

Boiling Point
  ● Range- starts at 91°C

Vapor Pressure
  ● N/A

Sol. In Water
  ● Slight (108-65-6)
Section 6 - FFR-K1 Reinforcing Scrim Technical Data

FFR-K1 Reinforcing Scrim is a 5x5 strands-per-inch polyester scrim with a thin layer of spun bonded polyester bonded to the top side. The woven strands of the scrim give very high tensile strength to the fabric. This is the only specified fabric for the FFR-K1 system.

Technical Features

- High tensile and tear strength
- Wets out well with full product embedment
- Moisture, rot and mildew resistant

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<thead>
<tr>
<th>Physical Properties</th>
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<tbody>
<tr>
<td>Average Net Weight</td>
<td>0.34 (Kgm²)</td>
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<th>Strip Tensile Strength</th>
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<tbody>
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<td>Machine Direction</td>
<td>45 (psi)</td>
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<tr>
<td>Cross Machine Direction</td>
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<th>Strip Elongation At Break (%)</th>
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<td>Cross Machine Direction</td>
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</table>

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<tr>
<th>Trapezoid Tear Strength* (lbs) (Median Load)</th>
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<td>12 (lbs) (Median Load)</td>
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<tr>
<td>Cross Machine Direction</td>
<td>11 (lbs) (Median Load)</td>
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*ASTM D 1117
Section 7 - Substrate Inspections and Testing Procedure

Whenever FFR-K1 is to be applied over an old or existing substrate, it is essential to carry out a survey that includes an inspection and testing procedure.

The inspection needs to include all substrates intended to be coated. The inspection will uncover the need for:

a) Repair work.

b) Cleaning and preparation work as described in the following section (Section 8).

All instances of repair work needs to be recorded and photographed so that they can be used in developing a scope of work and work history profile.

If during the inspection of the substrates it is noted that there are potential or existing structural deficiencies, such as weak framing under the substrate, a record with photographs must be taken, so that all relevant information may be passed on to a consultant engineer for an opinion of the area of concern. This may require the consultant engineer to carry out his own site inspection to verify the condition of the structure under the substrate.

Included in the survey, it is necessary to verify the condition of the uppermost substrate, over which the FFR-K1 is to be applied. This will require the testing of:

a) Existing substrate adhesion.

b) The presence of residual moisture contained within the sub-substrates.

For this reason, it is recommended that a qualified trade professional is utilized to carry out the required inspection prior to any major scope of work being created.

Each application of FFR-K1 must begin with an adhesion test. The success of any coating application is dependent upon successful adhesion to the underlying substrate.

Roof Coating Adhesion Test Procedure

1. Clean multiple test areas thoroughly and let dry.

2. Testing areas should include a variety of conditions including test areas that use approved primers and those that do not. Various primer products should also be used for comparative analysis. Each test area should be clearly labeled for identification.

3. Apply 16+ wet mils of roof coating on the prepared or primed surface.

4. Embed a 2”x6” swatch of polyester fabric into the roof coating. Allow 2” of the fabric to hang free.

5. Apply another 16+ wet mils of roof coating on the fabric until it is completely saturated.

6. Allow roof coating to dry and cure for at least 3 days. (10-14 days recommended to avoid false positives)
Section 7 - Substrate Inspections and Testing Procedure

7. Test for coating adhesion by pulling the fabric at a 90° angle to the substrate surface.
8. Using a small fish scale or other similar weight measurement device document the pull weight resistance of each sample.
9. Clearly document all results using photographs if possible and submit for approval.

How much adhesion is enough?
Obviously it is desired to have the greatest adhesive quality possible. Since this is a qualitative test, a frame of reference is valuable, if possible. For instance, measure adhesion of a coating to a substrate with and without a primer, compare two different cleaning methods, or even compare two or more different products (perhaps polyurethane and an acrylic).
After any test, determine if the bond failure was adhesive (between coating and substrate) or cohesive (within the coating film).

For further information and recommendations of testing procedures, please contact Final Flat Roof Technical Services.
Section 8 - Substrate Cleaning and Preparation

For all existing roofing substrates the following process steps must be followed to ensure that a high quality application is obtained:

8.1 General Roof Preparations

Step 1

- Inspect the roofing system to determine condition of existing roofing materials and roof substructure. Specifically note the following:
  1. Roof deck structural integrity and viability. Any structural deficiencies are to be repaired.
  2. Type and condition of roofing substrates and materials. Identify original roofing materials including manufacturer if possible.
  3. Areas affected by foreign materials.
  4. Areas to be removed, repaired, or capped prior to applying FFR-K1 coating.
  5. Roof top penetrations needing to be removed.
  6. Cleaning method to be carried out.

Step 2

- Perform initial roof cleaning and prepare the surface appropriately for coating. Preparation may require sweeping, power-brooming, scraping, and/or vacuuming prior to pressure-washing.

All surfaces must be pressure-washed or steam-cleaned where possible to remove any barrier films. A pressure of approximately 2000psi is required to ensure a consistent surface is prepared and all dirt, oils and loose/friable materials are removed.

The use of biodegradable cleaner/wash solution may be used to enhance the quality of the cleaning process on roofing systems that are heavily soiled, but this must be thoroughly rinsed off prior to the application process to avoid potential adhesion issues. (Contact Final Flat Roof Technical Services for further information).

Surface preparation shall always be in accordance with the highest standards of good trade practices.
Section 9 - Substrate Condition Inspections

Where any inspection raises concern regarding the structural soundness of a particular roofing system or substrate, an opinion from a qualified engineer should be sought prior to further work being carried out.

9.1 Wooden Substrates
All wooden-based panel roof decks are to be in structurally sound condition. Plywood and all panel/sheeted wood materials must be firmly adhered or mechanically fixed prior to application.

9.2 Metal Substrates
Metals must be free of mill-scale, oils, surface impurities and any loose/friable materials.

9.3 Cementitious Substrates
New concrete shall have a minimum of 28 days curing time and must be void of moisture. All concrete (new or old) should be inspected and tested for suitability by either hammer testing or pull of adhesion testing. Concrete must be suitably finished by means of wood float or steel pan. The surface finish must be uniform and free from defects such as laitance, voids or honeycombing. Any defects should be repaired using acceptable materials and trade practices.

9.4 Hard-finished Concrete
In addition to the above, hard-finished concrete should be etched to provide profile or “tooth” for optimal adhesion.

9.5 Brick, Stone, Slates and Tiles
Mortar joints must be sound and preferably flush pointed. Ensure all slates/tiles are sound and securely fastened, with any broken or missing items being placed prior to application of the FFR-K1 system.

9.6 Asphalt Substrates
Asphalt should be carefully assessed for moisture and/or air entrapment, grade, and surface finish prior to any application being carried out. Some color bleeding and slight non-detrimental staining can occur.

9.7 Bituminous Felt Substrates
Ensure that Bituminous felt is firmly adhered or mechanically fixed to the substrate. Areas of Bituminous felt that are badly worn should be repaired prior to any applications of FFR-K1 that do not include the benefit of FFR Scrim.
Section 9 - Substrate Condition Inspection (continued)

9.8 EPDM Rubber, TPO, PVC Membrane Substrates
All materials must be fully inspected for any delamination from the parent substrate. Seams, laps and material joints need to be inspected to ensure no separation of the material has occurred along the length of the existing system. Areas found to be lacking in adhesion and/or cohesive bond are to be repaired by means of mechanical fixing or re-adhesion prior to FFR-K1 application.

9.9 Paints and Existing Coatings
Any coatings must be clean and free from loose, degraded materials. Sufficient adhesion of existing surface coatings is required.

Existing FFR-K1 Coatings
Check the condition of the system prior to recoating. Ensure the surface to be coated is clean and free from any foreign material. Depending on the time between system applications, closer inspection of the roofing system may need to be carried out following the outline in Sections 7 and 8 of this Technical Manual.
## Section 10 - Substrate Priming Requirements

<table>
<thead>
<tr>
<th>Priming and Cleaning</th>
<th>Primer/Cleaner Required</th>
<th>Specific Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Metals:</strong> Stainless Steel, Aluminum, Brass, Copper, Ferrous and Non-Ferrous, Galvanized and Lead</td>
<td>Apple Cider Vinegar and/or Wire brush etching</td>
<td>Dilute vinegar to 1:3 / 1:5 with clean water. Wiped or washed down and dried prior to application.</td>
</tr>
<tr>
<td><strong>Cementitious Substrates:</strong> Concrete, Cement block, Compressed Sheet, etc.</td>
<td>Not required</td>
<td>Biodegradable wash if heavily degraded or soiled.</td>
</tr>
<tr>
<td><strong>Wooden/Timber Substrates:</strong> Plywood, Laminated board, Treated Timber, etc.</td>
<td>Not required</td>
<td>Biodegradable wash if heavily degraded or soiled.</td>
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<tr>
<td><strong>Bricks/Stone/Tiles/Slate</strong></td>
<td>Application-Specific</td>
<td>Contact Final Flat Roof Technical Services for relative information.</td>
</tr>
<tr>
<td><strong>Bituminous Materials/Asphalt Substrates</strong></td>
<td>Typically not required</td>
<td>Biodegradable wash if heavily degraded or soiled.</td>
</tr>
<tr>
<td><strong>TPO/PVC Membranes</strong></td>
<td>FFR Primer required</td>
<td>Biodegradable wash if heavily degraded or soiled.</td>
</tr>
<tr>
<td><strong>Butyl Rubber/EPDM Rubber</strong></td>
<td>FFR-K1 Surface Primer</td>
<td>Contact Final Flat Roof Technical Services for relative information.</td>
</tr>
</tbody>
</table>
Section 11 - Application Preparation

11.1 Repairs and Preparation
Using the FFR-K1 system or other approved products, repair all cracks and imperfections greater than 1/8 inch, including apertures, cracks, voids or stress points. Fill or cover minor imperfections with an appropriate product (Butyl Seam Tape or FFR-K1 coating) and make flush with adjoining surfaces. Apply an FFR-K1 coating over the repaired imperfections.

The FFR-K1 Repair System must be applied so as to adhere completely to the intended roofing surface and it must extend a minimum of 12 inches on either side of the imperfection, within reason and where practical.

Assure that all fastening devices such as screws and nails are secure. If not then the fastener must be removed and relocated or replaced with a fasteners of a greater diameter. Seal all fastening devices against moisture. Do not rely on the FFR-K1 system to secure any such devices or items in any way.

Assure the integrity of all existing seams and repair according to standard roofing practice.

To all repairs made that would otherwise be temporary in nature, apply FFR-K1 as a seal coat to a minimum coating thickness of 32 mils prior to the complete FFR-K1 system application.

11.2 System Application
Before the FFR-K1 system is applied to the field area of the roofing system, the product should first be applied to all roof protrusions, the entire top and inside of all parapet walls, and any other vertical surfaces, details, pipes, curbs, etc.

All existing asphalt-based roofing systems must have FFR Scrim embedded within two coats (32 mils total) of FFR-K1 to ensure protection at these typical stress points: all plane transitions, corners, where the roof membrane is adhered to metal and all such stress points. Apply a coat of FFR-K1 to end laps, side laps and membrane details with a minimum coating thickness of 32 mils. FFR Scrim is required at all deficient laps and details.

Seams of existing roof systems that are hot air welded (PVC and TPO), if probed for integrity, do not require special independent treatment as do those of asphalt-based systems.

Once all areas above are completed, the predetermined FFR-K1 system can be applied to the field area of the roofing system using the guidelines specified below.
Section 12 - Application Procedure

12.1 Final Flat Roof (Without FFR-K1 Reinforcing Scrim)
Apply the FFR-K1 coating in sections approximately 15 to 20 ft. long at the specified coverage rate (see consumption rate chart on page 20).
Ensure that the product is applied evenly across the surface of the substrate to provide adequate coverage of the field area.
Apply a sufficient volume of coating, compensating for absorption and irregularities of the exposed surface. To assure saturation of any surface imperfections and maximum contact with the roof’s waterproofing element, roll the FFR-K1 coating in two directions, 90 degrees to each other. Vigorously roll coating onto the exposed surface. Continue process until a monolithic edge-to-edge roof coating is achieved. FFR-K1 can be installed in one coat up to 32 mils. (2 gallons per square)

12.2 Final Flat Roof (With FFR-K1 Reinforcing Scrim)
Step 1: Initial Coating
Apply the FFR-K1 coating in sections approximately 15 to 20 ft. long at the specified coverage rate (see consumption rate chart on page 20). These sections must be a minimum of 2 inches wider, in all directions, than the FFR-K1 Scrim to be installed. This will allow a minimum of 2 inches of applied product beyond each side of the Scrim.
Apply a sufficient volume of coating, compensating for absorption and irregularities of the exposed surface, to cover the surface and to provide a base of full embedment for the FFR-K1 Scrim into the coating. Vigorously roll the coating onto the exposed surface. To assure saturation of any surface imperfections and maximum contact with the roof’s existing waterproofing element, roll FFR-K1 primary coat in two directions, 90 degrees to each other.

Step 2: Embed Scrim Fabric
Immediately, while the first coat is wet, roll out the FFR-K1 Scrim onto the wet coating. Pull the fabric tight and embed the fabric into the wet coating. On the second and ensuing courses, overlap the FFR-K1 Scrim at least 3 inches. A spiked roller works well for the embedment of the fabric.

Step 3: Apply Second FFR-K1 Coating
Immediately apply a second FFR-K1 coat on top of the Scrim at the specified coverage rate (see consumption rate chart on page 20). Apply enough coating to saturate the Scrim and make a dried film of at least 45 mils. (2.5 gallons per square plus scrim) Coverage rate of 3 gallons per square or more may be required for adequate embedment of Scrim. It is not unusual to see the profile of the Scrim embedded in the coating of the finished application.
Section 12 - Application Procedure (continued)

**Imperative:** Vigorously roll FFR-K1 coating into fabric with even strokes and remove all wrinkles, bubbles, air pockets, folds and excess coating, and ensure that full fabric penetration and embedment is achieved. Apply strokes with heavy pressure as follows:

**Horizontal Planes:** Start the strokes in the center and pull to the edge of the Scrim fabric or seal the lapping edge and then start the strokes about 6 inches from sealed Scrim edge and pull at a 45 degree angle to the Scrim fabric course direction.

**Vertical Planes:** Apply at a 90 degree angle to the Scrim fabric course direction. Begin the strokes within 6 inches of fabric edge or dissimilar plane and pull to the opposing fabric edge. Roll out air pockets, bubbles, folds, wrinkles and excessive coating, and assure full fabric penetration. The second coat of FFR-K1 should saturate and completely cover the fabric.

**Step 4: Finish FFR-K1 System**
Continue the application process until a monolithic coating, embedded with FFR-K1 Scrim fabric, entirely covers each vertical and horizontal roof plane and roof protrusion.
## Section 13 - FFR-K1 System Product Consumption Rate

<table>
<thead>
<tr>
<th>Build-Up</th>
<th>Repairs</th>
<th>FFR-K1 Up to 10 year warranty</th>
<th>FFR-K1 Up to 20 year warranty</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td><strong>Build-Up</strong></td>
<td><strong>Repairs</strong></td>
<td><strong>FFR-K1</strong> Up to 10 year warranty</td>
<td><strong>FFR-K1</strong> Up to 20 year warranty</td>
</tr>
<tr>
<td></td>
<td>FFR-K1</td>
<td>One Coat at 2 gallons per square</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use Scrim as required</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Minimum Dry Film Thickness</strong></td>
<td>32 mils</td>
<td>32 mils</td>
<td>60 mils</td>
</tr>
<tr>
<td><strong>Suggested allowance for remedial repairs and preparation</strong></td>
<td>N/A</td>
<td>10% - 25%</td>
<td>10% - 25%</td>
</tr>
<tr>
<td><strong>Total Consumption</strong></td>
<td>Minimum of: 2 gallons per 100 sf.</td>
<td>Minimum of: 2 gallons per 100 sf. Plus allowance</td>
<td>Minimum of: 3.5 Gallons per 100 sf. Plus allowance</td>
</tr>
</tbody>
</table>
Section 14 - Application Tools

**Drill and Paddle** - Upon the initial opening of the FFR-K1 product, inspection of the unit may be required to ensure that settling has not occurred. If it has, stirring the product may be required. If mixing in this way slow revolutions must be maintained in order to prevent air from being introduced into the product. This may cause air bubbles as the air escapes.

**Medium Pile Roller** may be used for the application of FFR-K1 as the initial coating of the roof surface and/or when embedding the FFR-K1 Scrim.

**Low Pile Roller** may be used for the final-coat application of FFR-K1 or to enhance the smoothness of the finished surface for a higher Reflectivity.

**Squeegee** – Use a squeegee for spreading and distributing FFR-K1 to flat field areas. A squeegee is also useful for removing surface water prior to application.

**Universal Spikey Roller** - Used to assist with embedment of the FFR-K1 Reinforcing Scrim material to wet product on large flat areas of roofing.

**Paint/Paste Brushes** - Used in the application of FFR-K1 in detailing and penetrations.

**14.1 Clean Up of Product and Tools**
Due to the nature of the FFR-K1 material, most disposable tools cannot be cleaned or washed after application. However, any tools that need to be cleaned up can be cleaned using Resene T-555 Automotive Thinners, Xylene or MEK. Please follow the appropriate safety and regulatory guidelines when handling any solvent based materials.
Section 15 - System Typical Detail Drawings

These detail drawings provide reference information on typical use of this product. This information is generic in nature; it does not contain the full details required for construction, nor does it constitute an express statement as to fitness for a particular purpose; professional advice is required to take into account all site-specific influences.

Designers and specifiers will typically provide details specific to particular projects: these should always be referred to in preference to the default system drawings.

15.1 Changes in Level

The change in level is carried out in two stages:

1- A coating of FFR-K1 membrane, with Reinforcing Scrim fully embedded is installed to the change in level extending a minimum of 4 inches onto the new field area.

2- The FFR-K1 membrane system is then applied over the entire area in accordance with the project specification including an additional installation of FFR-K1 Reinforcing Scrim for new construction applications.
15.2 - Pipe Penetration

The Pipe Penetration is carried out in two stages:

1- A coating of FFR-K1 membrane, with Reinforcing Scrim fully embedded is installed to the base of the pipe penetration and is extended both up the pipe and a minimum of 4 inches onto the new field area.

2- The FFR-K1 membrane system is then applied over the entire area in accordance with the project specification.
15.3 - Roof Drain

The Roof Drain is coated in two stages:

1- A coating of FFR-K1 membrane with Reinforcing Scrim fully embedded is installed into the throat of the outlet and a minimum of 36” onto the field area.

2- The FFR-K1 membrane system is then applied in accordance with the project specification.
15.4 - Repair to Damaged Substrate

The Repair to Damaged Substrate is coated in three stages:

1- An application of FFR-K1 Sealant is installed into the cracked or damaged substrate and tooled off flush with the adjacent surface area. (Larger areas of damage may require the use of a specific repair material. Please contact FFR-K1 Technical Services for further assistance).

2- A coating of FFR-K1 membrane, with Reinforcing Scrim, fully embedded, is installed over the now filled damaged area and extended out to a minimum of 4 inches onto the field area.

3- The FFR-K1 membrane system is then applied in accordance with the project specification.
Section 16 - System Warranty Information

Warranties of up to 20 years on the FFR-K1 system may be available, depending on the nature of the project, and strictly by system specification and contractor qualifications only. Typical terms of warranty are provided on request. Please contact your FFR representative for details applicable to your project.

Section 17 - Systems Limitations and Safety Information

17.1 - System Limitations

FFR-K1 has relatively few limitations, as are listed below:
- Do not apply over oil/grease or saturated surfaces or substrates.
- Always perform adhesion tests to determine suitability for a particular purpose.
- Do not apply any single coat of FFR-K1 at a DFT (dried film thickness) greater than 32 mils.
- Product may not fully adhere to silicon based products or sealants. Small areas can be bridged with a fully reinforced system of FFR-K1 membrane embedded in FFR-K1 Reinforcing Scrim.
- Temporary emergency repairs made under water or without proper preparation of the surface must be re-addressed to assure the permanence of the repair.

17.2 - Safety Information

Safety Measures on Site
For information and advice on the safe handling, storage and disposal of chemical products, users shall refer to the most recent Material Safety Data Sheet containing physical, ecological, toxicological and other safety-related data. The information below is put forward as a minimum requirement and should be followed in conjunction with all national and local body laws regarding safe work practices.
Section 17.3 - System Safety Information

Personal Protection
The following protective equipment is essential for anyone working with FFR-K1 Products.

In addition to protective clothing, it may be recommended to use a barrier cream on the skin. The use of a barrier cream is more useful and effective than often reputed; they are inexpensive, convenient, and protect well if they are not frequently flushed with solvents. However, barrier creams are only a supplement to, and not a replacement for, protective gloves; so always wear gloves. Always ensure there is no contamination inside gloves before reusing them. If any FFR-K1 products get on clothing, remove the garment at once. Wash your exposed skin occasionally during the workday and immediately if any product gets on it. Avoid using solvents since they can help the material penetrate into the skin and the solvents themselves are aggressive and harmful to the skin. If water is not available or in short supply, clean the contamination with sand instead. Certain hand cleaners also work without harmful effects. Citrus skin cleaners, for example, are effective and mild. Soap and water take time, but also eventually work for small areas. Avoiding skin contact by keeping tools and equipment clean is one of the best ways to protect oneself. Despite safety precautions, with any instances of skin contact rinse immediately with clean water and use warm water and soap to thoroughly clean the skin.

No FFR-K1 applications should ever proceed without sufficient water being adjacent and available for eye-washing. If adequate clean water is not provided then the project should not commence, no matter what the urgency. If a professional eyewash kit is not available, then at the very minimum one gallon of clean water must be present. The water can be in a pail, plastic jug or via a water hose. Safety glasses or other eye protection obviously help those during the work, but they can also create a false sense of security. Do not take risks with health and safety!

In the event of any spillage or contact into the eyes, always seek medical advice immediately after rinsing and cleaning the eyes with the clean water.

Ensure sufficient ventilation during application in closed or confined spaces. Dependent on local regulations, respiratory masks may be required. Please observe all relevant local regulations.
Section 17.4 - Disposal of Materials

Where residual material has fully cured the material poses no threat to health, safety or the environment. Therefore, containers coated with fully cured residues do not need special disposal considerations. However, where the containers carry hazard warning markings it may be advisable to cover, remove or otherwise obliterate these markings from the container. If these are not removed, there may be difficulties at the disposal site as the markings indicate that the contents are hazardous. However, where residual material has not cured or a skin has formed on the surface, this must be disposed of as hazardous waste, and any markings denoting hazards must remain. User is responsible for any and all requirements for proper handling, storage and disposal.

Section 18 - Technical Manual Information/Disclaimer

The information as set forth in the technical data contained herein has been developed based on test and evaluations made by Final Flat Roof for standard coating applications. We believe this information is the best currently available on the subject. It is offered as a possible helpful suggestion. Any experimentation you may care to undertake along these lines is at your own risk. Application guidelines must be followed to receive warranty.
FR-K1 Kevlar Roof Coating
www.finalflatroof.com (866) 637-ROOF (7663)

Description:
FFR-K1 is a flexible multi-purpose Kevlar reinforced Thermo-Set designed to protect a variety of surfaces including asphalt, single-ply, PVC, TPO, rubber, concrete, foam, wood, and metal. FFR-K1 is also suitable for coating petroleum-based surfaces such as tar or rubber cement. It is especially suited to applications where surface movement may defeat the protection of a rigid, non-reinforced coating.

Application Areas:
FFR-K1 is excellent for waterproofing EPDM, TPO, PVC, built-up, single ply, polyurethane foam, concrete, and metal roofs. The flexibility retained by FFR-K1 allows for surface movement caused by thermal shock to most structures.

Advantages & Benefits:
- Single component, no mixing.
- Adheres even to damp surfaces without priming. Withstands ponding water.
- Can be installed in freezing conditions. Retains flexibility in sub zero conditions.
- Withstands attacks from most chemicals, traffic, and severe environments.
- Highly thixotropic allowing for ease of application
- Surface temperature will not exceed 10°F above ambient. High Albedo reduces heat and lowers energy cost
- Low sag minimizing dripping.
- Kevlar reinforced (520,000 psi)
- Class “A” fire rated
- EPA Registered / Energy Star Approved.
- Sustainable roofing system that saves expensive removal and disposal cost.
- Cellulosic bond to concrete and wood.
- 100% adhesion of product to substrate
- 10 –20 yr. extendable warranty available for roofs.

Color:
FFR Standard Color (White)

Custom colors and specs available with minimum order of 3000 gallons.

Coverage:
Brush, Squeegee or roller approximately 50 Sq. Ft. per gallon
Dry Film Application Rate:
To yield dry film of Apply Sq. Ft/gallon
16 mils: 100 Sq. Ft.
32 mils: 50 Sq. Ft.

Surface Preparation:
Surfaces must be cleaned free of grease, oil, films, dust, or any other contaminants.

Roof:
Surfaces should be pressure washed to remove any barrier films.

Metal:
must be free of mill scale, oils, etc.

Hard-finished concrete:
Should be etched to provide profile or “tooth” for optimal adhesion. These preparation procedures are general guidelines. Consult FFR technicians for further details or special preparation procedures. Roofing specifications are also available for various substrates.

Mixing

******No Mixing Required******

FFR-K1 is the only one-part Kevlar reinforced Thermo-Set roof coating in the world. Just open up the bucket and apply. After application is finished just reseal bucket and FFR-K1 can be used at a later date.
FR-K1 Kevlar Roof Coating
www.finalflatroof.com (866) 637-ROOF (7663)

FFR-K1 is a UV / moisture cured reflective roof bonding agent. No other roof product in the world can be installed under water and in freezing conditions.

**Application:**
FFR-K1: can be applied by brush, squeegee or roller at approximately 50-sq. ft. per gallon. A 2-2.5 gallon per 100 sq. ft. application is recommended to help insure complete protection. Surfaces subject to significant movement or other difficult conditions may require heavier applications and the use of FFR Scrim. All penetrations or transitions of surface materials should be coated prior to field. Surface configuration or area surroundings may dictate application method.

Dry Film Application Rate:
To yield dry film of Apply Sq. Ft/gallon
16 mils: 100 Sq. Ft.
32 mils: 50 Sq. Ft.

**Limitations:**
Do not apply heavier than 32 dry mils per coat. If more is needed, apply in multiple coats. Allow FFR-K1 to become tack-free before applying additional coats or approximately 5 hrs. @ 75°F. FFR-K1 can be installed in wet conditions, under water and cure in sub-freezing temperatures.

**Curing Time:**
(when exposed to UV or Moisture)
Shelf Life- 1yr 35°C to 80°F
Pot Life- 5hrs @ 80°F
Drying Time- 16hrs @ 80°F
Complete – 14-30 days @ 80°F

**Mixing:**
None Required

**Packaging:**
5-gallon units: 13.24 lbs/gal

**Clean Up:**
Ventilate area. Confine spills. Collect with absorbent material. Dispose of in accordance with current, applicable local, state, and federal regulations. Uncured material can be removed with Steam. Cured material can only be removed mechanically. Application equipment cannot be cleaned. Use gloves and protective wear at all times. **FFR-K1 is non-toxic and low VOC.** Rub hands under cold water to cure product on skin once dry it can be scraped off. Once it sets and is cured, it is difficult to remove.

**Flammability:**
Flammable during application.
Will not support combustion when cured.

**Solids Content:**
95% Solids

**Density:**
13.24 pounds per gallon

**Set to touch time:**
3 hours

**Tack Free:**
5 hours

**Open to traffic:**
16 hours

**Salt-Fog Testing (ASTM B-117):**
500 hrs - pass

**Water Vapor Transmission (ASTM E-96):**
Permeance (expressed in perms): < 0.73

**VOC: Title 24 Low VOC**
< 0.4 pounds per gallon
< 50 g/liter (VOC exempt list)

For further assistance, contact one of our technicians via phone or e-mail. For emergency information contact:
CHEMTREC @ 1-800-424-9300
Shore Hardness:  
Circa 70A

Adhesion:  
1670 lbs. / sq. in.

Fire rating (ASTM E-108):  
Class “A” fire rating

Kevlar Resin Tensile Strength:  
525,000 psi

Kevlar Breaking Tenacity:  
424,000 psi

Kevlar Thermal Conductivity:  
.03 (BTU x in./(h x ft x °F))  
Shows no embrittlement or degradation at temperatures as low as -320°F

General:  
FFR-K1 should be applied in well-ventilated areas. Surfaces should be free of foreign matter. DO NOT apply near open flame.

First Aid:  
Eyes: Hold eyelids apart and flush thoroughly with water for 15 minutes.

Skin: Remove contaminated clothing. Wash skin thoroughly for 120 minutes with soap and cold water until product cures.

Inhalation: Remove person to fresh air.

Ingestion: Do not induce vomiting. In all cases, contact a physician immediately if symptoms persist

Safety:  
Adequate health and safety precautions should be observed during storage, handling, use, and drying periods. For safe usage, user is specifically directed to consult the current Material Safety Data Sheet for this product.

When using this product in a confined space or closed area, consult the OSHA or ANSI bulletins on safety requirements.

The information as set forth in the technical data contained herein has been developed based on test and evaluations made by Final Flat Roof, for standard coating applications. We believe this information is the best currently available on the subject. It is offered as possible helpful suggestion, any experimentation you may care to undertake along these lines, is at your own risk. Application guidelines must be followed to receive warranty.

FFR shall have no liability for incidental or consequential damages, indirect or direct. Our liability is limited to the net selling price of the purchased product(s) or the replacement of our product, at our option.

Warranty:  
Final Flat Roof warrants this product for up to 20 years from date of installation to be free from manufacturing defects. User determines suitability of product for intended use and assumes all risks. Buyer’s sole remedy shall be limited to the purchase price or replacement of product exclusive of labor or cost of labor. NO OTHER WARRANTIES EXPRESS OR IMPLIED SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. FINAL FLAT ROOF SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES. SPECIAL OR CONSEQUENTIAL DAMAGES.

For further assistance, contact one of our technicians via phone or e-mail. For emergency information contact:  
CHEMTREC @ 1-800-424-9300
**GRACE ICE & WATER SHIELD® HT**
Self-adhered roofing underlayment for high temperature applications

**Product Description**
Grace Ice & Water Shield® HT high temperature self-adhered roofing underlayment is a premier membrane designed to deliver premium in-place performance for high temperature applications. It is composed of two waterproofing materials—an innovative and proprietary rubberized asphalt adhesive combined with a high performance polymeric film with UV barrier properties. The rubberized asphalt surface is backed with a foldless release paper that protects its adhesive quality. During application, the release paper is easily removed, allowing the rubberized asphalt to bond tightly to the roof deck. In addition, embedded in the membrane is a split release on demand feature called Ripcord®.

**Features & Benefits**
Today’s sloped roof designs utilize more insulation, incorporate long-lasting roof coverings and tend to have lengthy construction cycles. The many variables that contribute to roof top temperatures; insulation, facing, pitch, color, etc., make it difficult to predict what kind of heat profile the roof top will experience. Choosing an underlayment that will perform under all of these demanding conditions is essential to a successful roof design.

Grace Ice & Water Shield® HT underlayment was specifically designed to meet the challenge of these high-temperature applications. It is an environmentally conscious solution that provides both confidence and design flexibility.

**High temperature resistance**—Rubberized asphalt will not flow, even at temperatures as high as 260°F (127°C).

**Extended exposure**—Can be left exposed for up to 120 days.

**Superior adhesion**—The self-adhered membrane bonds firmly to the roof deck without heat or special adhesives.

Ripcord is a unique, patented feature that makes Grace Ice & Water Shield® HT underlayment easier to apply by giving the applicator a split release on demand. Faster application of the membrane in the straight-aways, as well as ease of membrane positioning in detailed areas (valleys, around dormers, etc.), are just some of the benefits.

**Foldless release paper**—The foldless release paper provides multiple performance enhancements: fewer edge catches, 180° pull-back, ease of membrane cutting (single cuts) and membrane positioning, quicker “one-man installs” resulting in an easier, more productive release.

**Seals around fasteners**—The rubberized asphalt layer in Grace Ice & Water Shield® HT membrane seals around roofing nails and other fasteners, resisting leakage caused by water back-up behind ice dams or wind-driven rain.

**Dual barrier protection**—Rubberized asphalt is combined with polymeric film to form two waterproofing barriers providing maximum protection.

**Membrane will not crack, dry out or rot**—Grace Ice & Water Shield® HT membrane resists attacks from fungus and bacteria; maintains its integrity for long lasting protection.

**Protects under all standard sloped roof coverings**—Grace Ice & Water Shield® HT underlayment protects under slate, tile, cedar shakes, metal and conventional asphalt shingles.

**Slip resistant surface**—Grace Ice & Water Shield® HT underlayment has a slip resistant embossed surface to maximize traction and improve safety.

**Reroofable**—Unlike some granular surfaced membranes, Grace Ice & Water Shield® HT roofing underlayment will not adhere to the underside of the exposed roof covering. It can be applied over the old Grace underlayment (except over Grace Basik®, Grace Tri-Flex® and Grace SYN 15™) in retrofit applications, making reroofing easier, less costly, more durable and environmentally friendly (as the structural deck remains intact avoiding the need to purchase additional wood decking).
Grace technical support—Grace Ice & Water Shield® HT roofing underlayment is backed by a team of local technical support personnel that help ensure every application goes smoothly.

Guidelines for Use
Grace Ice & Water Shield® HT underlayment is a water-proofing underlayment designed for use on sloped roof decks and is suitable under most traditional roof coverings, including metal and shingles for both commercial and residential applications. The Grace Ice & Water Shield® HT membrane resists water penetration due to water back-up behind ice dams or wind driven rain. It also offers leak protection in trouble prone spots like valleys, skylights, protrusions and other flashing areas.

Ice Dams
Grace Ice & Water Shield® HT membrane should be used in conjunction with designs which minimize ice dam formation. In cold climates, it is particularly important to provide proper insulation and ventilation to reduce the size of ice dams and to avoid interior condensation. Cathedral ceilings must include ventilation between rafters to allow for air flow to a ridge vent. Well ventilated cold roof designs are particularly important in alpine regions to reduce the size of ice dams which could contribute to structural damage.

Several variables will influence the height of ice dams and the membrane coverage required.
1. Climate—The annual snow fall will affect the amount of membrane needed.
2. Slope—On a low slope, ice dams will extend farther inward from the roof edge.
3. Overhang—A wide overhang will require more membrane to reach the appropriate point on the roof.
4. Insulation and ventilation—A very well insulated building with a cold, well ventilated attic will have smaller ice dams.
5. Valleys—Any valleys formed by projections such as dormers or roof direction changes are likely to trap more snow and cause larger ice dams.
6. Exposure—A northern exposure or shaded areas will generally contribute to larger ice dams. While gutters may make it easier for an ice dam to start, large dams can occur on roofs with no gutters.

Removing snow from a roof edge or installing heat cables may not prevent ice dam formation, but may shift the location of the ice dam. Under certain conditions, a dam can form at the edge of the remaining snow.

Local building codes should be consulted for specific requirements.

Installation Procedure
Surface Preparation
Install Grace Ice & Water Shield® HT roofing underlayment directly on a clean, dry, continuous structural deck. Some suitable deck materials include plywood, wood composition, wood plank, metal, concrete, or gypsum sheathing. Remove dust, dirt, loose nails, and old roofing materials. Protrusions from the deck area must be removed. Decks shall have no voids, damaged, or unsupported areas. Wood planks should be closely butted together. Repair deck areas before installing the membrane.

Prime concrete, masonry surfaces and DensGlass Gold® with Perm-A-Barrier® WB Primer. Prime wood composition and gypsum sheathing with Perm-A-Barrier® WB Primer if adhesion is found to be marginal (refer to Technical Letter 12, Use on Oriented Strand Board (OSB) Roof Sheathing). Apply Perm-A-Barrier® WB Primer at a rate of 250–350 ft²/ gal (6–8 m²/L). Priming is not required for other suitable surfaces provided that they are clean and dry.

Membrane Installation
Apply Grace Ice & Water Shield® HT roofing underlayment in fair weather when the air, roof deck, and membrane are at temperatures of 40°F (5°C) or higher. Apply roof covering material at temperatures of 40°F (5°C) or higher.

Cut the membrane into 10–15 ft (3–5 m) lengths and reroll loosely. Peel back 1–2 ft (300–600 mm) of release liner, align the membrane, and continue to peel the release liner from the membrane. Press the membrane in place with heavy hand pressure. Side laps must be a minimum of 3.5 in. (90 mm) and end laps a minimum of 6 in. (150 mm). For valley and ridge application, peel the release liner, center the sheet over the valley or ridge, drape, and press it in place. Work from the center of the valley or ridge outward in each direction and start at the low point and work up the roof.

Alternatively, starting with a full roll of membrane, unroll a 3–6 ft (1–2 m) piece of membrane leaving the release liner in place. Align the membrane and roll in the intended direction of membrane application. Carefully cut the release liner on top of the roll in the cross direction being careful not to cut the membrane. Peel back about 6 in. (150 mm) of the release liner in the opposite direction of the intended membrane application exposing the black adhesive. Hold the release liner with one hand and pull the roll along the deck with the release liner, leaving the applied membrane behind. Use the other hand to apply pressure on the top of the roll. Stop frequently to press the membrane in place with heavy hand pressure. When finished with the roll go back to the beginning, reroll and pull the remaining release paper from the material, finishing the installation.

For successive membrane courses, align the edge of the release liner with the dashed line provided on the surface of the membrane to achieve the 3.5 in. (90 mm) side lap. Consistent with good roofing practice, install the membrane such that all laps shed water. Always work from the low point to the high point of the roof. Apply the membrane in valleys before the membrane is applied to the eaves. Following placement along the eaves, continue application of the membrane up the roof. The membrane may be installed either vertically or horizontally.

Use smooth shank, electro-plated galvanized nails for fastening shingles to get the best seal. Hand nailing generally provides a better seal than power-activated nailing. If nailing of the membrane is necessary on steep slopes during hot or extreme cold weather, backnail and cover the nails by overlapping with the next sheet.

Extend the membrane on the roof deck above the highest expected level of water back-up from ice dams and above the highest expected level of snow and ice on the wall sheathing.
on vertical side walls (dormers) and vertical front walls for ice dam protection. Consider a double layer of membrane in critical areas, such as along the eaves or in valleys and in climates where severe ice dams are anticipated. Apply the membrane to the entire roof deck for wind-driven rain protection. Apply a new layer of Grace Ice & Water Shield® HT membrane directly over the old Grace underlayment in retrofit applications following the standard membrane application procedure.

**Precautions & Limitations**

- Slippery when wet or covered by frost.
- Consistent with good roofing practice, always wear fall protection when working on a roof deck.
- Release liners are slippery. Remove from work area immediately after membrane application.
- Do not leave permanently exposed to sunlight. Cover within 120 days.
- Place metal drip edges or wood starter shingles over the membrane.
- Do not fold over the roof edge unless the edge is protected by a drip edge, gutter or other flashing material.
- Do not install on the chamfered edges of wood plank.
- Do not install directly on old roof coverings.
- Certain product applications are prohibited in hot desert areas in the southwestern United States. Check with your Grace Construction Products representative.
- Check with the manufacturer of the metal roofing system for any special requirements when used under metal roofing. Do not install directly under roof coverings especially sensitive to corrosion, such as zinc, without providing proper ventilation.
- Do not install under copper, Cor-Ten®, or zinc metal roofing in high altitudes. These roofs can reach extremely high temperatures due to the low reflectivity, high absorption, and high conductivity of the metals. Use Grace Ultra™ butyl-based underlayment for these roof types. Check with your Grace Construction Products representative.
- Provide proper roof insulation and ventilation to help reduce ice dams and to minimize condensation. Grace Ice & Water Shield® HT underlayment is an air and vapor barrier.
- Repair holes, fishmouths, tears, and damage to membrane with a round patch of membrane extending past the damaged area 6 in. (150 mm) in all directions. If fasteners are removed leaving holes in the membrane, they must be patched. The membrane may not self-seal open fastener penetrations.
- Do not install fasteners through the membrane over unsupported areas of the structural deck, such as over the joints between adjacent structural panels.
- Due to its slight asphaltic odor, do not apply where the membrane is exposed to interior living space. Refer to product literature for more complete information.
- Not compatible with EPDM or TPO; use Grace Ultra® for tie-ins (refer to Technical Letter 5, Chemical Compatibility).
- Not compatible with polysulfides, flexible PVC, or high concentrations of resin (pitch). For more information, refer to Technical Letter 5.

**Code Compliance**

Grace Ice & Water Shield® HT underlayment meets all key code performance requirements for self-adhered underlayments.

- Underwriters Laboratories Inc. R13399- Class A fire classification under fiber-glass shingles and Class C under organic felt shingles (per ASTM E108/UL 790)
- Meets ASTM D1970
- ICC-ES ESR-3121, per AC 48 Acceptance Criteria for Roof Underlayments
- Miami-Dade County Code Report NOA #11-0912.14
- Florida State Approval Report No. FL289-R3
- CCMC Approval No. 13671-L
**Ice Dams**

Water from melting snow over the heated portion of the house runs down the roof. It freezes at the cold eave and an ice dam begins to form preventing drainage.

As the ice dam grows, water is trapped behind it and backs up under the shingles. Eventually it reaches the roof deck and leaks through, damaging the interior of the structure.

Grace Ice & Water Shield® HT membrane resists this leakage because of the seal around the fasteners, ability to make water-tight laps, and the membrane’s bond to the deck.

**Wind-Driven Rain**

Sloped roofs are not waterproof. They protect structures by shedding rain water.

Storm-driven winds can cause sloped roof coverings to lift. Rain can then be easily driven under the roof covering directly to the unprotected roof deck where it causes leaks and damage to the interior of the structure.

Grace Ice & Water Shield® HT membrane applied beneath the sloped roof covering helps prevent wind-driven rain from entering the structure.

**Product Data**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roll length</td>
<td>75 ft (22.9 m)</td>
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<tr>
<td>Roll width</td>
<td>36 in. (914 mm)</td>
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<tr>
<td>Roll size</td>
<td>225 ft² (20.9 m²)</td>
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<tr>
<td>Packaging</td>
<td>Corrugated cartons</td>
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<tr>
<td>Roll weight</td>
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<tr>
<td>Rolls per pallet</td>
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**Performance Properties**

<table>
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<tr>
<th>Property</th>
<th>Value</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>Gray-black</td>
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</tr>
<tr>
<td>Thickness, membrane</td>
<td>40 mil (1.02 mm)</td>
<td>ASTM D3767 method A</td>
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<tr>
<td>Tensile strength, membrane</td>
<td>MD 25 lbf/in., CD 25 lbf/in.</td>
<td>ASTM D412 (Die C modified)</td>
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<tr>
<td>Elongation, membrane</td>
<td>250%</td>
<td>ASTM D412 (Die C modified)</td>
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<tr>
<td>Low temperature flexibility</td>
<td>Unaffected @ -20°F (-29°C)</td>
<td>ASTM D1970</td>
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<tr>
<td>Adhesion to plywood</td>
<td>3.0 lbs/in. width (525 N/m)</td>
<td>ASTM D903</td>
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<tr>
<td>Permeance (max)</td>
<td>0.05 Perms (2.9 ng/m²/s Pa)</td>
<td>ASTM E96</td>
</tr>
<tr>
<td>Material weight installed (max)</td>
<td>0.22 lb/ft² (1.3 kg/m²)</td>
<td>ASTM D461</td>
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</tbody>
</table>

**www.graceresidential.com**
www.graceconstruction.com

For technical assistance call toll free at 866-333-3SBM (3726)

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