Substrate Preparation Guide

Liquid-Applied Roofing Systems

2/2017

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Preparation- General

- Preparation of the roof substrate is the responsibility of the installer.
- Examine substrate to receive new roofing. Do not proceed with new roofing until preparatory work has been completed or until unsatisfactory conditions have been corrected in a manner acceptable to GAF.
- Roof must have positive drainage. Substrate should not pond water for more than 48 hours after precipitation stops.
- Protect adjacent surfaces not designated to receive waterproofing.
- Do not apply waterproofing to surfaces unacceptable to GAF, or under inclement environmental conditions.
- Substrates must be clean, completely dry, and free of any debris before application of liquid-applied products.
- GAF liquid-applied coatings products should not be used on heavy-traffic bearing substrates. If foot traffic is expected, a rooftop walkway system approved by GAF must be used.

Substrate Preparation Checklist: Page

Moisture Survey ✓

General

It is the responsibility of the roofing contractor to determine the suitability of any substrate to receive a liquid-applied roofing system. Roof moisture surveys are a common tool used to assist this determination. When the deck/substrate has more potential to "hold" water, their use may be required by GAF.

Alternately, for decks/substrates such as steel, the use of roof cuts to verify the suitability of the substrate can be effective.

Where a moisture survey is performed:

- GAF requires a moisture survey be conducted by the roofing contractor and requires it for all non-metal roofs prior to warranty issuance.
- If the moisture survey shows areas of the roof that are wet, **remove and replace** all wet areas with new materials. Make typical repairs with original roof technology and follow the appropriate surface preparation steps.
- Moisture surveys include: IR scans, nuclear scans, test/core cuts, and portable devices used to indicate moisture.

Liquid-Applied Roofing Systems
Roof Moisture Survey Criteria

Emerald & Diamond Pledge Guaranteed Systems			
Project Size	**Less than 100 Sqs.**	**100 Sqs. or Greater**	
Roof Survey Criteria	**Roof Surveys Recommended**	**Roof Surveys Recommended**	**Roof Surveys Required**
Deck/Substrate (non- standing seam metal) †	All*	➢ Steel * ➢ Wood * ➢ Cementitious Wood Fiber (Tectum or equivalent)* ➢ Gypsum*	➢ Structural Concrete ➢ Lightweight Insulating Concrete ➢ Existing SPF ➢ Any existing system with a vapor retarder ➢ Any existing system that is a recover system ➢ Significant ponding water (e.g. poor drainage)
Liquid-Applied Limited Warranty			
Project Size	Any Project Size		
Roof Survey Criteria	Roof Surveys Recommended*		

*****Without significant ponding water. Minimum of (3) three roof cuts for the first 100 squares and (1) one test cut per additional 100 squares are required to verify existing roof conditions are acceptable and/or to determine where moisture is present that must be removed.

†Roof moisture surveys are not required/recommended for any system installed over an existing standing seam metal roof or when the liquid-applied roofing system is applied directly to an approved deck (not as a recover system).

Repair ✓

General

Inspect and make all necessary repairs to damaged substrates. Refer to the **Damaged Substrate Treatment** sections below for specific substrate you are working with.

Damaged Substrate Treatment- Metal	
Areas of Concerns	**Treatment**
Rust Areas	➢ Severely damaged or rusted seams and/or fasteners are to be replaced. Roof panels that are corroded to the point where they have holes must be replaced. ➢ Light rust areas must be treated to prevent further deterioration on metal panels. Roof surface shall have no more than 20% rust.
Fasteners	➢ All fasteners must be retightened, secured, or replaced as necessary. All stripped fasteners must be replaced with new larger fasteners. ➢ All deteriorated fasteners and missing must be replaced. All fasteners must be fully encapsulated with Roof Mate Butter Grade Flashing or with UniCap Fastener Covers (Refer to the Product Data Sheet for specific application requirements).
Excessive Gaps	➢ Seal cracks, joints, penetrations, curbs and with appropriate sealant materials as recommended.
Seams	➢ Repair all seams as needed. Refer to the **Seam Treatment** section for specific seam treatment guidance.

Repair ✓ (contd.)

Damaged Substrate Treatment- Non-Metal	
Substrate	**Treatment**
TPO	➢ Any areas where TPO has torn, cracked, and/or buckled must be repaired using similar products manufactured by GAF. ➢ Any wet insulation must be replaced as part of the roofing repair. Allow at least 48 hours drying time before application of liquid-applied products.
Hypalon® or PVC	➢ Any areas where Hypalon or PVC has torn, cracked, and/or buckled must be repaired using similar products. ➢ Any wet insulation must be replaced as part of the roofing repair. Allow at least 48 hours drying time before application of liquid-applied products.
Sprayed Polyurethane Foam	➢ All area where the urethane foam has degraded must be re-foamed to bring substrate to a smooth, workable surface. ➢ Any areas where foam has become wet must be removed and re-foamed.
EPDM	➢ Any areas where EPDM has torn, cracked, and/or buckled must be repaired using similar products. ➢ Any wet insulation must be replaced as part of the roofing repair.
Mineral & Granule Surfaced BUR or Modified Bitumen (SBS & APP) ***OR*** **Smooth Surfaced BUR or Modified Bitumen (SBS & APP)**	➢ Any areas where BUR or MB has blistered, buckled, is wet and/or otherwise damaged must be removed and repaired using similar products manufactured by GAF. ➢ New BUR or MB repair materials must be allowed at least 30 days to weather before applying liquid-applied products to these repaired areas. ➢ All areas where BUR or MB substrate surface has significantly craze cracked (gaps 1/16” or greater in width and/or depth) must be repaired using Roof Mate Butter Grade Flashing to bring the substrate to a smooth, workable surface. ➢ Allow at least 24 hours to dry. Areas with thicker applications may require additional drying time.

Damaged Substrate Treatment- Non-Metal (Contd.)	
Substrate	**Treatment**
Corrugated Transite Panels	➢ All large or excessive gaps (greater than 1/4") existing between roof panels must be filled or made flush with closed-cell foam strips or polyurethane foam to pre-fill voids. ➢ All fasteners must be retightened, secured, or replaced as necessary. All stripped fasteners must be replaced with larger fasteners. ➢ All deteriorated or missing fasteners must be replaced. All fasteners must be fully encapsulated with Roof Mate Butter Grade Flashing or with UniCap Fastener Covers. ➢ Repair all horizontal seams as needed. Refer to the **Seam Treatment** section for specific seam treatment guidance. ➢ Many of these panels can contain **asbestos**. Refer to the **Environmental Considerations** within the Cleaning section below for further information.
Wood	➢ Any areas where substrate is rotten, wet and/or otherwise damaged must be removed and repaired using similar products. ➢ All large or excessive gaps (greater than 1/4") existing between roof panels and/or penetrations must be filled Roof Mate Butter Grade Flashing to bring the substrate to a smooth, workable surface. ➢ All fasteners must be retightened, secured, or replaced as necessary. All stripped fasteners must be replaced with larger fasteners. ➢ All deteriorated fasteners and missing must be replaced. All fasteners must be fully encapsulated with Roof Mate Butter Grade Flashing or UniCap Fastener Covers.
Concrete	➢ All large or excessive gaps (greater than 1/4") shall be repaired using high-quality concrete grout. Grout must fully cure before application of the liquid-applied roofing system. ➢ Correct areas of ponding water.

Clean ✓

	Treatment
General Surface Prep	➢ Clean and prepare surfaces to receive waterproofing. Remove all dirt, dust, loose and flaking particles, grease, oil, laitance, pollution fallout, and other contaminants that may interfere with proper adhesion. ➢ Use of a stiff bristle push broom and/or pressure washing for cleaning and surface preparation is required. ➢ When encountering roof substrates that have living organisms such as algae, mold or fungus, a sterilant such as 3:1 bleach solution shall be used to kill and remove these organisms during the roof cleaning.
Pressure Washing	➢ Substrate must be **pressure-washed** with water and/or approved cleaner. Refer to the ***Cleaner & Primer Guide*** for specific cleaner information for the substrate you are working with. ➢ A minimum working pressure of 2,000 psi is to be used to remove all dirt, dust, chalking and waste products (oil, oil-based roof cements, solvents, grease, animal fats, etc.). ➢ Concrete, wood and metal substrates should use a minimum working pressure of 3,000 psi. ➢ Care should be taken not to damage the roof surface or inject water into the substrate during washing. ➢ Allow at least 48 hours for complete drying after the cleaning process.
Important! **Environmental Considerations**	➢ Corrugated asbestos panels are likely to contain significant amounts of asbestos, which may be released during pressure-washing. Asbestos dust is an extreme health hazard and known as carcinogen. It is the Installer's responsibility to check with state and local agencies regarding proper disposal, as well as the proper protection for workers exposed to this material. ➢ Roof wash-off catchment systems should be in place when required. Be sure to follow state and local requirements for roof-wash off catchments during the cleaning process.

Test ✓

General

Adhesion testing is generally performed to verify the suitability of any substrate to receive a liquid-applied roofing system. It is the responsibility of the roofing contractor to determine the suitability prior to the installation of a liquid-applied roofing system, regardless whether priming is required or not.

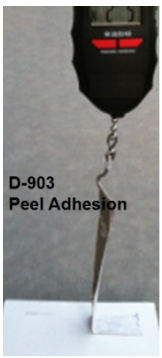
When adhesion tests are conducted:

- Test patches shall be labeled and photographed to document adhesion results for your records.
- Installer can consult with GAF's Technical Services Department (800-766-3411) concerning all adhesion test results.

GAF recommends either of the following test methods:

Test Method #1: Test Patches	
Overview	Patch testing gives information about the bond strength created between a liquid-applied product and a substrate.
Preparation	➢ Installer shall prepare no less than three **(3)** test patches for all questionable roof substrates to verify adhesion of the liquid-applied roofing system.
Test Method	➢ Minimum test patch size shall be 1 square foot. ➢ After the test patches have been applied, allow at least seven **(7)** full 24 hour days of drying time before checking adhesion. ➢ Check adhesion by slicing an "X" (approx. 6" In size) near the center of the test patch. ➢ Using a spatula, try to remove the material at the center of the "X".
Acceptable Result:	➢ Test patches that show good adhesion will release or chip away from the surface in very small pieces.
Unacceptable Result:	➢ Test patches which peel off of the surface shows a surface that is not acceptable.

Test Method #2: Field Peel Adhesion (Alternate to test patches)

Overview	ASTM D903 "Peel adhesion" is found in all roof coating standards and is especially well suited to field testing with elastomeric materials. Primers and enamels may also be evaluated by a similar test called ASTM D3359 "Tape Adhesion." Often it is important to run the test wet, this is called "wet adhesion."
Preparation	➢ Make a mock-up of the intended coating system. ➢ Duplicate any mechanical surface preparation. ➢ Simulate Cleaners and power washing. o A worn Scotch-Brite® cleaning pad makes a good power washing simulation. ➢ Prime as specified. ➢ Apply a layer of elastomeric coating to the substrate.
Test Method  	➢ Wet about 6" of a precut 1" wide by 12" long fabric strip with the coating. ➢ Allow the remaining 6" of the fabric to be available to pull on the test sample. ➢ Apply another layer of coating to encapsulate the wetted section of fabric. ➢ Allow to dry. o This can be anywhere from 24 hours to 2 weeks. o In warm weather, 1 day may be sufficient. o In cold weather, 5 days is often required. o The standard practice is 2 weeks. ➢ Soak prior to testing (best practice). o One hour is usually sufficient, use wet rag and cover with a bucket lid or plastic. o Note: this can be deceptive, some coating like a PVDF or Silicone take much longer.
Optional	➢ Pre-cut 1" wide strips of butyl tape work faster and can be used in a post installation inspection. A "wet adhesion" version can be accomplished by soaking the roof area first as indicated above, but follow with a towel dry, and then use butyl tape to run the pull test. The butyl tape can be easier to use with a gauge as it will bond to itself making a perfect loop.

Quantitative Evaluation (best practice)	Qualitative Evaluation
➢ Use a force gauge such as a digital fish scale or trigger pressure gauge. ➢ A loop or better a staple or clamp is used to hold the fabric in the gauge. ➢ Pull slowly, the peak value should be above 1 pound and preferably over 2 pounds (standard is 2 pounds/inch).	**Excellent:** Coating tears up the substrate (cohesive-substrate) **Very Good:** Most of the coating remains on the substrate (cohesive-coating) **Good:** Some coating remains on the substrate (mixed-cohesive-coating) **Fair:** Coating pulls clean but pulls below 2 pounds **Poor:** Test strip comes off easily and cleanly

Prime ✓

General

It is important to choose the correct primer for the specific substrate you are working with. Before the primer is applied, make sure you have followed the sections above.

- Application of the primer is dependent on the substrate you are working with. Refer to the ***Cleaner & Primer Guide*** for specific primer information for the substrate you are working with.
- Be sure to follow the application rates and specifications before applying the primer.

Seam Treatment ✓

General

Roof seams can be a primary area where leaks occur. It is important to properly treat all seams prior to the application of the LAR (Liquid-Applied Roofing) system.

- All horizontal and vertical seams must be flashed in accordance with GAF liquid-applied detail drawings and application instructions.
- Refer to the ***Seam Treatment Guide*** for specific seam treatment product guidance.

Apply ✓

General

Be sure to follow the specific application instructions for the GAF liquid-applied roofing system you are working with.

- Refer to the ***System & Warranty Summary Guide*** for specific application rates and warranty guidelines.