

APPLICATION INSTRUCTIONS

1. Product Description

- 1.1 VaporLock-m™ Methane Barrier System is composed of TUFF-N-DRI® membrane installed over an approved Class A 10 mil thick polyolefin geomembrane, or approved geotextile fabric. TUFF-N-DRI® is a fluid-applied, single component, polymer-modified asphalt emulsion. The VaporLock-m system is designed for applications on grade, over a sand substrate, or over unusually irregular substrata such as wood lagging. TUFF-N-DRI is applied directly to substrata such as cast in place (CIP) concrete or concrete masonry units (CMU), and on decks. Proper installation is critical to ensuring the quality of membrane performance. Application instructions are outlined in the following text and should be strictly adhered to during all phases of application.

2. Storage

- 2.1 TUFF-N-DRI, like all asphalt emulsions, must be kept from freezing. It is best to store TUFF-N-DRI off the floor at an ambient temperature above 50° F. Opened drums should be tightly sealed before storage to avoid a skin developing on top of the liquid. When shipping emulsion-based products during winter months, there is always a risk of the material freezing while in transport. The risk is much higher on shipments of less than 40 drums because these shipments go as "less than truckload" and therefore do not go directly from our warehouse to yours. If you suspect that a shipment has been exposed to temperatures below freezing, you can easily inspect the material yourself. Insert a pole or stick through the bung opening and check for "chunks" or debris. If none is detected, the material should be fine to spray. If you are still uncertain, contact your Tremco Technical Representative.

3. Safety

- 3.1 Use the following safety instructions when handling TUFF-N-DRI emulsion. Also review the Material Safety Data Sheet (MSDS), as well as the safety precautions provided by the spray equipment manufacturer.
1. Avoid direct contact with the emulsion material. Prolonged or repeated contact can cause skin irritation. If prolonged contact is anticipated, impervious gloves should be worn.
 2. Mist from spray application in a confined area can cause a headache, nausea, and irritation of the nose, throat and lungs. If applying in a confined space, a NIOSH approved respirator for ammonia must be worn per the MSDS.
 3. To protect eyes from contact with high-pressure spray, wear chemical safety glasses with side shields. If contact with eyes occurs, flush with large amounts of cool water while holding eyelids open. Get medical attention if irritation persists.

4. Surface Preparation

1. Surfaces to be coated with membrane must be clean, smooth, firm, free of dust, mud, loose mortar, wires, fins, metal projections or any other substances which might prevent placement and bonding of a continuous film. Take particular care to ensure that the footing and cove are clean.
2. VaporLock-m methane barrier system, consisting of TUFF-N-DRI barrier membrane sprayed on to the geomembrane or geotextile may be applied over dry or damp soil or gravel substrata. However, the product must not be applied over standing water, a water film, or ice or snow.
3. The sub-grade shall be compacted so that no settling will occur after the membrane, slab, footing, wall, etc. have been installed. At

a minimum the subgrade shall be moisture conditioned and compacted to 90% relative compaction or as specified by a civil/geotechnical engineer. The finished surface shall be uniform, smooth and free of any debris and/or standing water. All stones or clods greater than 0.25 inches shall be removed.

4. Sub-grades consisting of aggregates shall be rolled flat.
5. Membrane installation shall be completed within 72 hours of finishing the preparation of the subgrade.
6. Penetrations shall be prepared per Tremco Barrier Solutions' specifications. Form stakes that penetrate the membrane shall be rebar which shall not be removed and can be bent before installation so as to be incorporated into the structure or slab.
7. Spray applied soil sterilizers shall be installed (per the manufactures' recommended rate) on subgrades that contain plant materials with the potential for growth (e.g. seeds, grasses) prior to the installation of the waterproofing system.
8. Related Materials: Treat joints and install flashing as recommended by Tremco.
9. After the membrane has been installed, cured and checked for proper thickness and voids, then install the protection course per manufacturer's instructions.

5. Product Application

1. TUFF-N-DRI can be applied to surfaces down to 20° F. For ambient temperatures above 50° F, TUFF-N-DRI can be sprayed without heating.
2. To ensure proper temperature at the spray gun, insulate the lines and the pump housing of the spray apparatus. When spraying below 50° F ambient temperature, it is highly recommended to have your equipment and material enclosed in a heated compartment.
3. Spray TUFF-N-DRI in a pressure range between 2000 and 2500 pounds per square inch (psi).
4. Roll out the geomembrane or geotextile. Overlap seams a minimum of five inches. Make sure the geomembrane or geotextile is tight at all inside corners. Within the seam overlap, spray TUFF-N-DRI to a 60 mil (wet) minimum thickness. Lay the seam back together and press the covering geomembrane or geotextile into the TUFF-N-DRI if needed.
5. VaporLock-m methane barrier system, barrier membrane thickness requirement combined is 60 mils dry for applications on geomembrane or geotextile; the 60 mil dry thickness refers to the TUFF-N-DRI and geomembrane or geotextile thickness, and it may be necessary to have additional thickness of the VaporLock-m thickness per code requirements or methane specifications.
6. Spray TUFF-N-DRI over the entire area of geomembrane or geotextile at a rate not to exceed 20 sq feet per gallon coverage, or a minimum of 70 mils wet thickness measured on top of the geomembrane or geotextile. This will cure to a total composite thickness of 60 mils. Use a wet film gage to measure the application thickness. A caliper mil gauge may be used if membrane is completely cured. For non-porous surfaces such as poured concrete, the same coverage rate of 20 sq. ft per gallon will yield the desired application thickness of 44 dry mils for the TUFF-N-DRI membrane alone.
7. Careful attention must be taken during the application process to ensure a consistent, homogenous membrane.
8. Detail drawings must be consulted to make sure the above and other common waterproofing situations on the job are sealed appropriately.

- For best results on geomembrane or geotextile, use a calcium chloride co-spray application procedure. In this process TUFF-N-DRI is installed using a 2% (wt) calcium chloride/water solution co-sprayed with the TUFF-N-DRI Waterproofing. The ratio of calcium chloride solution to TUFF-N-DRI should be 1-part CaCl₂ solution to 5 parts TUFF-N-DRI Waterproofing. The wet thickness of the cosprayed membrane immediately after application should be 20% thicker than membrane applied without co-spray. Thickness measured with a notch film gauge should measure >80 mils.
 - Inspect the sprayed VaporLock-m System carefully for pin holes, blisters or other voids in the membrane. If any are detected, lightly re-spray until a monolithic coating is achieved.
- Large patches shall be handled in the same manner as the original installation of the methane barrier membrane. See instructions in section 4 of BARRIER MEMBRANE APPLICATION given above.

6. Care of Membrane Prior to Protection Course Application

- The barrier membrane shall be protected at all times from damage and/or displacement. Any known or possible damage or displacement of the membrane shall immediately be brought to the attention of the General Contractor and the membrane installation contractor.
- Installers, inspectors and other personnel that need to walk over the exposed membrane shall wear smooth sole and smooth heel boots or other smooth-bottom footwear.
- The membrane shall be kept free of heavy wheel traffic, rocks, dirt, nails and other sharp objects, tools, buckets, solvents and other deleterious materials, until the approved protection course is installed.
- The membrane shall not be exposed more than 14 days, before the protection course is installed.

7. Sampling and Repair Procedures

- The thickness of the applied TUFF-N-DRI emulsion may be measured with a notch film gauge film thickness gauge, or caliper mil gauge. The correct emulsion thickness also tends to create a distinctive rippled appearance once the correct application thickness has been reached. Use the membrane's appearance and the film thickness gauge to ensure proper amount of TUFF-N-DRI has been applied.
- For VaporLock-m methane barrier composite applications, determine the wet emulsion thickness by carefully inserting the gauge into the wet TUFF-N-DRI coating until the resistance of the fabric is felt. If a sample of the composite must be measured, cut a maximum 2 inch square of the cured methane barrier membrane and use calipers to measure the thickness of the composite.
- Re-spray spots where the dry film gauge was used to fill any voids created by the measurement process. Inspect the area sprayed prior to moving on so as to spot and spray any voids in the membrane.
- Voids found after the membrane has cured may be repaired by spraying the void and 2 inches surrounding the void with TUFF-N-DRI to approximately 70 mils wet (44 dry) required. Alternately, the TUFF-N-DRI membrane may be troweled or brushed into the void and the surrounding 2 inches. Multiple troweled or brushed coats may be required to achieve the required thickness.
- Small areas (up to 8 inch square areas) of barrier membrane that have to be repaired due to faulty installation or because of thickness sampling shall be repaired in the following manner. First a tack coat of TUFF-N-DRI shall be applied to cover the repair area and a minimum of 3 inches beyond the borders of the repair area. Next, a piece of geomembrane or geotextile is placed so that it extends over the repair area and 2 inches beyond the borders of the area. Then apply a 70 mil wet (44 mil) dry coat of TUFF-N-DRI over the patch.

8. Equipment Recommendations

- Emulsion-based products require some special handling in order to optimize their application. Below are listed some equipment recommendations and a "troubleshooting" section should any spray problems arise.

9. Equipment Set-Up

- A piston type pump capable of spraying 3000 psi is required. The GRACO #733 or GRACO #833 pumps or equivalent piston type pumps work well with this material. (Contact your Tremco Technical Representative for assistance with equipment purchases.)
- The diameter and length of all the lines is critical to ensuring a good flow of material to and from the pump. The larger the diameter and shorter the length of all lines decreases the flow resistance and optimizes product transfer. All connections should be as tight as possible to eliminate introducing air into the lines.
- Make sure the lower piston ball check is on the high setting. Consult your equipment manual for adjustment procedures.
- Make sure there are no air leaks in any part of the spray system. The spray hose must be a "high pressure" type, capable of taking 4000 psi. A maximum of 1/2" diameter line should be used for all but the last 50 feet of hose. The last 50 feet can be reduced to 3/8" diameter. No more than 200 feet of hose is recommended.
- Many different spray guns can be used. consult with your Technical Representative for more information.
- When using co-spray application, extra equipment is needed such as a low pressure pump (60 psi to 150 psi) with approximately one gallon/minute capacity, low pressure hose (1/4 inch air hose works well), a container for mixing and holding the calcium chloride solution (a clean 5 gallon plastic pail) and a co-spray gun.

10. Troubleshooting

- If you lose pressure while spraying:
 - Check all line connections for air leaks.
 - Reduce the amount of engine coolant going through the heat exchanger (if used), but watch to be sure that the TUFF-N-DRI material temperature does not drop below 110° F.
 - Flush system with diesel fuel or mineral spirits.
 - Spray product to test pressure.
 - If pressure cannot be maintained, take apart the lower foot valve and inspect the piston ball check. If the piston ball check moves freely and is seating correctly, take out the piston rod and inspect the packings. Replace the packings if they are damaged or worn excessively.
 - Reassemble the equipment and spray product to see if a constant pressure can be maintained.
 - If pressure still cannot be maintained, open up the heat exchanger (if used) and check for blockage. If blocked, clean thoroughly and reassemble.
 - If these procedures do not work, consult your GRACO Service Representative or Tremco Technical Representative.

11. Operational Maintenance

- Consult your GRACO Service Manual for maintenance scheduling or replacement of vital parts (i.e.piston packings, ball check, etc.).

1. Many different solvents can be used to flush the system but mineral spirits are recommended because they act as a lubricant for the leather packings in the pump.
2. DO NOT use water to flush TUFF-N-DRI out of the lines. This will shock the emulsion and cause it to "break" in the lines.
3. Mineral spirits, diesel fuel and most other solvents are flammable and/or hazardous. Be sure to check with the suppliers of these solvents for the correct safety and handling procedures and follow the suppliers' recommendations when using clean up solvents.
4. Do not leave TUFF-N-DRI in the lines, pumps and heat exchangers for long periods of time. If the spray equipment is not going to be used within 3 days, flush the system with solvent.
5. If using a tank to transport TUFF-N-DRI, be sure to fill the tank completely at the end of each workday to reduce the amount of air on top of the coating which will reduce the possibility of skin forming in the tank.

12. Transportation

12.1 TUFF-N-DRI is classified as a non-hazardous emulsion and does not require placarding.

13. Projects to Avoid

1. Jobs involving "potable water" (drinking water). Example: Underground tanks for drinking water.
2. Exposed Surfaces. VaporLock-m methane barrier system not resistant to ultraviolet light and, therefore, should never be used in exposed applications.
3. Curing Agents. TUFF-N-DRI emulsion will not adhere well to surfaces treated with silicone or siloxane release or curing agents. These materials should not be used at any penetrations to be sealed. Consult with the Tremco Technical Department if you have further questions.

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Please refer to our website at www.tremcosealants.com for the most up-to-date Application Instructions.

Tremco Construction Products Group

3735 Green Rd
Beachwood OH 44122
800.876.5624

1451 Jacobson Ave
Ashland OH 44805
419.289.2050 / 800.321.6357

220 Wicksteed Ave
Toronto ON M4H1G7
416.421.3300 / 800.363.3213

1445 Rue de Coulomb
Boucherville QC J4B 7L8
514.521.9555