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## **TUFF-N-DRI® Basement Waterproofing System Detailed Membrane and Board (Full System) Application Instructions**

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### **Product Description**

The TUFF-N-DRI Basement Waterproofing System is comprised of the TUFF-N-DRI Waterproofing Membrane and either the WARM-N-DRI® or TUFF-N-DRI Barrier Board insulation and drainage board. The TUFF-N-DRI membrane is a fluid-applied, single-component, polymer-modified asphalt emulsion, manufactured by Tremco Barrier Solutions, Inc. (TBS). This material is specifically designed for spray applications on below-grade exterior foundation walls, or above-grade walls when covered by other material. The WARM-N-DRI and TUFF-N-DRI Barrier Boards are fiberglass insulation and drainage boards manufactured for Tremco Barrier Solutions by Owens Corning. The TUFF-N-DRI membrane can be applied to many different substrates, but the TUFF-N-DRI Full-System Limited Warranty applies only for new construction, below-grade vertical foundation walls for residential applications. The TUFF-N-DRI Full-System Limited Warranty is for poured concrete walls, bare block walls, parged block walls or pre-cast concrete walls.

Proper installation of the TUFF-N-DRI Full-System is critical to ensuring the quality of the final cured membrane. It is the responsibility of the waterproofing contractor and/or his applicator, to achieve the goal of creating a uniform, continuous, fully adhered, cured waterproofing membrane with a minimum thickness of 40-mils in all areas of the application. The applicator must consider and respond appropriately to any impediments to achieving that goal. This includes, but is not limited to, site conditions, the condition and quality of the foundation wall, current and expected weather, as well as backfill composition, procedure and timing. The applicator should proactively communicate with the builder and/or other trades to surface and resolve any issues that would impede achieving the goal of a quality waterproofing application. The following instructions detail the recommended practices for product application and, if followed, will be instrumental in the creation of a quality finished waterproofing system. However, an applicator may deviate from specific items contained in these instructions, as long as he is able to achieve the goal of creating the quality finished waterproofing system by alternate, but effective, means.

If you suspect that there may be a quality issue with the product or that it may not conform to its published specifications, do not apply the product. Contact your TBS Territory Manager or Technical Representative for investigation or resolution of the suspected quality issue.

### **Storage**

TUFF-N-DRI membrane, like all asphalt emulsions, must be kept from freezing. It is recommended that TUFF-N-DRI be stored indoors off the floor at an ambient temperature above 50°F (10°C). Opened drums should be tightly sealed before storage to avoid a skin developing on top of the liquid.

When shipping emulsion-based products during the winter months, there is 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 do not go directly from our warehouse to yours.

If you suspect that a product has frozen, contact your TBS Technical Representative or Territory Manager. If you inspect and determine that incoming material is frozen, do not accept delivery from the freight carrier.

## Safety

Use the following safety instructions when handling TUFF-N-DRI membrane. 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 material. Prolonged or repeated contact can cause skin irritation. If prolonged contact is anticipated, impervious gloves should be worn.
2. In a confined space at temperatures greater than 212°F (100°C), sufficient vapors can accumulate and flash if a source of ignition is present. TUFF-N-DRI Membrane will not support sustained combustion, and will not burn under normal circumstances.
3. Mist from spray application in a confined area can possibly cause a headache, nausea, and irritation of the nose, throat and lungs. To prevent this, a dust mask or cartridge respirator may be worn but is not required.
4. To protect the 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.

## Application Instructions

### Preparation and Limitations

1. The block, parged block, poured concrete or pre-cast concrete must be clean, smooth, firm, free of dust, mud, ice, snow, loose mortar, wires, fins, metal projections, wall ties, or any other substance which might prevent placement and bonding of a continuous film. Take particular care to ensure that the footing and/or cove area are clean.
2. On poured concrete walls, remove wall ties on the outside and inside of wall. This must be done prior to the application of TUFF-N-DRI Membrane.
3. On poured concrete walls, the tie holes must be patched with hydraulic cement, vinyl concrete patch, or non-shrinking grout. Flat snap ties that break off cleanly without chipping the surrounding concrete, only require pre-spraying with a 10 to 15-mil wet coating of TUFF-N-DRI Membrane, but may be treated as above as well. Whichever method the applicator chooses, the tie holes must be prepared prior to the standard 60 mil wet application. Honeycombs or voids in the wall must be patched with hydraulic cement, vinyl concrete patch, or non-shrinking grout.
4. For bare block walls, all mortar joints between the masonry units shall be compressed and tooled or struck smooth. All voids in the mortar joints between masonry units shall be patched with hydraulic cement, vinyl concrete patch or non-shrinking grout.
5. For parged block walls, the parging must be firm and smooth. It must not crumble to the touch or have too high of a sand content. Any patching of the parging must be done with hydraulic cement, vinyl concrete patch or non-shrinking grout.
6. For block or parged block walls, find out whether any or all of the cores of the block foundation are to be filled with concrete. If any of the cores are to be filled, the filling must be completed

and cured before the wall is waterproofed. Filling of the cores after the TUFF-N-DRI Membrane is installed can damage the membrane, and will render the warranty invalid.

7. For block or parged block walls, brick ledges should be capped and solid. The TUFF-N-DRI System Limited Warranty covers neither the horizontal surface of the brick ledge nor the vertical wall surface above the ledge regardless of wall type. The performance warranty covers only the vertical wall coated with TUFF-N-DRI Membrane and Insulation from the footing/wall joint up to the brick ledge.
8. TUFF-N-DRI Full System may be applied to damp or green concrete. However, the product must not be applied over standing water, a water film, ice, frost or snow.
9. Before waterproofing a monolithic slab/footing foundation (where the floor slab and footing area are a single slab), contact a TBS Technical Representative. The cold joint between the slab/footing and the vertical wall must be prepared with a urethane based cold liquid-applied waterproofing material, applied and fully cured per manufacturers instructions, to a minimum of 4 inches above and below the joint. This cold joint must also have a protection/drainage board over the cold joint and a minimum of four feet up the vertical foundation wall. The top of the drain tile shall also be a minimum of four inches below the wall/slab joint and the gravel over the tile shall extend 10 inches above the wall/slab joint.
10. For block or parged block wall lintels, all gaps in the mortar must be filled. TUFF-N-DRI Membrane should be applied to both sides of the lintel and beyond the lintel at least one block into the non-living space.
11. For pre-cast walls, the joints between the panels of high tensile strength concrete must be caulked and sealed in accordance to manufacturer instructions (non-silicone based caulks only). Similar to tie holes, these caulked joints should be pre-sprayed with 10 to 15 mils of TUFF-N-DRI Membrane prior to the standard 60 mil wet application.
12. The foundation must be of such strength and design to ensure structural integrity. Foundation walls must be properly cured according to local building code regulations. If these are not available, consult the National Concrete Masonry Association for specifications or the Concrete Foundation Association.

## **TUFF-N-DRI Application**

1. TUFF-N-DRI Membrane can be applied to surfaces using standard application procedures down to 20°F (-7° C). For colder applications, see the section on Cold and Inclement Weather Application below. Material temperature at the spray tip should be between 110°F (43°C) and 130°F (54°C).
2. To ensure proper temperature at the spray gun, insulate the lines and pump housing of the spray pump. When spraying below 50°F (10°C) ambient temperature, it is highly recommended to have your equipment and material enclosed in a heated compartment.
3. Spray TUFF-N-DRI Membrane in a pressure range between 2200 and 2800 psi. For best results use a .035 or .039 tip. For atomization and curing reasons, do not use any tip larger than a .039.
4. The membrane should be applied to a minimum thickness of 60 mils wet, measured in-place on the wall with a notch film gauge. The product will cure to dry film thickness of 40 mils. Use a notch film mil gauge to ensure proper application thickness. Gauges can be obtained from

TBS. For smooth surface poured concrete walls, the proper thickness application will yield a coverage rate not to exceed 25 square feet per gallon (sf/gal). For brick pattern (decorative) poured walls, the proper thickness application will yield a maximum coverage rate of 18 sf/gal. The maximum coverage rate on block walls should not exceed 20 sf/gal. Coverage rates may be lower depending on the porosity of the block, parged block, or poured concrete walls. It is the contractor's responsibility to ensure that 40 cured mils are on the exterior of the vertical wall when the waterproofing is completed.

5. Careful attention must be taken during the application process to ensure a consistent, homogeneous membrane. For best results, apply TUFF-N-DRI Membrane using a two-coat technique utilizing a tack coat on an entire wall and a second coat to build up to the required wet mil thickness. A tack coat will reduce bubbling and pin holing caused by poured concrete walls curing and out-gassing. An applicator may choose to spray the TUFF-N-DRI Membrane in one coat. This type of application must be carefully completed to ensure no thin spots. A one-coat application will be more prone to bubbling and pin holing on poured concrete walls.
6. Inspect the sprayed wall thoroughly for pin holing, voids or thin spots. Lightly re-spray any areas requiring additional milage to the correct thickness for the substrate.
7. After application, applicator must verify that:
  - a. Adequate foundation drainage system is installed (See Drainage Requirements)
  - b. All penetrations (water, sewer, etc) have been properly sealed.
  - c. Backfill does not exceed the level of the waterproofing membrane.
  - d. Grade slopes away from the foundation.
  - e. 40 cured mils are on the wall.
  - f. Backfill does not occur until the TUFF-N-DRI Membrane is fully cured.
8. The waterproofing contractor or applicator may pass the responsibilities in number 7 on to the builder or general contractor, and ensure that the builder or general contractor is aware of these responsibilities, should they do so.
9. To waterproof penetrations, the voids around the penetration must be filled with hydraulic cement, non-shrinking grout or vinyl concrete patch. The penetration area must then be sealed with an additional coating of TUFF-N-DRI Membrane or a urethane liquid membrane.

## **WARM-N-DRI / TUFF-N-DRI Barrier Board Installation**

1. Applying the board at the correct time is essential to ensure good adhesion to the TUFF-N-DRI Membrane. The board must be set as the membrane begins to cure. The proper timing for this will vary.
2. To install the board, place the bottom of the board on the footing at the footing/wall joint and press firmly. Slowly work your way up to the top of the board carefully pressing the board onto the membrane. Take special care not to slide the board. The board may appear to be loose, but as the membrane cures, it will draw the board in resulting in excellent adhesion between the board and the membrane. If the board falls off, check the integrity of the membrane and re-spray to 60 mils wet if needed. It may be necessary to spray a mist of TUFF-N-DRI membrane on the wall to increase adhesion.
3. Place the board around the foundation in the same direction as the membrane was applied. All boards should be checked before leaving the job site. When the WARM-N-DRI Board or

TUFF-N-DRI Barrier Board is applied, the foundation can be backfilled in 24 hours. It may take longer during some weather conditions for the TUFF-N-DRI Membrane to cure, and the foundation should not be backfilled until the membrane is fully cured.

4. When installing 4x4 boards, install the bottom board first then immediately place the top board. This prevents any excess TUFF-N-DRI Membrane from running down and onto the top edge of the bottom board.
5. It may be difficult to achieve the desired adhesion characteristics when applying the thicker WARM-N-DRI or TUFF-N-DRI Barrier Boards, or if the foundation wall is not smooth. Adhesives, or non-corroding masonry nails and mechanical fasteners can be considered. Consult your TBS Technical Representative for availability and detailed application instructions on these products.
6. Another technique to enhance board adhesion is to wet the back-side of the WARM-N-DRI or TUFF-N-DRI Barrier Boards with a calcium chloride solution before installing the board to the membrane. The solution is simply prepared by mixing up a ratio of approximately 2-3 pounds of granular calcium chloride per 1 gallon of water. Be aware that dissolving the calcium chloride can heat the water significantly, up to 150°F (66°C).
7. Wet the board with the solution using a watering can or weed sprayer or similar device. It is not necessary to drench the board; simply dampen it. Install the wet side of the board into the wet TUFF-N-DRI membrane. Consult your TBS Technical Representative for more instruction on this procedure.

## **Cold Weather and Inclement Weather Application Information**

1. It is possible for the TUFF-N-DRI Membrane to be applied at temperatures lower than 20°F (-7°C). The Contractor assumes responsibility for ensuring the TUFF-N-DRI fully cures to a dry film thickness of 40 mils. Applying the 60-mil wet thickness of the TUFF-N-DRI membrane in one coat is recommended for application temperatures below 20°F (-7°C). Heating the product to the maximum application temperature of 130°F (54°C) at the spray tip is also recommended.
2. It may take longer than 24 hours for the TUFF-N-DRI membrane to fully cure during periods of low temperatures, high humidity, rainfall or snowfall following the membrane application. Therefore, wash-offs due to the application of TUFF-N-DRI membrane during or immediately before inclement weather are possible. The TBS Contractor assumes responsibility for ensuring the TUFF-N-DRI fully cures to a dry film thickness of 40 mils in all areas of application.

## **Additional Application Information and Limitations Crawlspaces**

The TUFF-N-DRI Full-System Limited Warranty includes crawlspaces only when the following criteria are met:

1. The crawlspace must have a proper exterior drainage system that channels water to the lower foundation footing drains which drain to a functional sump or to drainage pipe properly sloped to daylight. See Drainage Requirements listed below.
2. The crawlspace must have a finished concrete floor. Crawlspaces with dirt or gravel floors do not meet warranty requirements.
3. Exterior crawlspace walls must be block, parged block, poured concrete, or pre-cast concrete and must meet preparation requirements listed above.

## Additions

The TUFF-N-DRI Full-System Limited Warranty includes foundation additions only when the following criteria are met:

1. The addition must have a proper exterior drainage system that channels water to a functional sump or to drainage pipe properly sloped to a daylight exit. See Drainage Requirements listed below.
2. The addition walls must be block, parged block, poured concrete, or pre-cast concrete and must meet preparation requirements listed above.
3. The cold joint between the existing foundation wall and the new addition wall must be prepared with a urethane based cold liquid-applied waterproofing material, applied and fully cured per manufacturers instructions, to a minimum of four inches on both sides of the joint prior to the 60-mil application of TUFF-N-DRI Membrane. This cold joint area must also have a drainage/ protection board applied over the urethane liquid membrane and TUFF-N-DRI Membrane. This cold joint area is not covered under the terms of the TUFF-N-DRI Full-System Limited Warranty, but if the proper preparations are taken, the area should not leak.

## Top of Wall Transitions

In some building markets, it is common to see a few rows of block masonry on top of a poured wall, or a short poured wall on top of a block masonry wall. The cold joint between the two different foundation materials must be prepared by an application of a urethane based, cold liquid-applied waterproofing material, applied and fully cured per manufacturers instructions, spanning the joint and extending a minimum of four inches above and below the joint, prior to the 60-mil application of TUFF-N-DRI Membrane. Although this cold joint transition area is not covered under the terms of the TUFF-N-DRI Full-System Limited Warranty, if this procedure is followed, the area should not leak.

If the entire wall is parged with one continuous smooth coating covering both the block and poured sections without interruption, apply the TUFF-N-DRI Membrane following the normal procedure for parged walls.

## Brick Ledges

The horizontal brick ledge area of a foundation wall is not covered under the terms of the TUFF-N-DRI Full-System Limited Warranty. Brick ledge areas are not covered for the following reasons:

1. Brick ledges are almost always left exposed to ultraviolet rays for longer than 15 days.
2. The brick application process can puncture and/or scrape the TUFF-N-DRI Membrane.
3. Water that penetrates into the brick or stone below the sill plate may have no drainage exits, and may accumulate on the brick ledge.

## Drainage Requirements

In order to qualify for the 30-Year Limited Warranty, a proper drainage system must be installed. TUFF-N-DRI requires a positive drainage system that is consistent with good construction practices and that meets local code requirements. An exterior drainage system consisting of a 3-inch minimum diameter perforated drainage pipe, with gravel covering the pipe and footing and extending at least one foot (12") up the face of the WARM-N-DRI or TUFF-N-DRI Barrier Board on the vertical wall is required. The drain tile must channel the water to either an operating sump pump or to a gravity (daylight) drain. DrainStar® Foundation Strip Drain, installed so that it can drain the WARM-N-DRI BOARD, is also an approved exterior drainage system, where accepted by code.

## Equipment Set-Up

1. A pump capable of spraying 3000 psi is required. The Graco 733, Graco 833 or the Speedflow Hydra-M is recommended. Contact a TBS Technical Representative for assistance with equipment purchases.
2. The diameter and length of the interlinking suction side (low pressure) lines are crucial to ensuring a good flow of material to and from the pump. Larger diameters and shorter lengths of all interlinking lines decrease the flow resistance and optimize product transfer. The siphon line from the truck tank or drum dip tube to the heat exchanger should not be longer than six feet if possible, and a 2-inch or 1.5-inch diameter is recommended. The line from the heat exchanger to the pump should have a minimum inside diameter of 1 ¼-inch and be no longer than 4 feet. All connections should be as tight as possible to prevent air from entering the lines.
3. Make sure the lower piston ball check is on the high setting. Consult your equipment manual for adjustment procedures.
4. A single-pass heat exchanger connected to an engine's coolant system is the best way to heat the TUFF-N-DRI Membrane to the recommended application temperature of 110°F (43°C) to 130°F (54°C) at the spray tip. One heat exchanger that produces good heat transfer is the API Basco Model 500. Contact a TBS Technical Representative for assistance with equipment purchases. All heat exchangers must have a ball valve attached to the inlet side of the coolant hose. The applicator must turn off the flow of coolant to the heat exchanger when the truck is driving to and from jobsites and when the spray pump is not in use. The flow of coolant is to be used only when circulating or spraying TUFF-N-DRI Membrane.
5. The spray hose must be a "high-pressure" type, capable of withstanding 4000 psi. A maximum of ½-inch diameter line is recommended for the first 100 feet of hose. It can then be reduced to 3/8-inch for the next 100 feet. No more than 200 feet of hose is recommended.
6. Many different airless spray guns can be used to spray TUFF-N-DRI. The most widely used brand is Graco, and the Graco Silver Plus gun is the most popular for polymer-modified asphalt emulsion spraying. You may also use the Graco Heavy Duty Texture gun or the Graco Flex Plus gun. The Graco Contractor II line of guns can also be used if the handle filters are removed.

## Equipment Troubleshooting

If you lose pressure while spraying:

1. Check suction side lines for air leaks.
2. Reduce the heat to the heat exchanger.
3. Re-prime pump.
4. Inspect the piston ball check and packings.
5. Check heat exchanger for blockage.
6. If procedures do not work, contact a TBS Technical Representative or pump manufacturer

## Operational Maintenance

Consult your pump service manual for maintenance scheduling or replacing of vital parts (piston packings, ball check, etc.).

1. Many different solvents can be used to flush the system, but mineral spirits are recommended because it acts as a lubricant for the pump packings.

2. Do not use water to flush the TUFF-N-DRI Membrane. This will “shock” the emulsion and cause it to break in the lines. A soap solution consisting of ½ cup Dawn dishwashing liquid per gallon of water may be used to remove uncured liquid material.
3. Mineral spirits, toluene 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 supplier’s recommendations when using clean up solvents.

## Transportation

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

## Foundation Troubleshooting

Troubleshooting a foundation to determine if a leak is penetrating through the TUFF-N-DRI Full System is very important. The standard troubleshooting procedure for below grade waterproofing is called a water test, or flood test. A water test isolates water from a garden hose directly into the waterproofing system, introducing the water to only the below-grade treated area of the foundation. To water test a suspect area on any type of below-grade foundation wall, follow these basic steps:

1. Locate the suspect area on the outside of the foundation. This may require measuring the problem area on the inside of the foundation wall. A picture of the suspect area should be taken.
2. Using a shovel, dig a small trench approximately three feet wide in the suspect area. Expose the top four to five inches of the TUFF-N-DRI System. This will also give the applicator a good idea of any over-grading that may have occurred.
3. Isolate water from the garden hose directly into the trench. Ensure that no water gets above the final waterproofing grade line. Note the time, and run water for up to 30 minutes.
4. Check the suspect area in the basement every few minutes. If the suspect area begins to show water penetration during or immediately after the water testing, it proves that the waterproofing membrane is allowing water to penetrate through it. Further investigations may be necessary to determine why the waterproofing membrane did not function properly.
5. If the suspect area does not show water penetration, there may be other issues causing the water penetration into the foundation. Other issues include, but are not limited to, brick ledge leaks, wind driven rain seeping into block above grade, window leaks, penetration leaks, and above grade cracks in foundation walls or stucco.
6. Before and after pictures are good ideas for a waterproofing applicator during investigations.
7. Contact a TBS Technical Representative concerning any leaking water tests that will result in warranty repairs.



**If you have any further questions please call us at 800.876.5624**

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