

3M™ Wind Protection Tape Application Instructions

3M™ Wind Protection Tape can be used to help protect wind turbine blade surfaces from damage caused by minor impacts and erosion due to rain, sand, dirt, or other debris. It is made from an exceptionally tough, transparent, abrasion-resistant polyurethane elastomer that resists puncture, tearing, and erosion. This highly durable material has also been designed to be resistant to UV light.

3M™ Wind Protection Tape (WPT) Basics

When & where can I apply 3M Wind Protection Tape?

- 3M Wind Protection Tape should be applied to the outer 1/3 to 1/2 section of the blade (closest to the tip).
- 3M Wind Protection Tape can be applied when the air and substrate temperatures are above 60°F (16°C).
- 3M Wind Protection Tape can be applied at the OEM facility or in an O&M situation, either on the ground or up-tower.
- Paints and coatings must be fully cured (a minimum of 24 hrs at 72°F/22°C) before applying 3M Wind Protection Tape.
- Blades can be put into service 4 hrs after 3M Wind Protection Tape is applied at 72°F/22°C.

What can I apply 3M Wind Protection Tape to?

- WPT adheres well to two part epoxy and urethane paints, epoxy primers and bare composites.
- 3M Wind Epoxy Filler W3120, 10 min can eliminate a coating step! 3M Wind Protection Tape can be applied directly to 3M Wind Epoxy Filler W3120, 10 min. Direct application eliminates a coating step, which saves time while providing additional leading edge protection.
- 3M Wind Protection Tape may be difficult to adhere to some low surface energy surfaces. Please contact 3M Renewable Energy Division if there are questions regarding specific substrates.

What else do I need to know?

- The use of gloves is recommended during the application procedure.
- Keep sharp tools parallel to the surface at all times during use to avoid damaging the wind blade surface.
- To cut 3M Wind Protection Tape, hold a new razor blade on top of the tape where the cut is needed. Apply only enough pressure to hold the razor blade in place. Gently pull 3M Wind Protection Tape up against the edge of the razor blade to cut the tape. Do not push down on the razor blade to cut the tape.

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

Note: Direct application of the 3M Wind Protection Tape to 3M Filler is only possible with 3M Wind Epoxy Filler W3120, 10 min. A coating must be applied to all 3M Wind Polyurethane Fillers before the installation of 3M Wind Protection Tape.)

Please see 3M.com/wind for additional information on 3M Wind Fillers.

Installation Supplies Needed:

Name	Size
3M™ Wind Protection Tape	—
3M™ Wind Protection Tape Edge Sealer W2600	50 cc
3M™ Protective Tape Application Solution	1 qt.
3M™ Scotch-Weld™ EPX™ Plus II Applicator	50 cc
3M™ Wind Tape Adhesion Promoter W9910	7 × 7 in. wipe
3M™ Hand Applicators/Squeegees	Various
3M™ Random Orbital Sander	Various
3M™ Clean Sanding Discs 236U or 735U P180	Various
3M™ Clean Sanding Discs 236U and P320	Various
3M Wind Tape and Residue Remover (TARR) W9900	16 oz / 1 gal

Other Supplies: Respirators, Utility Knife, Scissors, Pencil, Measuring Tape, Gloves, Cleaning Cloth
See 3M.com/wind for product numbers and details

Surface Preparation

The surface upon which 3M Wind Protection Tape will be applied can significantly influence tape performance. It must be fully cured and exhibit a **smooth** and **clean** condition.

1. Confirm that there are no significant chips or damage to the leading edge of the wind blade. If damage is present, determine degree of damage and repair using the appropriate tools and products. If damage is minor and fiberglass reinforcement is not needed, 3M Wind Fillers may be an appropriate repair solution. Please see 3M.com/wind for information on 3M Wind Fillers.
2. Wipe down the leading edge of the wind blade using a 3M™ High Performance Cleaning Cloth (or a clean, lint-free cloth) and 3M™ Protective Tape Application Solution (or an IPA / water mixture).
3. Define the area where 3M Wind Protection Tape will be applied. Starting from the leading edge, measure ½ the width of the wind tape (for e.g., 4 in. (10 cm) if total tape width is 8 in. (20 cm)) and use a pencil to mark where the edge of the tape will be. Make guide marks at the blade tip and the furthest point at which wind tape will be applied.



- Using the marks as guides, apply 3M™ Vinyl Tape 471 to define the area where 3M Wind Protection will be applied.



- Smooth the surface of the leading edge using a 320 grit abrasive on a random orbital or DA (dual action) sander or by hand sanding. Be careful not to grind through the coating, especially on the leading edge.



- Remove sanding debris using a 3M High Performance Cleaning Cloth (or a clean, lint-free cloth) and 3M Protective Tape Application Solution (or a 75% water/25% IPA mixture).

Tape Application

Wash hands thoroughly. Excessive dirt and oil from the skin will compromise the wind protection tape adhesion. Two person teams are recommended for the most efficient application.

Wet Application Technique

Recommended application method for long, straight sections of the wind blade.

- Measure and cut a piece of 3M™ Wind Protection Tape to the length required. Use scissors to round the tape corners.
- Align the 3M Wind Protection Tape just below the 3M 471 Tape guide. Use tabs of 3M Vinyl Tape 471 about 12 in. (30 cm) apart to hold it in place. Do not stretch the 3M Wind Protection Tape.

- Create a hinge by applying a strip of 1 in. (2.5 cm) wide 3M 471 Tape along the top edge of the 3M Wind Protection Tape. The hinge will overlap the existing 3M Vinyl Tape 471 guide.



- Fold the tape back along the hinge and remove the liner.



- Spray the 3M Protective Tape Application Solution (or a 75% water/25% IPA mixture) on the 3M Wind Protection Tape and the substrate.



- Lay the 3M Wind Protection Tape in position. Apply slight tension to the wind protection tape and use a flexible polyethylene squeegee and pressure to remove the application solution from beneath the 3M Wind Protection Tape. If an air bubble is found, promptly lift the tape to the point of the bubble, re-spray with 3M Protective Tape Application Solution, and begin the squeegee process again.



- Remove the 3M Vinyl Tape 471 and use a squeegee to apply the edge of the tape.

Dry Application Technique

Recommend application method for curved and contoured blade sections such as the tip.

- A narrower section (2 – 4 inches, or 5 – 10 cm) of 3M Wind Protection Tape should be used for the curved section at the blade tip. This narrower section of 3M Wind Protection Tape can be created and installed in two ways:

- Cut a short, narrow piece of 3M Wind Protection Tape and install it at the blade tip. Join it to the wide, long piece of 3M Wind Protection Tape with a splice. Please see the Splicing section for details.
- Use scissors to “neck down” a short section of the long piece of tape for installation near the blade tip. The transition from the wide section to the narrow section should be a gradual curve as shown here.



- Hold down the 3M Wind Protection Tape at one end. Stretch the tape around the contoured section while applying the center of the tape to the leading edge of the blade.
- Apply slight light tension to the tape edges and use a squeegee and pressure to apply them to the surface.
- Extra material may “tent” along the edges of the 3M Wind Protection Tape, especially around curves. If this occurs, excess material in “tents” can be trimmed and the edges pressed into place. 3M Wind Tape Adhesion promoter can also be used to tack down the edges if needed.

Edge Sealing

Application of 3M Wind Protection Tape Edge Sealer W2600 is recommended to smooth and protect the tape edge. Wear appropriately fitting protective gloves when applying edge sealer.



1. For best appearance, mask the area to be sealed by placing a strip of 3M™ Vinyl Tape 471 across the top of 3M Wind Protection Tape 1/32 in. (1 mm) back from the edge. Apply a second strip of 3M 471 Tape to the wind blade surface, 1/8 in. (3 mm) from the edge of the 3M Wind Protection Tape.
2. Insert cartridge into applicator gun and remove cap. Equalize the cartridge by releasing a small amount of product until both parts A and B dispense equally. Attach the nozzle. Dispense a small amount of material and discard.
3. Apply 3M Wind Protection Tape Edge Sealer W2600 to the surface between the pieces of 3M 471 Tape. Properly applied 3M Wind Protection Tape Edge Sealer W2600 should be transparent with minimal air entrapment.
4. Using a body filler spreader, spread and smooth the sealant bead between the strips of 3M 471 Tape.
5. Remove the 3M 471 Tape within 5 – 10 minutes.



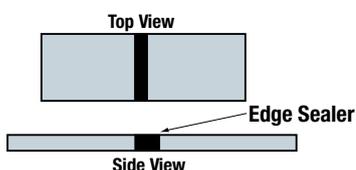
Splicing

Although applying 3M Wind Protection Tape in one long continuous piece is recommended, it may not be practical in some situations. As a result, 3M Wind Protection Tape can be applied in smaller sections using “butt” or “overlap” splices. “Overlap” splices are easier to complete, but may not be aesthetically pleasing.

The following instructions discuss how to create a splice against a piece of 3M Wind Protection Tape already installed on the wind blade.

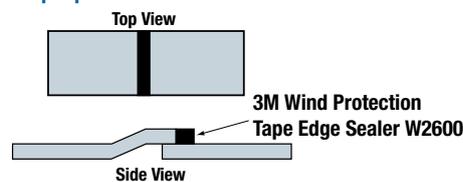
1. Cut the next piece of Wind Protection Tape 1 in (2.5 cm) longer than needed. On the side where a splice is needed, leave the liner in place on a 1 in (2.5 cm) strip.
2. Line up the tape so the section with the liner (1 in – 2.5 cm) will overlap the tape already installed on the blade.
3. Use wet or dry application technique to apply the wind protection tape leaving the 1 in (2.5 cm) strip of liner intact on the side to be spliced.
4. Remove Vinyl Tape 471 if present.

Butt Splice



1. Remove the rest of the liner from the Wind Protection Tape.
2. Spray all surfaces with Protective Tape Application Solution (or a 75% water/25% IPA mixture).
3. Lay the edge of the Wind Protection Tape in place overlapping the tape on the blade. Use the already installed tape as a guide to cut the edge of the spliced section to the right length. Be sure to use proper cutting techniques as described in the “Before Starting” section.
4. Use a squeegee to remove the application solution and tack the tape edge in place.
5. Apply edge sealer over the joint between the two pieces of Wind Protection Tape. Please see the Edge Sealer section for details on its use. Please see 3M Wind Tape Adhesion Promoter W9910 section for details on its use.

Overlap Splice



1. With the liner in place, lay the edge of the Wind Protection Tape in place overlapping the tape on the blade. Determine how far it will overlap the installed tape.
2. Apply adhesion promoter to the top of the Wind Protection Tape that will be overlapped and wait 10 minutes. Please see Adhesion Promoter section for details on its use.
3. Remove the liner from the edge of the second piece and lay it in place using a rolling motion and pressure to remove air.
4. Remove liner from edge of second piece and lay it in place using a rolling motion and pressure to remove air.
5. Apply edge sealer over the joint between the two sections. Please see the Edge Sealer section for details on its use.

3M™ Wind Tape Adhesion Promoter W9910

3M Wind Tape Adhesion Promoter W9910, is only needed in the following situations:

- To increase tape adhesion on the outermost edge of the application, especially in curved areas where the tape edges have “tented”.
- To promote 3M Wind Protection Tape adhesion to low surface energy coatings.

Application Instructions

1. Complete the surface preparation as previously described.
2. Apply a thin, uniform coating of 3M Wind Tape Adhesion Promoter to the surface using a clean, lint-free cloth wetted with 3M Wind Tape Adhesion Promoter W9910.
3. Allow promoter to dry for 10 minutes.
4. For best results, apply 3M Wind Protection Tape to the promoted surface within two hours.

Caution: Using 3M Wind Tape Adhesion Promoter W9910 will make 3M Wind Protection Tape removal more difficult. Do not apply 3M Wind Tape Adhesion Promoter W9910 to the adhesive side of the tape.

Note: Coating should be thin – applying excess promoter will not improve adhesion.

Repair

If 3M™ Wind Protection Tape requires repair, small sections can be replaced using “butt” or “overlap” patches. The patch will be serviceable immediately without the use of edge sealer or after 2 hours if edge sealer is applied.

To expedite the repair, removal and replacement of the entire width of the Wind Protection Tape area that needs repair is recommended.

1. Carefully trim any damaged or loose tape areas with a razor blade or knife using the cutting techniques outlined in “Before Starting.” Avoid damaging the substrate.
2. Decide whether you wish to make a “butt” patch or an “overlap” patch. Overlap patches are easier, but may not be as aesthetically pleasing.
3. Cut a piece of wind protection tape to the length required for the repair.
4. Ensure that blade surface is smooth and clean as needed. Apply 3M Wind Tape Adhesion Promoter W9910 to the wind blade surface where the repair piece will be applied.
5. Apply the repair tape using the “butt” or “overlap” splice installation procedure. Apply edge sealer as desired. Please see the Splicing section for details.

Removal Procedure

3M Wind Protection Tape may need to be repaired or removed during or at the end of its service life. The three recommended removal methods are listed below.

Physical Removal

1. Lift at the tape edge and peel back at a 90° to 180° angle.
2. Adhesive residue left on the surface may be removed by applying acetone, isopropyl alcohol, or another substrate compatible solvent to a clean rag or cheesecloth and scrubbing affected area.
3. If needed, a 3M™ Scotch-Brite™ General Purpose Hand Pad 7447 may aid in removing stubborn residue.

Wallpaper Steamer

1. Direct a jet of low pressure steam from a wallpaper steamer at the tape or sealer peel point.
2. Use a phenolic scraper or plastic squeegee as a removal aid.
3. Remaining adhesive residue can be removed using acetone, isopropyl alcohol, or another substrate compatible solvent.

3M™ Wind Tape and Residue Remover W9900

1. Apply a 1/8 in. (3 mm) thick layer of 3M Wind Tape and Residue Remover W9900 to the tape surface.
2. Cover the 3M Wind Tape and Residue Remover W9900 with a layer of plastic food wrap or aluminum foil to prevent evaporation and cross-contamination.
3. Allow to dwell for approximately four hours.
4. After this dwell period, the tape can be pulled from the structure.
5. Remaining adhesive residue can be removed with another application of the 3M Wind Tape and Residue Remover W9900 (or a 75% water/25% IPA mixture).

3M Wind Protection Tape Edge Sealer W2600 Removal

If 3M Wind Protection Tape has been applied with 3M Wind Protection Tape Edge Sealer W2600, the sealer can be removed physically by scraping or sanding using a random orbital or DA (dual action) sander and 320 grit sandpaper. The 3M™ Wind Protection Tape Edge Sealer W2600 can also be softened with a small wallpaper steamer and scraped off with a phenolic scraper or plastic squeegee.

For more information on our wind manufacturing product line, contact 3M Renewable Energy at 800-755-2654 or visit us at www.3M.com/wind.

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