



WXGUARD WIND SEGMENTED LIGHTNING DIVERTER STRIPS
INSTALLATION GUIDE

www.WXGUARDWIND.com

Shine Wire Products, Inc.
25 Print Works Drive
Adams, MA 01220
1-800-543-5151
www.ShineWire.com

WXGuard is the new generation of segmented diverters, featuring excellent lightning protection, increased survivability against rain erosion, and stronger adhesion properties than traditional diverters. This guide provides recommendations on how to install WXGuard diverters to provide long-lasting performance on your turbine blades. As specific coatings and materials can affect the bond strength of an adhesive, it is important that you validate these recommended processes for your particular application before applying WXGuard to your blades. If you have questions about WXGuard segmented lightning diverters or how to install the diverters on your blades, please contact Shine Wire at 1-800-543-5151.

Recommended Installation using 3M™ Acrylic Adhesive Tape

WXGuard segmented lightning diverter may be purchased with 3M™ acrylic adhesive tape pre-applied to the underside of the diverter. The adhesive tape reduces the time required to install the diverters while providing a secure connection to the blade.

WXGuard recommends using the acrylic adhesive tape on blades operating at temperatures above -55 °C (-67 °F). If the blade operates at temperatures below -55 °C (-67 °F), then follow the instructions for using 3M™ EC-2216 epoxy adhesive provided on page 6 of this installation guide.

- A. Temporarily secure the diverter in the desired location using a termination fastener (for diverters with Types 10D, 14D, or 10F terminations) or masking tape at the terminating end and masking tape at the far end.
- B. Using the diverter as a template, mask around the diverter using tape. The tape should be placed directly adjacent to the diverter's edges to form an outline of the diverter.
- C. Remove the termination fastener and masking tape temporarily securing the diverter to the blade and remove the diverter from the blade.
- D. Lightly scuff sand the surface of the blade inside the masked area with 320 grit sandpaper. Clean the surface with isopropyl alcohol and a clean lint-free cloth and allow the surface to dry.
- E. Apply 3M™ Adhesion Promoter 86A with a pre-saturated 3M™ 86A Promoter wipe or with a cheesecloth wetted with 3M™ 86A Promoter, using the minimum amount that will coat the blade surface. MORE IS NOT BETTER. Allow to dry for 10 minutes.

NOTE: *The 3M™ acrylic adhesive tape application temperature range is 20 to 38 °C (68 – 100 °F). Initial tape application to surfaces at temperatures below 10 °C (50 °F) is not recommended because the adhesive becomes too firm to adhere readily. However, once properly applied, low temperature holding is generally satisfactory. In some cases the bond strength can be increased and ultimate strength can be achieved more quickly by exposure of the bond to elevated temperatures (65 °C /150 °F) for one hour. This provides better adhesive wet-out onto the substrate.*

- F. If the diverter has a termination (Types 10D, 14D, or 10F termination), remove the backing from the 3M™ acrylic adhesive within 1 inch of the termination. Carefully install the termination using a fastener onto the blade, making sure the diverter will lay within the masked area on the blade (see Step B). Once the fastener is in place and the acrylic adhesive has bonded near the termination, start at the termination end of the diverter and slowly peel the remaining backing from acrylic adhesive while gently pressing the diverter onto the blade.

If the diverter does not have a termination (Type EDG), remove the backing from the 3M™ acrylic adhesive within 1 inch of one end of the diverter (preferably the end closest to the grounding point). Make sure the diverter is aligned with the masked area of the blade. Slowly peel the remaining backing from the acrylic adhesive while gently pressing the diverter onto the blade.

- G. Remove the masking tape from the periphery of the diverter.

- H. If edge sealing is desired, clean the area around diverter using isopropyl alcohol and a clean lint-free cloth. Prepare the diverter by covering the diverter segments with masking tape for protection. The tape should protect the segments and the spaces between the segments from being covered in adhesive. Apply of 3M™ ES2000 Edge Sealer along the diverter edges. Allow the edge sealant to cure per the manufacturer's instructions. Remove the masking tape covering the diverter segments. Visually inspect that the diverter segments are free of adhesive.

- I. If using a diverter with a termination, install the termination fastener. Do not install the fastener with sealant.

Figure 1 provides an overview of a diverter adhered with acrylic adhesive tape.

Figure 2 provides a cross-section of the diverter adhered with acrylic adhesive tape.

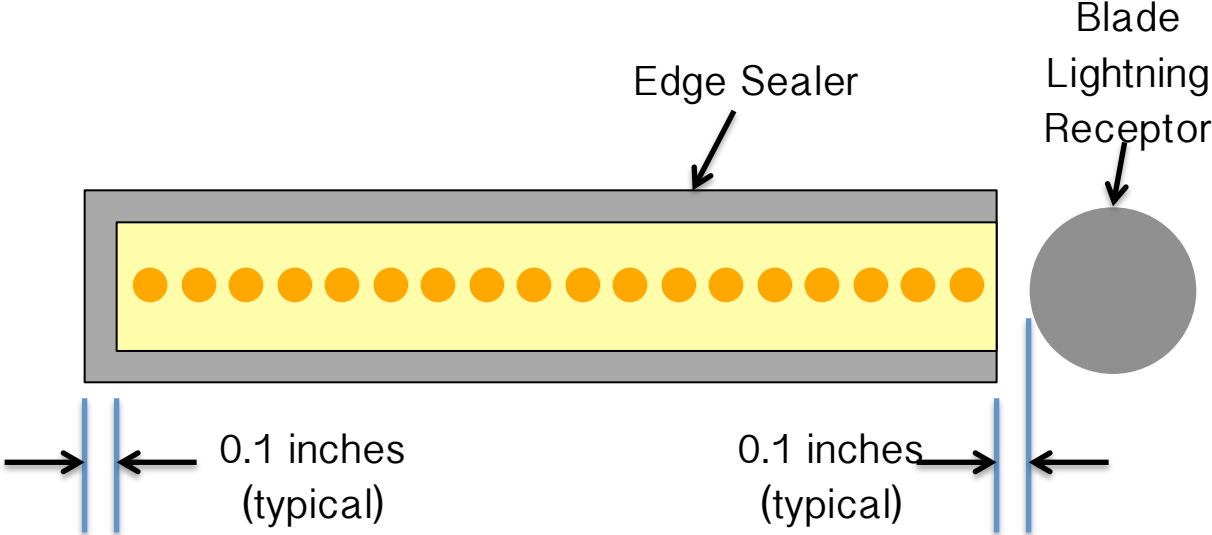


Figure 1 – Overview of diverter installation with acrylic adhesive tape

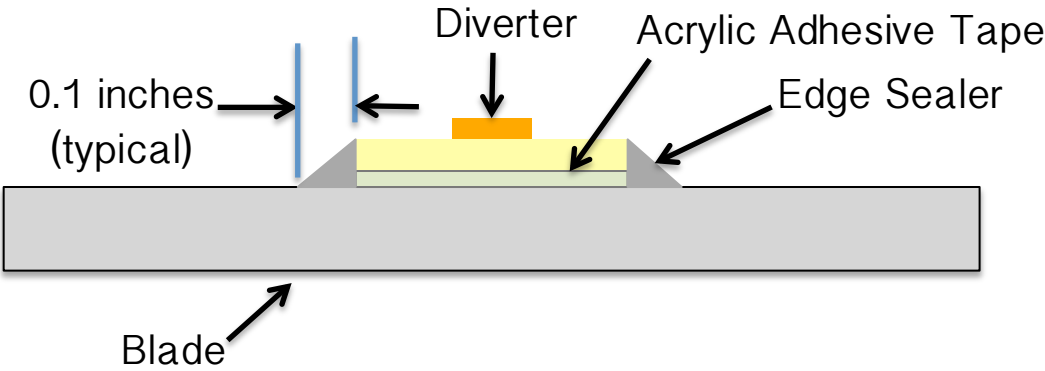


Figure 2 – Cross-section of installation with acrylic adhesive tape

Recommended Installation using 3M™ EC-2216 Gray Epoxy Adhesive

3M™ EC-2216 gray epoxy is an industry standard aerospace quality epoxy with many thousands of hours of successful service history. EC-2216 was also a recommended adhesive for diverter strip installations in the U.S. Air Force specification MIL-I-83456. WXGuard recommends EC-2216 for diverter installations on blades that operate below -55 °C (-67 °F).

- A. Apply masking tape to the upper surface of the diverter for protection. The masking tape will prevent adhesive from bonding to the segments and provide a cleaner installation.
- B. Temporarily secure the diverter in the location defined on the installation drawing using a termination fastener (for diverters with Types 10D, 14D, or 10F terminations) or masking tape at the terminating end and masking tape at the far end.
- C. Using the diverter as a template, apply two layers of masking tape around the diverter edge. The tape should be spaced a maximum of 1/8th inch from the diverter edge. The two layers of tape (approximately 0.010" total thickness) provide a wall for the adhesive to rest against and helps prevent the adhesive from spreading.
- D. Remove the termination fastener and masking tape temporarily securing the diverter to the blade and remove the diverter from the blade.
- E. Lightly scuff sand the surface of the blade inside the masked area with 320 grit sandpaper. Clean the surface with isopropyl alcohol and a clean lint-free cloth and allow the surface to dry.
- F. Lightly clean the underside of the diverter (side to be bonded) using isopropyl alcohol and a clean lint-free cloth and allow to dry.

- G. Verify that the masking tape is still applied to the upper surface of the diverter to protect the segments.
- H. Mix the 3M™ EC-2216 gray adhesive per the manufacturer's instructions.
- I. Apply the mixed adhesive to the underside (bonding) surface of the diverter making sure the adhesive is smooth, evenly distributed, and free of voids.
- J. Apply the mixed adhesive to the blade within the masked off area making sure the adhesive is smooth, evenly distributed, and free of voids. Do not apply adhesive in the diverter terminating fastener hole.
- K. Locate the diverter on the blade. If the diverter uses a termination fastener, use a temporary fastener to locate the diverter. Firmly press the diverter into the adhesive beginning at the termination end of the diverter and working towards the diverter end. Make sure the diverter lays evenly along the surface. Remove the excess adhesive.
- L. Apply a layer of masking tape over the entire diverter length or apply small strips of masking tape across the diverter to maintain intimate contact to the blade while the adhesive cures.
- M. Cure the adhesive per the manufacturer's instructions. The temperature should be above 16°C (60°F) for proper curing.
- N. Once the adhesive has cured, remove all the masking tape used to secure the diverter to the blade. Replace the masking tape protecting the segments.

- M. Using 320 grit sandpaper, sand the adhesive on and around the diverter to remove any excess adhesive and to smooth the transition between the blade and the diverter.
- N. Remove the masking tape from the area around the diverter. Also remove the masking tape covering the surface of the diverter.
- O. Clean the diverter and the surrounding surface using isopropyl alcohol and a clean lint-free cloth.
- P. Prepare the diverter for applying fairing adhesive by masking over the diverter segments for protection. The tape should protect the segments and the spaces between the segments from being covered in adhesive. The forward-most diverter segment should remain uncovered by masking tape to allow the adhesive to create a smooth transition over the end of the diverter.
- Q. Mask off around the diverter using the diverter as a template. The spacing between the masking tape and the diverter edge should be approximately 0.25 inches.
- R. Using 320 grit sandpaper, lightly abrade the area between the diverter and the masking tape.
- S. Clean the sanded area using isopropyl alcohol and a clean lint-free cloth.
- T. Mix the 3M™ EC-2216 adhesive per the manufacturer's instructions.
- U. Apply the adhesive to the masked off area on the blade creating a smooth transition between the blade surface to the edges of the diverter. Remove any excess adhesive.

- V. Cure the adhesive per the manufacture's instructions. The temperature should be above 16°C (60°F) for proper curing.
- W. Remove all the masking tape around the diverter.
- X. Sand the adhesive with 320 grit sandpaper to remove any excess adhesive and ensure a smooth transition between the diverter and the blade.
- Y. Clean the diverter and the blade surface using isopropyl alcohol and a clean lint-free cloth.
- Z. Remove the masking tape covering the diverter segments. Visually inspect that the diverter segments are free of adhesive.
- aa. If using a diverter with a termination, install the termination fastener. Do not install the fastener with sealant.

Figure 3 provides an overview of a diverter adhered with EC-2216 epoxy.

Figure 4 provides a cross-section of the adhered diverter.

Allowable to cover portion of forward-most diverter segment with adhesive.

Do not cover other segments.

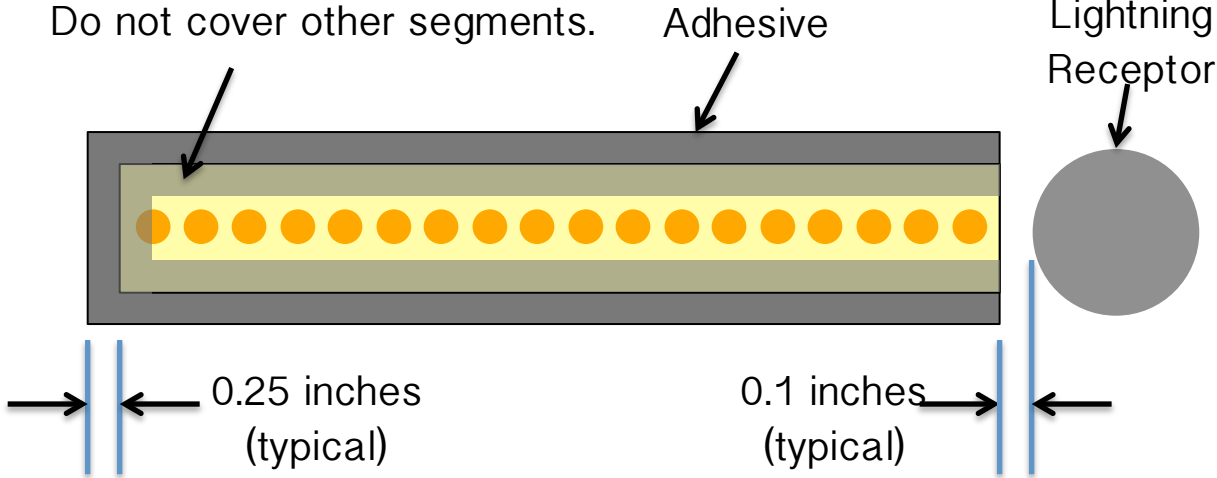


Figure 3 – Overview of diverter installation with EC-2216 Gray epoxy adhesive

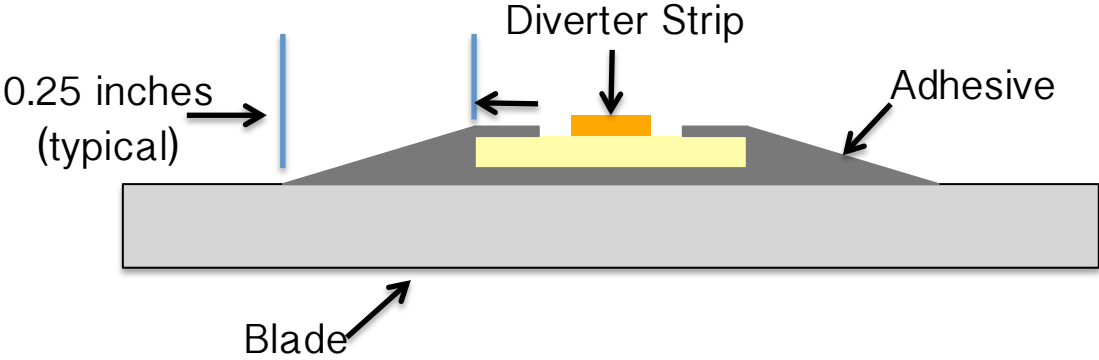


Figure 4 – Cross-section of installation with EC-2216 Gray epoxy adhesive