

# ULTRACONDUCTIVE COATING E1006760-61

## Ultraconductive Spray for Lightning Strike Protection

Application Guide – Guide d'Application

The UltraConductive Spray coating is designed as a single layer spray coating for zone 2A lightning strike protection and surfacing of composite parts. The coating is stored as a 2-part system (Part A: E1006760 + Part B: E1006761). The coating is sprayed with standard HVLP paint equipment, or disposable aerosol sprayer (Preval®), directly onto the tool/mold surface which has been prepared with release agent. After application of the coating, the coated tool is then heated to remove solvents, and to improve coating strength prior to prepreg application. Composite layup and cure procedures may then begin, including: composite prepreg application, prepreg repositioning (alternatively, fiber pre-form placement and VARTM), vacuum bagging, autoclave curing, composite part release and trimming.

### SPRAY COATING APPLICATION

#### SPRAYING PROCEDURE

- *Tool/Mold preparation*

Coat the tool surface with the desired release agent; follow manufacturer's directions regarding curing/drying. Mask off desired sections. Tool surface finish will dictate the surface quality (roughness) of the resulting coating.
- *Mixing large quantities for use in HVLP sprayers*
  - Mix part A and part B independently for 10 minutes on a paint shaker or with propeller mixer.
  - Ensure that the coatings appear well mixed, with no sediment at bottom of containers.
  - Add the appropriate weight of Part B into Part A (see page 1).
  - Mix the combined system on a paint shaker for at least 5 minutes.
- *Mixing small quantities for use in disposable aerosol sprayers*
  - Independently shake the small jars by hand for 3-5 minutes.
  - Ensure that the coatings appear well mixed, with no sediment at bottom of containers.
  - Pour the entire contents of the Part B jar into the Part A jar.
  - Shake the combined system by hand for 3 minutes.
- *Thinners*

No thinners are required. MEK may be needed if thinning is necessary.
- *Spray equipment*
  - HVLP
    - HVLP sprayer.
    - Filter.

- 30 psi air pressure at sprayer.
    - Adjust air and liquid metering until desired uniform spray coating is achieved.
    - Ensure adequate ventilation (paint booth) during spray coating.
  - Disposable aerosol sprayer
    - Aerosol propellant canister (Preval® is the only brand that has been successfully tested).
    - Ensure adequate ventilation (paint booth) during spray coating.
- *Spray coating thickness control: Use conventional wet comb gauge and/or tared overspray panels*
  - Note: For precise areal weight control, it is recommended to spray 2-3 practice coupons of varying areal weight. This practice will allow a more exact determination of the WET areal weight that gives the desired DRY / CURED areal weight. For example, Table 1 gives a suggested WET areal weight of 180 gsm for a DRY / CURED areal weight of 140 gsm.
- *Spray application*
  - HVLP
    - Pour the mixture into the HVLP gun cup through a filter.
    - Spray using 50% overlapping passes and alternating spray patterns.
    - Allow spray coating to flash off between passes – typically about 2 minutes.
    - Spray to the desired wet comb thickness.
    - Clean HVLP spray gun after use.
  - Preval® application
    - Remove the cap on the bottle containing mixed part A and part B.
    - Attach the propellant canister.
    - Spray using 50% overlapping passes and alternating spray patterns.
    - Allow spray coating to flash off between passes – typically about 2 minutes.
    - Spray to the desired wet comb thickness.
- **Important Note:** Spray the UltraConductive in a “wet spray” condition such that the coating appears wet and the solvent is seen flashing off within moments of spraying. If no solvent is seen flashing off, the coating has been sprayed too dry (“dry spray”); poor electrical conductivity will result. A “dry sprayed” coating will appear darker and could have small spheres of material present on the coating.

## **DRYING**

- Temperature: Preheat oven to approximately 100°C (212°F).
- Time: Place the freshly coated tool/mold into the oven for 35 ± 5 minutes.
  - The tool surface should reach 95°C (203°F) for 10-15 minutes.

- These times are based on a 1/8" to 1/4" thick aluminum tool/mold. Times vary for tools/molds having different thermal masses.
- Remove the tool/mold from the oven. Allow to cool before applying composite prepreg.

## **CARBON PREPREG LAYUP AND CURING**

- Prepreg fabric or tape may be placed directly onto the UltraConductive pre-baked coating.
- If needed, the prepreg can be gently removed and repositioned without damaging the UltraConductive coating.
- The part can undergo standard carbon prepreg layup, rework, vacuum bagging and autoclave curing procedures.
- Once the composite is cured, the part will remove easily from the release agent coated tool/mold surface.

## **PAINTING**

- Compatible with existing primers and topcoats, including PPG Desoto® and PPG Desothane® products.
- Light scuffing (240 grit) and surface wipe down of sanding dust are recommended prior to paint application.

## **SPRAY APPLICATION GUIDE**

### 1. Bare Mold (Tool) Preparation

- a. Apply release agent (Frekote®, WaterWorks®, etc).



Bare Mold



Release Agent

- b. Mask off areas that will not be spray coated.



Masked Mold

## 2. Spray the UltraConductive Coating

- a. Silver in color.
- b. Standard HVLP equipment or Preval® disposable sprayer.
- c. Wet spray apply: solvent seen flashing off within 5 - 30 seconds.
- d. HVLP pressure: 2 bar (30 psi).
- e. HVLP stand-off distance: 15 – 25 cm (6-10 in).
- f. Sweeping passes with 50% overlap.



Spray UltraConductive

## 3. Drying

- a. Temperature: Preheat oven to approximately 100°C (212°F).
- b. Place the wet coated tool into the oven for 35 ± 5 minutes.
- c. The soak temperature and time should be at least 95°C (203°F) and 10-15 minutes, respectively.
- d. Remove the tool from the oven.
- e. Allow to cool before applying composite prepreg.



Heat Dry/ Pre-Bake

## 4. Carbon Prepreg Layup & Rework

- a. Carbon prepreg can be repositioned (reworked) without damage to UltraConductive Coatings.



Composite Prepreg Layup

## 5. Vacuum Bag & Autoclave Cure

- a. Soak temperature of 120-180° C for ≥ 30 minutes.
- b. Autoclave pressures between

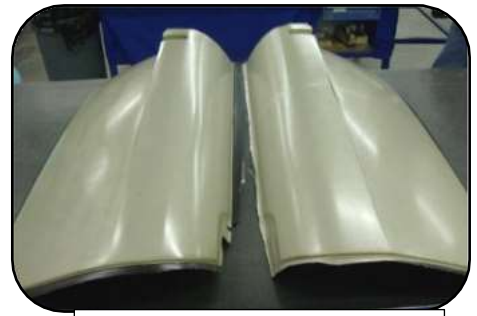


Vacuum Bag



Vacuum Bag

6. Finished Part



Finished Parts

7. Reusable Mold (Tool)



Reusable mold surface

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**TABLE 1: TECHNICAL SPECIFICATIONS**

	ULTRACONDUCTIVE E1006760 PART A	ULTRACONDUCTIVE E1006761 PART B
Name:	E1006760	E1006761
Appearance:	Silver	Yellow
Material:	Epoxy resin solution	Curative solution

Storage:	4 – 30°C (40 - 86°F)	4 – 30°C (40 - 86°F)
VOC	669 g/L	519 g/L
Mix ratio:	Part A 6.3 grams : Part B 1.0 grams	
Intended use:	Spray apply directly onto release treated tool surface (outside mold line OML), before layup of prepreg or resin vacuum infusion. Co-cures with composite layers.	
Target wet thickness (approximate):	100 microns = 180 gsm WET = 140 gsm DRY / CURED 140 microns = 240 gsm WET = 190 gsm DRY / CURED	
Drying temperature:	Surface temperature of 95°C (203°F) 10-15 min soak time	
Cure temperature:	120–180°C (250-350°F) 1-2 hour soak time Autoclave pressure 3 - 7 bar (40 – 100 psi)	
Cured sheet resistance:	$\leq 15 \text{ m}\Omega / \blacksquare @ 140 \text{ gsm (0.029 psf)}$ $\leq 10 \text{ m}\Omega / \blacksquare @ 190 \text{ gsm (0.039 psf)}$	



## Storage

- Ship and store Part A and Part B separately at 4 – 30°C (40 - 86°F) or below in a moisture proof container.
- Note: Excess mixed coating (Part A and Part B mixed together) can be stored at -12 to -7°C (10 to 20°F) in a sealed container for up to 6 months.
- Work life of combined system (Part A and Part B mixed together) in a sealed container is approximately 90 days at room temperature.

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