



NC-05-003

Thermawing Deice Heater Installation Guide

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Revisions

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1.0 INTRODUCTION

This document describes the Installation of the Kelly Aerospace Thermal Systems Thermawing Deice system's deicer heaters on aircraft flight surfaces. The Thermawing system is designed to remove ice from the flight surfaces of an aircraft. The Thermawing deice system is an electrically heated system with dedicated wiring and an electronic controller. The Thermawing Deice System is intended to remove ice during inadvertent flight into icing conditions. The system is not intended for flight into known icing.

1.1 DESCRIPTION

Electrically actuated deice systems have been in service on light general aviation aircraft for many years. This system is similar to other systems currently in service. The system employs deicer heaters that are bonded to the leading edge of the horizontal flight surfaces including the wings and horizontal stabilizers. The deice heaters contain an electrically resistive material which when electrically energized creates a temperature rise in the deice heater.

The deice heaters are a composite construction consisting of a protective polymer outer layer which sandwiches a graphite heating element and a parting strip heating element. The layers are held together by acrylic adhesive layers. The deice heaters are temperature cured under a vacuum. The resulting heater is a monolithic construction. The deice heaters are bonded to the leading edge of the aircraft flight surfaces using thermal setting adhesive.

1.2 SCOPE

This document described the Engineering Requirements for Kelly Aerospace Thermal Systems Thermawing Deice Heaters.

1.3 APPLICABLE DOCUMENTS

Applicable Manufacturers Material Safety Data Sheets (MSDS)

Applicable Kelly Aerospace Thermal Systems Technologies Deicer Heater Drawings.

2.0 SAFETY INSTRUCTIONS

2.1 SOLVENT

Adhesive and solvent vapors are toxic and flammable. Use only with proper ventilation. Avoid prolonged breathing of vapors. Excessive exposure may cause dizziness or nausea. Seek fresh air immediately.

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Follow precautions listed on the manufacturers Material Safety Data Sheets (MSDS) sheets for health and safety considerations. The manufacturers Material Safety Data Sheets supercede this document regarding environmental information as well as handling, application, removal, and disposal procedures.

3.0 MATERIALS AND EQUIPMENT

Cleaning solvent: Toluene or equivalent
4" Rubber or acrylic roller
1" masking tape
Lint free cloths
Straight edge
Work bench or table longer than deicer heater
Carpenter's chalk line
Razor blade or Utility Knife
Awl or Pick
Standard Mechanics Tools
Clear coat paint and hardener (any vendor)
Sharpie or equivalent

4.0 PREPERATION AND INSTALLATION

4.1 DEICER HEATER PREPERATION

Locate the centerline marks on the deicer heaters. The centerline of the heater is in the center of the parting strip. The parting strip is a 5/8" wide slightly raised portion near the physical center of the deicer heater that extends almost the entire length of the heater. Mark the centerline on the backside of the deicer heater by drawing a line the entire length of the heater. Do not press hard on the heater or you will see the line on the outward surface. Trace the centerline with an ink marker.

Note: The marking of the centerlines is a critical step in assuring de-icer installation is positioned correctly.

Mark the locations of the electrical connections per the applicable installation drawing. Place the deicer heater in position on the leading edge of the flight surface to verify alignment of the electrical connections. Press on the copper strip to make an impression of the stud location into the copper. This will give you alignment confirmation and location of adhesive removal to expose the copper strip.

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With a sharp razor or utility knife score the deicer heater backing at the electrical connection location. Remove the white backing material to expose the copper conductor. The fiberglass thickness removed is .004". Take care not to damage the copper conductor or cut into the deicer heater. Refer to the applicable installation drawing for additional information.

4.2 FLIGHT SURFACE PREPERATION

Mark the centerline on the leading edge of the flight surface per the applicable installation drawing. Refer to Columbia leading edge templates for exact position of centerline. Snap a chalk line or draw a line with a sharpie and a metal ruler between the leading edge centerline marks. Trace over the chalk line with an ink marker.

Note: The marking of the centerlines is a critical step in assuring de-icer installation is positioned correctly.

Dry fit the heater per the applicable installation drawing. Align the heater on the marked centerline. Using 1" wide masking tape, tape off the leading edge 1" away from the edges of the deicer heater. Mark the centerline on the masking tape for future reference.

Remove all waxes from the surface of the leading edge to prepare for application of the adhesive. If the surface is glossy or smooth, lightly scuff the surface with scotch-brite to provide a 'tooth' for the adhesive.

If the previously marked centerline is no longer visible, remark the centerline to aid in the deicer heater installation.

At this point sand the surface of the brass studs to insure a smooth surface and clean contact area for the copper power strip.

Verify the threaded area is clean and clear of obstruction. On occasion a tap may be used to clear out debris from threaded area.

4.3 HEATER APPLICATION TO LEADING EDGE

NOTE: The deicer heater installation requires two installers working together to minimize entrapped air and provide a smooth heater surface after installation.

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CAUTION: Keep the adhesive side of deicer heater from touching the leading edge of the aircraft until ready to install the heater.

Position the de-icer heater so that deicer heater centerline and leading edge centerline match.

Pull the deicer heater tight and bring the center into contact with the leading edge of the aircraft while aligning the marked center lines. Use a rubber roller to bond the deicer to the leading edge working from the center toward the inboard and outboard ends of the heater. Press the deicer onto the leading edge and roll firmly with the roller to eliminate trapped air and provide good adhesion.

NOTE: Use a heat gun with a rating of at least 1200 watts.

Begin working above the centerline of the heater. Hold the deicer back to reveal centerline bond. Starting at the center of the deicer heater, heat up the adhesive with a heat gun on the deicer heater and leading edge together in an area 3-4" wide making sure to heat up the fold between de-icer and leading edge. Using a slow movement of the heat gun move outboard as pressure is applied to the heater.

Roll the deicer heater onto the upper leading edge, starting at the bond line in the center and moving outward toward the inboard and outboard edges. Apply tension to the deicer heater to prevent wrinkling or entrapping air as the heater contacts the leading edge. Press the deicer onto the leading edge and roll firmly with the roller to eliminate trapped air and provide good adhesion.

Repeat until the upper surface of the deicer heater is bonded to leading edge.

Continue working below the centerline hold the deicer back to reveal centerline bond. Starting at the center of the deicer heater, heat the adhesive on the deicer heater and leading edge in an area 3-4" wide making sure to heat the fold between de-icer and leading edge.

Roll the deicer heater onto the lower leading edge, starting at the bond line in the center and moving outward toward the inboard and outboard edges. Apply tension to the deicer heater to prevent wrinkling or entrapping air as the heater

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contacts the leading edge. Press the deicer onto the leading edge and roll firmly with the roller to eliminate trapped air and provide good adhesion.

Repeat until the lower surface of the deicer heater is bonded to leading edge.

Roll the deicer heater edges with a roller to assure edge adhesion. If the deicer heater edges are puckered or not adhered, reheat the edges and roll firmly.

Locate the electrical connection areas on the deicer heater. Using an awl or pick carefully make a hole in the deicer heater located in the center of the threaded electrical connection. Insert the proper screw into the hole and tighten. Screws should be flush with the wing surface.

Once all the heaters are installed sealing the edges with a clear coat paint is required. Tape along the edges of the heater on the wing surface with masking tape separated from the heater edges by 1/16" space. Do the same on the heater surface. Brush on a clear coat to seal the ends of the heater. A two part clear coat will cure to the touch in approximately 1 hour depending of vendor.

5.0 INSPECTION

Inspect the deice heaters during 100hr and annual inspections. Refer to maintenance manual section 6.7 for inspection criteria and limits.

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