# STIC Note

## Window Treatments

### BACKGROUND/PROBLEM

Maintaining visibility through windows on Coast Guard (CG) vessels is essential for operations. Visibility is reduced when exhaling warm moisture-filled air into an enclosed area creates condensation on the windows. This issue is particularly relevant in cold environments, as moisture in the air will rapidly cool and condense. Additionally, sea spray can freeze on the outside of windows, further reducing visibility. Manually cleaning windows is time-consuming and not always feasible. The CG Research & Development Center (RDC) Science and Technology Innovation Center (STIC) researched commercially available technologies that can increase visibility through windows and reduce the efforts of the crew needed to keep windows clear. Two methods were considered to decrease fogging and increase visibility: 1) electronically heated window film and 2) antifogging sprays, pastes, and wipes.

### METHODS

The electrically heated window film was purchased from SEACLEAR industries and installed on the bridge windows aboard CGC POLAR STAR (Figure 1). The film was 26'' x 49'' and operates at 220 VAC; the maximum available size is 26'' x 60''. Additionally, transformers were purchased and installed aboard CGC POLAR STAR to make the SEACLEAR system compatible with the cutter. The transformers were purchased at a unit price of $388 and the SEACLEAR films were purchased at a unit price of $588.

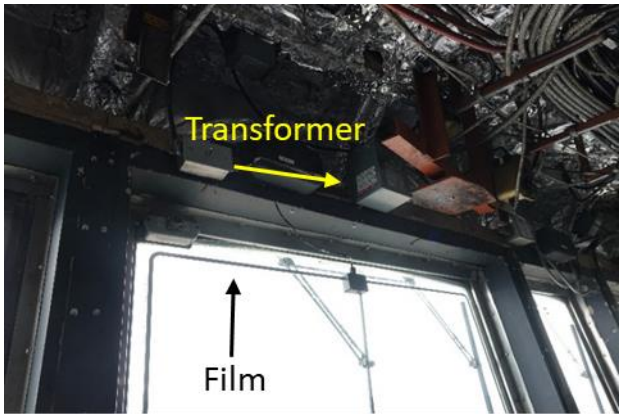


Figure 1. The SEACLEAR film (black) and a transformer (yellow) installed on CGC POLAR STAR. (Source: USCG)

Antifogging products come in various forms, such as pastes, sprays, and wipes. To determine which form was best suited for CG usage, antifogging products from each of these major categories were purchased: three pastes (Cat Crap, Zooke, and Z-Clear), two sprays (Optix 55 and Quick Sheen), and two wipes (Parker's Perfect and LifeArt). These seven products were tested across two platforms: the windows in the aloft conn aboard the POLAR STAR and the cabin windows aboard a 29' boat kept at the RDC. A humidifier was used in the 29' boat to simulate a humid environment.

### EVALUATION

CGC POLAR STAR tested the SEACLEAR film system for functionality while away. CGC POLAR STAR was able to succesfully increase the temperature of the windows (Figure 2), which does prevent fogging and icing.

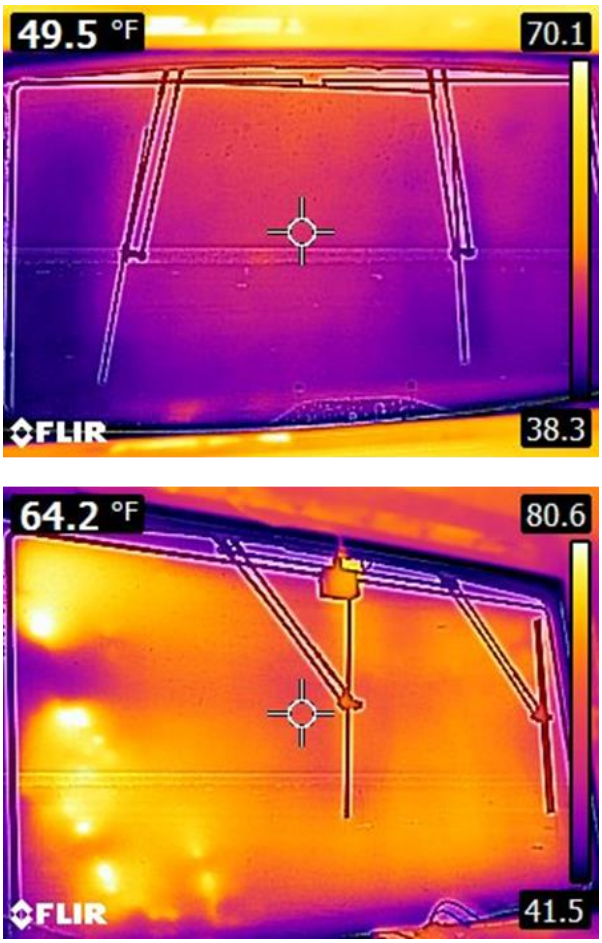


Figure 2. FLIR images of the SEACLEAR film turned off (top) and turned on (bottom). (Source: USCG)

CGC POLAR STAR and the STIC agreed that the Optix 55 spray performed the best to prevent fogging when temperatures were above freezing. STIC also found that Quick Sheen and LifeArt prevented fogging adequtely (Figure 3). However, STIC tested the antifogging products in temperatures below 20°F where water from the humidifer froze on the windows, but none of the antifogging products prevented the freezing.


Figure 3. Antifogging product testing on the 29' before (top) and after (bottom) the humidifier was turned on. From left to right the products are: (1) LifeArt, (2) Parker's Perfect, (3) Quick Sheen, (4) Optix 55, (5) Zooke, (6) Z-clear, and (7) a control where no product was used. (Source: USCG)

## CONCLUSIONS

SEACLEAR technology was successfully installed and operated aboard CGC POLAR STAR. This product is recommended for use by the Coast Guard.

The Optix 55 antifogging spray received positive feedback from both units that tested the product. It is recommended that this product be used when temperatures are above freezing.