



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

August 31, 2017

STRUCTURES

Group Chairman's Factual Report

WPR17LA031

**Attachment 1 – PPG Aerospace Transparencies Report
(7 pages)**



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PPG Aerospace Transparencies

Failure Analysis Report

The information herein is based on the best available data and practices known to PPG Industries at the present time, but PPG Industries does not warrant the performance, results, accuracy or comprehensiveness of such information.



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September 1, 2017

TO: Clint Crookshanks
Aerospace Engineer (Structures)
National Transportation Safety Board

RE: Evaluation of a Left Hand Main Windshield for Piper; PPG Part Number 45213; S/N 7-H-1-2-147

Introduction and Background

The subject windshield was received for investigation of an event where the windshield fractured during flight and departed the airplane. Correspondence indicates that the window was installed on a Piper PA-31T and failed on December 5, 2016 during cruise at 23,000 feet. The windshield was received by PPG Huntsville in January 2017. PPG Aerospace completed manufacture of the windshield in January 1977.

Summary of Key Findings

- Unknown if failure origin is located in heated zone or not.
- Unknown if inboard or outboard lite broke first.
- Both LH and RH windshields available for review.
 - RH windshield (1-H-8-16-310 – Manufactured August 16, 1981) received intact.
 - Both had visible warped inner retainers – likely caused by application of heat via heat gun during removal.
 - Inspection of RH windshield revealed peel chip visible along top edge of window – 14.5” from center post, 5/8” from window edge (see Figure F). Peel chips are created by local excessive adhesion at the glass surface from contraction of vinyl during operation.
- Per glass remnants left along periphery, center-aft area of LH window is suspect for failure origin location.
- Corrosion of metal insert visible on both LH and RH windows around entire periphery. Heavy areas evident where vinyl retainer was no longer bonded on both inboard and outboard sides (see Figure E).



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Conclusion

Due to the windshield fracturing and departing the airplane, minimal glass remnants were left to analyze to determine root cause of the event. The failure origin occurred around the center-aft area of the window, but it was undeterminable if it was located in the heated zone or not, or which ply of the window broke first. Heavy corrosion of the metal insert was visible, and the vinyl retainer was no longer bonded on both inboard and outboard sides. At this point, those areas lose their structural integrity, and there is no way for the operator to inspect this area as it would be covered during installation. While exact failure location is unknown, these factors likely contributed to the ultimate failure of the window.

Reported by:

[REDACTED]

Ms. Connie Griesemer
Product Support Engineer



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Detailed Failure Analysis

Figure A: Outboard overall view of the LH windshield as received.

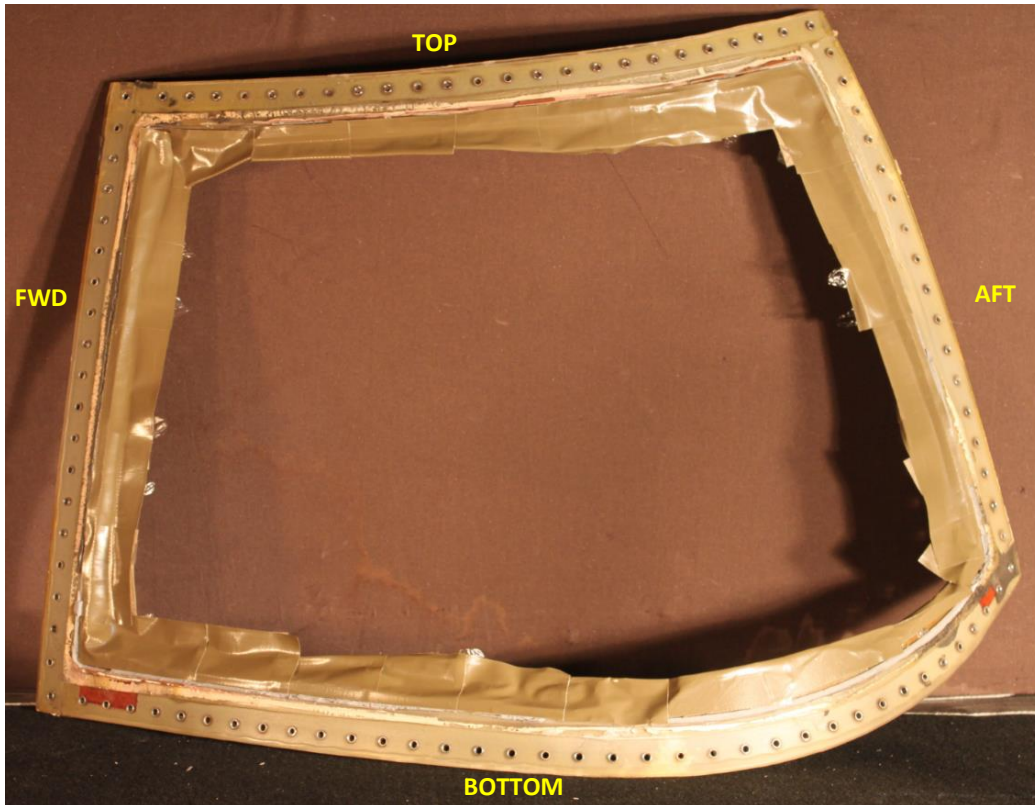


Figure A: Overall View - LH

Figure B: Trademark label including the part number and serial number.



Figure B: Trademark Label - LH

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Detailed Failure Analysis (continued)

Figure C: Outboard overall view of the RH windshield as received.



Figure C: Overall View - RH

Figure D: Trademark label including the part number and serial number.



Figure D: Trademark Label - RH



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Detailed Failure Analysis (continued)

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Figure E: Corroded metal insert of LH windshield.



Figure E: LH Windshield Corroded Insert

Figure F: Outboard view of peel chip in RH windshield.

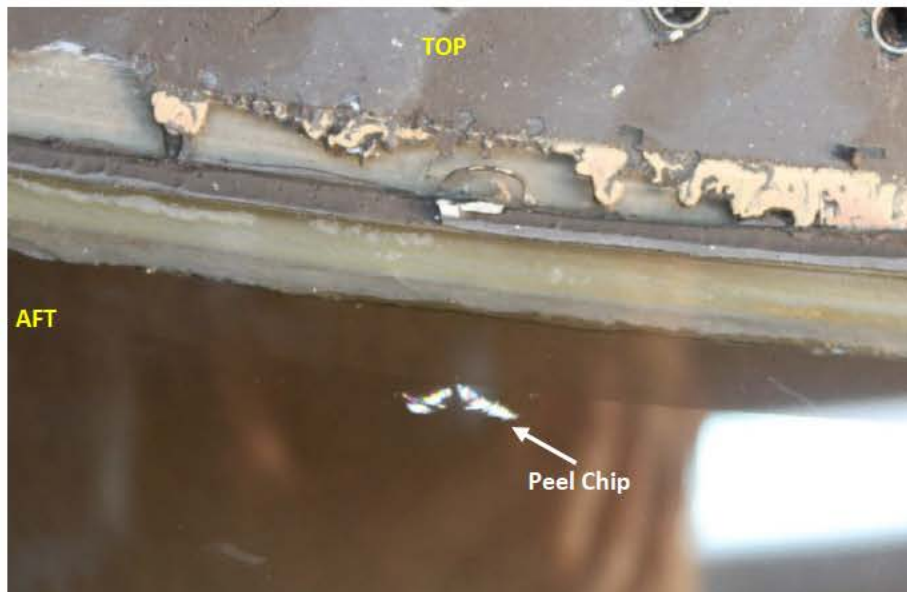


Figure F: RH Windshield Peel Chip



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Figure G: Window Cross-section.

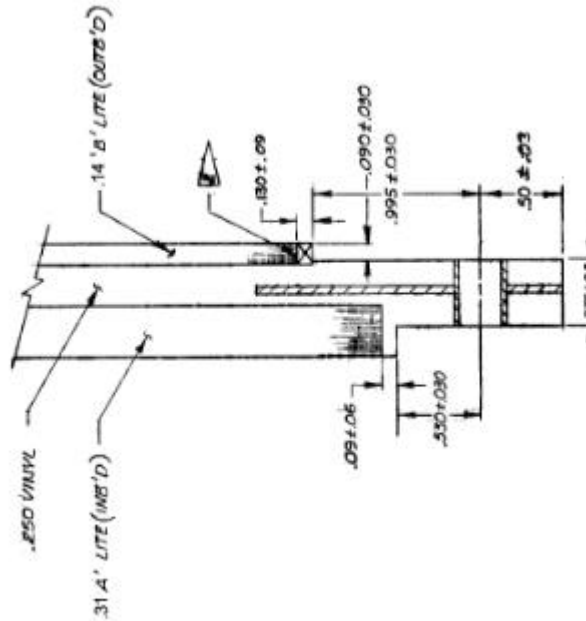


Figure G: Window Cross-section