



Use of Non-Certified Equipment on Cockpit Windows

The use of non-certified equipment, like sunshades or suction cup mounted devices, on the inner surface of cockpit windows may create risks to the windows integrity and therefore aircraft safety.

This document highlights the risks associated with non-certified equipment used on cockpit windows. It provides operational recommendations to flight crews and recalls that certified tablet holders, mounted on the windows' frame, are available as a safe alternative.

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CASE STUDY

Event Description

An A320 aircraft was in cruise when the **ANTI ICE R WINDOW** ECAM alert triggered. The flight crew had previously installed a sunshade, purchased online by one crew member, on the right sliding cockpit window.

The flight crew did not observe any immediate problems on the right windows after the ECAM alert triggering. However, after a short period, the right sliding window became hot and started to become distorted.

The flight crew checked the **COCKPIT WINDSHIELD / WINDOW CRACKED** and **COCKPIT WINDSHIELD / WINDOW ARCING** procedures from the QRH, and decided to initiate a descent and perform a diversion. They pulled the circuit breaker connected to that window (*ANTI-ICE/WINDOWS R*).

During final approach, when passing through 1 000 ft, the flight crew heard a crack in the right window. They landed safely at the diversion airport.

Postflight inspection found severe damage to the right sliding window. The sunshade that was covering the window also displayed heat damage (**fig.1**).



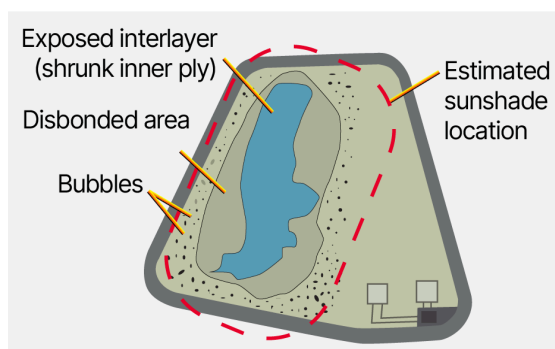
(fig.1) Damage observed on the RH sliding window and on the sunshade (pictures from the Operator)

Event Analysis

The damaged window was removed from the aircraft and sent to the windows manufacturer for investigation.

Damage to inner ply caused by excessive heat

Detailed inspection by the manufacturer revealed that "the window experienced excessive temperature at the inner ply. The excessive temperatures had caused thermal relaxation of the inner ply to such an extent that the inner ply had fully relaxed back to expose the interlayer over a large area."



(fig.2) Mapping of the damage of the sliding window

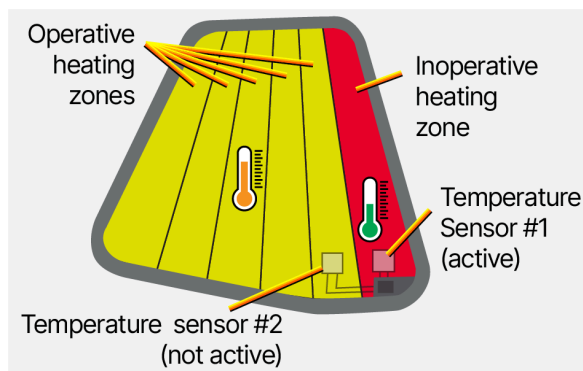
Outer ply was not damaged

The windows manufacturer also described that "Non-destructive thickness measurements taken of the outer ply in conjunction with visual assessment concluded this ply to be undamaged. As such the window can be considered to remain failsafe." The structural integrity of the window was therefore still maintained.

First contributor to the overheat: A faulty window heating system

The heating film adjacent to the active^(*) temperature sensor was found to be inoperative. This failure on this type of window can cause the window heating system to incorrectly estimate the temperature of the window, resulting in an increase in temperature of the window areas with a functional heating film.

^(*) On this type of window only one sensor is active at a time. The second sensor can be activated by maintenance if the other sensor fails.



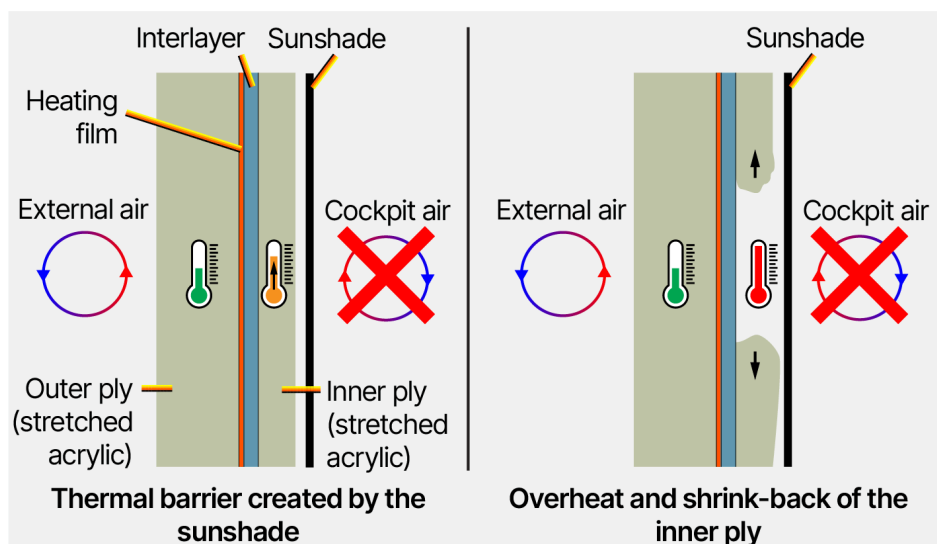
(fig.3) An inoperative heating zone caused a dysfunction of the window temperature regulation

Second Contributor to the overheat: Thermal barrier caused by the sunshade

The sunshade applied on the window acted as a thermal barrier, preventing natural cooling of the inner side of the window by convection of the cabin air on the window surface **(fig.4)**.

Shrink-back effect on the inner ply

The combination of the overheating, caused by the faulty heating system with the thermal barrier effect created by the sunshade resulted in the temperature of the inner ply to go above the acrylic material's glass transition temperature. This caused the inner ply to be affected by a shrink-back effect causing the damage.



(fig.4) The sunshade prevented the natural cooling by the cockpit air circulation, causing the overheating and shrink back of the inner ply



INFORMATION

More information about the shrink-back effect caused by high temperature on a stretched-acrylic window can be found in the "[Under the spotlights](#)" Safety first article published in September 2024.

COCKPIT WINDOWS

Glass or stretched acrylic

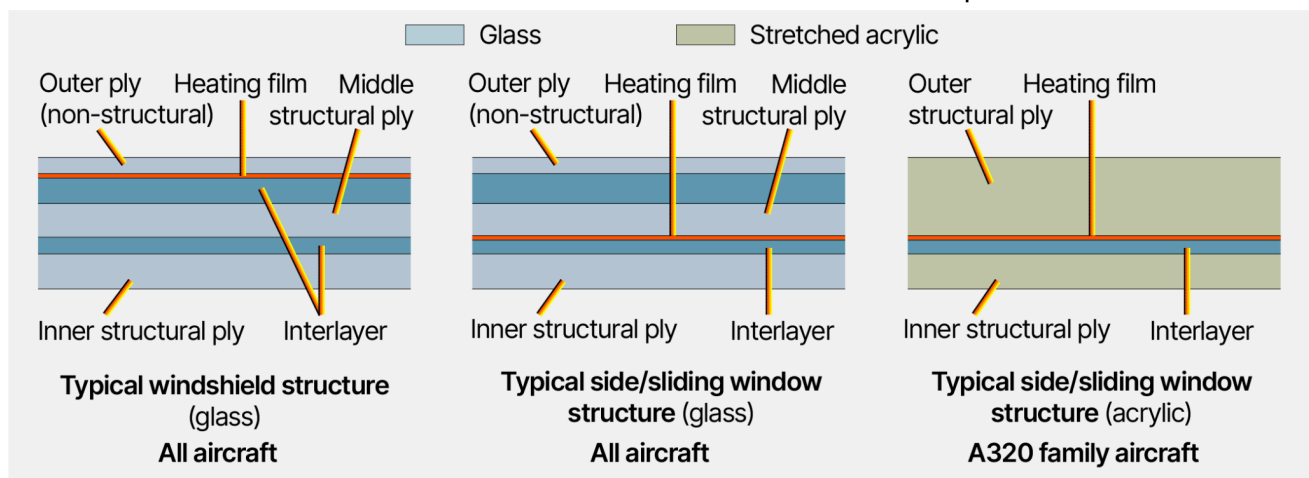
Cockpit windshields of all Airbus aircraft are made of glass. Cockpit side windows of A220, A300, A310, A330, A340, A350, and A380 aircraft are also made of glass, with the exception of A320 family aircraft that can have side windows made of glass or of stretched acrylic.

Typical structure

Regardless of the material they are made of, two structural plies ensure the integrity of the window thanks to a fail-safe concept: each structural ply is able to sustain two times the maximum differential pressure on its own. A supplementary protective outer ply is used on glass windows to protect the structural plies against FOD damage (fig.5).

A heating film provides anti-ice/anti-fog capability to the window. Its location may change depending on the type of window. ■

(fig.5) Typical cockpit windows structure



RISKS OF USING NON-CERTIFIED EQUIPMENT ON COCKPIT WINDOWS

Installation of equipment preventing natural cooling of the windows may cause damage

The event described earlier in this article illustrates the thermal barrier effect of a sunshade. However, suction cups used to attach different types of equipment on the windows can also act as a thermal barrier. This can affect the local cooling of the covered area. When combined with a loss of the temperature regulation of a window, this can cause significant damage to the window (**fig.6**).



(fig.6) Example of damage caused by a loss of the temperature regulation of an acrylic sliding window combined with the use of a tablet mount equipped with two suction cups (pictures from the Operator)

Possible damage on glass windows

Even if glass windows are not at risk of shrinking, equipment acting as a thermal barrier still creates a local overheat that may have an impact on the service life of the window. Overheat can cause bubbling of the interlayer next to the heating film, causing damage to the window heating system or affecting visibility.

Risk of fall

Suction cups may not be strong enough to maintain the equipment in place in the case of vibrations. Equipment falling from a cockpit window may obstruct cockpit controls and affect the safety of the flight, particularly in critical flight phases like takeoff and landing.

Risk of interference with cockpit operations

Non-certified equipment used on cockpit windows may affect visibility and cockpit operations, like, for example, the use of the oxygen mask, roller blind operation, or accessibility to emergency equipment. It can also affect the opening of a sliding window during an emergency evacuation. ■

OPERATIONAL CONSIDERATIONS

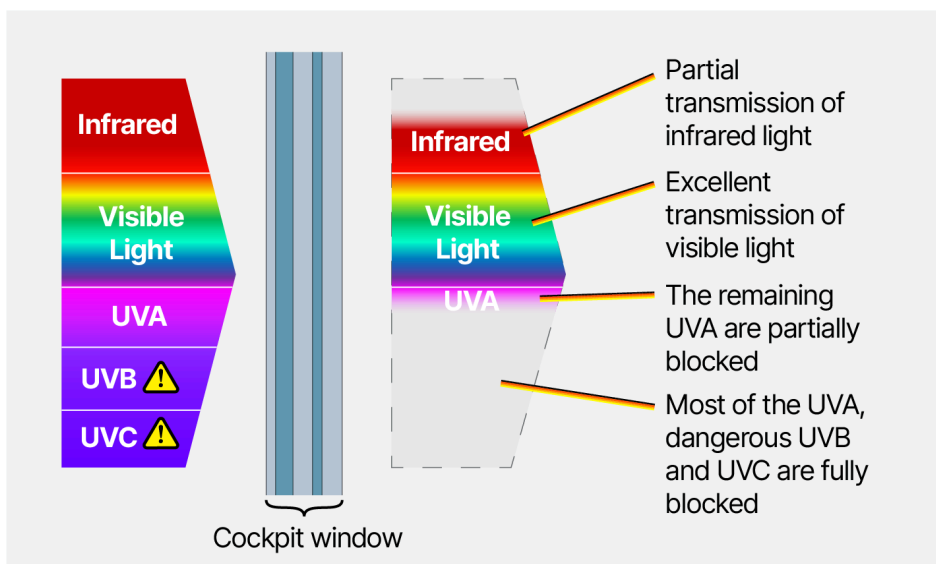
In general, flight crews should avoid attaching any equipment to the inner surface of the cockpit windows. This practice is advised to prevent the risks previously described.



DID YOU KNOW _____

No requirement for additional UV protection

Both glass and acrylic cockpit windows protect the flight crew against the most dangerous Ultra-Violet (UV) radiation (**fig.7**). There is therefore no requirement to use additional equipment to protect flight crew members against UV radiation.

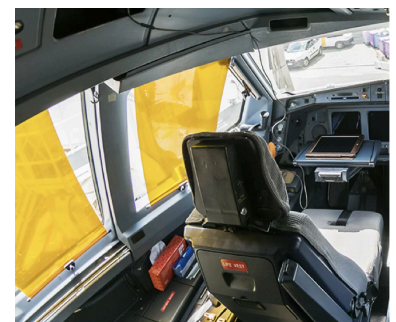


(fig.7) Radiation protection provided by cockpit windows

Use sun visors and roller blinds

Flight crews should use the sun visors and roller blinds installed in the cockpit. They reduce the quantity of light entering the cockpit, while still enabling sufficient cooling of the window's inner side. Sun visors and roller blinds are designed so that their filtering capability enables direct vision of the sun through them.

Due to the complex shape of the cockpit windows, sun visors and roller blinds cannot cover their entire surface. This results in sunlight leaks inside the cockpit. If the protection against excessive light provided by the existing devices is considered to not be sufficient, flight crew can consider using sunglasses as an additional safeguard. However, they should make sure to use the appropriate type of sunglasses to prevent reducing the visibility of the flight instruments. ■



(fig.8) Roller blinds of an A320 family aircraft



(fig.9) Sun visors of an A350 aircraft

AVAILABLE ENHANCEMENTS

Certified cockpit mounts for tablets are available

Airbus developed specific cockpit mounts for A320 family, A330, A340, A350 and A380 aircraft. These mounts can be installed as an option on newly built aircraft or in retrofit on in-service aircraft **(fig.10)**. They are **attached to the window's frame** and were tested to safely hold tablets in position in every condition. They are EASA and FAA approved, and designed taking into account their integration in the cockpit, and ensuring compatibility with normal and emergency operations (use of oxygen masks, accessibility to flashlight, emergency evacuation, etc...).

Operators wishing to install these mounts should contact their Customer Support Director.

STC alternatives

Supplemental Type Certificate (STC) alternative products are also available on the market, providing approved solutions **attached to the window's frame** that can safely support tablets and prevent damage to the windows. ■



(fig.10) Example of a cockpit mount for tablets recommended as an option on A320 family aircraft

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**With thanks to Josep
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The use of non-certified equipment, like sunshades or suction cup mounted devices, on the inner surface of cockpit windows may create a risk to aircraft safety and window integrity. These items can act as a thermal barrier, resulting in excessive heat and possibly causing severe damage on stretched-acrylic windows. These effects can reduce the service life of glass windows. In addition, non-certified equipment may interfere with essential cockpit operations and reduce visibility, or it may fall and interfere with flight controls.

To ensure safety, flight crews should avoid attaching any equipment to the inner surface of the cockpit windows. The flight crew should instead rely on certified solutions like the sun visors and roller blinds already installed in the cockpit. For tablet use, certified cockpit mounts are available from Airbus and through Supplemental Type Certificate (STC) alternatives. These approved mounts are designed to be attached securely to the window frame, preventing window damage and ensuring compatibility with normal and emergency operations.

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