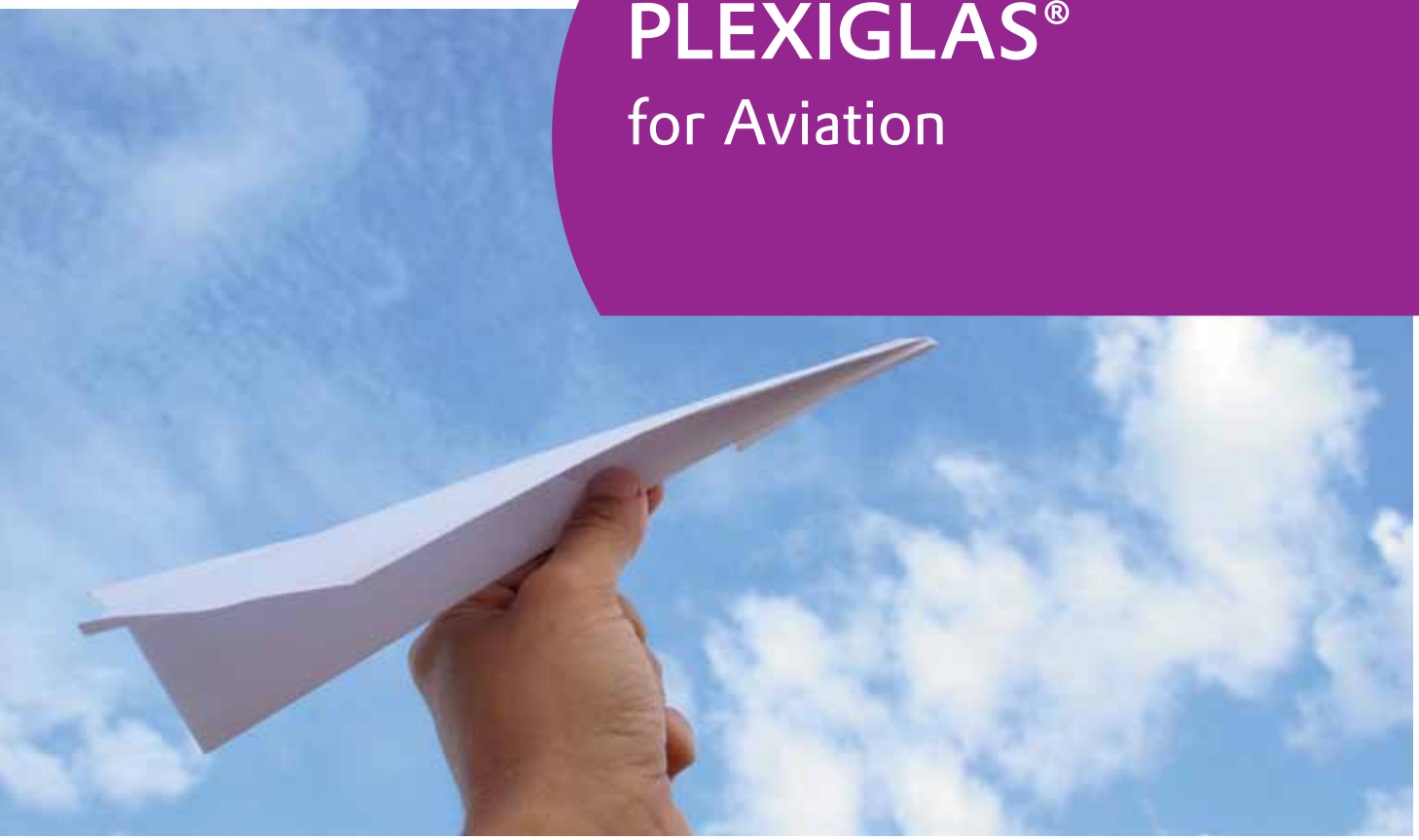
EVONIK INDUSTRIES

PLEXIGLAS®
for Aviation



PLEXIGLAS®

Evonik. Power to create.

Discover infinite space

The world is growing closer together. People travel to another continent on a business trip, and to another city for a shopping spree. Global air traffic is on the increase, as is the number of aircraft that take off every day.

Aircraft construction materials have always had to meet the most stringent requirements, whether for huge commercial airliners or small sailplanes. They must withstand extremes of temperature, protect against UV radiation, be tough and weather-resistant. On top of all that, they have to weigh as little as possible. One important target is to cut fuel consumption by reducing weight. PLEXIGLAS® aircraft construction materials help to promote developments in all these fields.

We at Evonik are among the world's leading suppliers of PMMA and acrylic products, invented 1933 by Dr. Otto Röhm and his team. The products we market under the PLEXIGLAS® brand (and under the ACRYLITE® brand in the Americas), as well as our know-how, are available everywhere, either directly via our global distribution network, via regional distributors or qualified fabricators.

Reach for the sky with Evonik!

A specialized material that is reliable and durable

PLEXIGLAS® is one of the world's highest-quality and most versatile plastics, and is also one of the most environmentally friendly. It can be manufactured with many different functional properties and surfaces: highly light-transmitting, light-diffusing, light-focusing, sight-screening, heat-reflective, heat-shielding, heat-resistant, heat-insulating, noise-reflecting and scratch-resistant.

It weighs only about half as much as glass, with eleven times its impact strength, making it the ideal choice for aircraft construction. Another benefit is the material's machining and fabrication behavior: it is tough during handling and installation, can be routed, sawed and polished, and is easy to form. In addition, it is easy-care and highly suitable for permanent use. PLEXIGLAS® is also a good choice when it comes to safety; it is non-toxic in the event of fire. It forms no acutely toxic smoke gases and burns with almost no smoke. Escape and rescue routes thus remain clearly visible.

PLEXIGLAS® aircraft materials are available in various sizes and thicknesses with very close thickness tolerances. The material offers maximum – and enduring – optical clarity. It is highly transparent and remains just as clear as on day one for many years to come. There is no yellowing or embrittlement. What is more, PLEXIGLAS® offers excellent resistance to weathering and aging.

PLEXIGLAS®
lightweight material for a clear view

Just climb in and take off – aircraft have long become an everyday means of transport. Yet the fascination of flying still remains. So it comes as no surprise that a growing number of increasingly small and lightweight aircraft are taking to the skies, not just large passenger planes.

Despite their low weight, the materials have to withstand various types of stress. Owing to their lightness and impact strength, PLEXIGLAS® aircraft materials are ideal for ultralight aircraft and sailplanes. However, lightweight construction is also important in megaliners. The fewer kilograms need to be lifted into the air, the less fuel the aircraft consume. That saves money and reduces their environmental impact.

Large passenger planes and sailplanes alike rely on a perfectly clear view. PLEXIGLAS® aircraft materials are the best choice. They are available in clear grades or transparent colors, and comply with stringent optical standards for aircraft construction, which allow no optical distortions in the material. And PLEXIGLAS® retains its clarity in the long term, being extremely resistant to weathering and aging.

PLEXIGLAS®
the UV radiation shield

Although sunlight makes plants flourish and gives us warmth, it also contains harmful UV radiation. This may be detrimental to human health and attacks plastics, causing them to yellow and grow brittle. PLEXIGLAS® is immune to such change. This is all the more important because the level of UV radiation increases with altitude. Pilots, passengers and planes are most strongly exposed to this risk. Thanks to PLEXIGLAS® aircraft materials, all that enters the cabin is the sun's warmth. The UV radiation stays outside.

PLEXIGLAS® is extremely easy to form and gives pilots an unprecedented panoramic view, which is especially impressive in bubble-shaped helicopter canopies.

These large canopies are often tinted to screen pilots from sunlight. The transparent colors protect pilots from glare, and PLEXIGLAS® aircraft materials offer inherent protection against UV radiation.

PLEXIGLAS® is an expert for all these needs. The products GS 245 and GS 249 were specially developed for aircraft construction and provide optimized UV protection. They exceed the relevant standards and show residual UV transmission of less than one percent – a coveted value for sport planes, sailplanes and ultralight aircraft too. For these in particular, PLEXIGLAS® offers a high degree of UV protection, together with its customary first-class optical quality.

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Certified quality
PLEXIGLAS® has the following approvals as an aircraft glazing material

Country	PLEXIGLAS® GS 245	PLEXIGLAS® GS 249	PLEXIGLAS® GS 249 correctly stretched
Germany	complies with WL 5.1412, DIN 65321	complies with WL 5.1415, DIN 65321	complies with WL 5.1416
France	complies with AIR 9106/A, Type I	complies with AIR 9106/A, Type I	complies with AIR 9106/A, Type III
UK	Type Approval DTD 5592A	Type Approval DTD 5592A	–
Russia	complies with GOST 10667-90	complies with GOST 10667-90	–
USA	qualified to ML-P-5425*)	qualified to MIL-P-8184, Type I, Class 2	corresponds to MIL-P-25690**)
AECMA	complies with prEN 4364	complies with prEN 4365	complies with prEN 4366

*) can be used in accordance with WL 5.1412
**) qualified to specifications of various customers

Flammability
PLEXIGLAS® GS 245 and PLEXIGLAS® GS 249 meet the requirements of FAR 25.853 (a) (1) (iV) (corresponds to JAR, Part 25, Paragraph 25.853 (b-2) and AITM 2003)

PLEXIGLAS® withstands high stress levels

Passenger aircraft generally cruise above the clouds at altitudes of more than 10,000 meters. Outside, double-digit sub-zero temperatures prevail. Inside, the cabin is pressurized. Aircraft materials are exposed to enormous stress levels, and PLEXIGLAS® withstands them all.

This is a crucial factor for aircraft construction, because cabin and cockpit glazing and windshields are exposed to high mechanical and thermal loads. The drastic differences in temperature from the runway to cruising altitude are no problem for PLEXIGLAS® aircraft materials either.

The higher they fly, the greater the loads to which aircraft are exposed. That is why the aviation industry relies on glazing made from PLEXIGLAS® GS 249 to meet the highest requirements. Besides its structural stability and impact strength, this crosslinked product also offers greater resistance to stress cracking. It also boasts a higher heat deflection temperature under load and is highly suitable for jet canopies and windshields. Moreover, it can be stretched with excellent results and thereby achieves even better impact strength and mechanical stability.

PLEXIGLAS®
best possible outlook

It is always exhilarating to fly so high that skyscrapers look like needles, rivers like silver threads and mountains like small rock formations. PLEXIGLAS® Optical HC with a scratch-resistant coating is the ideal choice for a permanently clear outlook. Together with its high optical quality, it offers high transparency and a distortion-free view. In addition, the material absorbs almost all UV light and protects both passengers and aircraft cabins from dangerous radiation.

On top of this, PLEXIGLAS® Optical HC offers high resistance to abrasion and chemicals, which makes it ideal for frequently cleaned passenger planes. The material's coating makes it insensitive to surface wear.

Application	Product	Properties
ultralight (ULA) and very light (VLA) aircraft	PLEXIGLAS® GS 241	• UV transmittance less than 1 % • is a grade of cast acrylic tested to high optical standards for glazing that does not specify material certified to any particular aviation standard • can be supplied in both clear-transparent and transparent colored grades
helicopter canopies, glider canopies, sports plane glazing and ultralights	PLEXIGLAS® GS 245	• certified to aviation standard • UV transmittance less than 1 % • is a cast acrylic with unsurpassed weather resistance specially developed to meet the high optical requirements of the aviation industry • can be supplied in both clear-transparent and transparent colored grades
cabin windows in civil aircraft, glazing for pressurized aircraft cabins, cockpit glazing, canopies and windshields	PLEXIGLAS® GS 249	• certified to aviation standard • is another cast acrylic specially developed to meet even higher demands by the aviation industry, but is additionally crosslinked • offers higher resistance to media that cause stress cracking and a higher heat deflection temperature • is also excellently suited for stretching, which makes it possible to improve its properties even further over the unstretched state • UV transmittance less than 1 %
cabin windows inside	PLEXIGLAS® Optical HC	• optical quality, UV-absorption, abrasion and chemical resistance

Products, properties and applications


JDG

® = registered trademark

PLEXIGLAS is a registered trademark of
Evonik Röhm GmbH, Darmstadt, Germany

Certified to DIN EN ISO 9001 (Quality) and
DIN EN ISO 14001 (Environment)

Evonik Industries is a worldwide manufacturer of PMMA products sold under the PLEXIGLAS® trademark on the European, Asian, African and Australian continents and under the ACRYLITE® trademark in the Americas.

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