



PLEXIGLAS[®] Solar

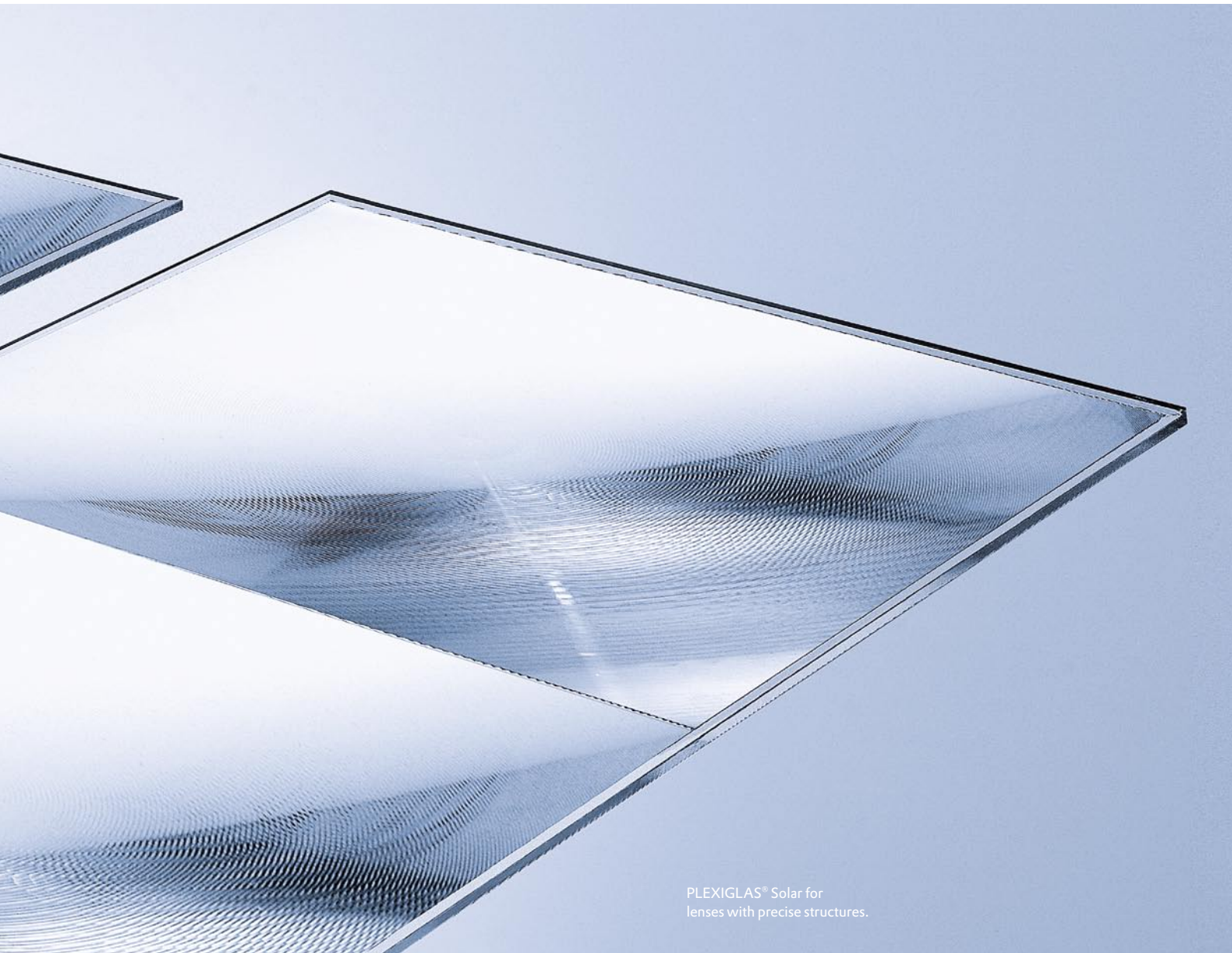
Systematic Expertise



PLEXIGLAS® Solar: A New Product Range for Concentrating Photovoltaics

Products crowned with enduring success owe this to their constant self-renewal. Thanks to intensive research and development and driven both by trends and a growing understanding of sustainability and global climate protection, PLEXIGLAS® is excellently suited as a material for new fields of application. A primary example is solar power generation by means of concentrating photovoltaics (CPV), a highly efficient method for generating electrical current

directly from sunlight. How does this work? Structured lenses such as Fresnel lenses, have micro or macrostructures that focus sunlight by a factor of 10 to 1000. When these lenses are placed in front of a solar cell, the sunlight that would otherwise be spread over a large area is concentrated on a fraction of that area and is then converted to power by highly efficient solar cells.



PLEXIGLAS® Solar for lenses with precise structures.

PLEXIGLAS® Solar: The Special Solution

With its new PLEXIGLAS® Solar product group, Evonik offers a complete range of molding compounds and sheet products for many demanding lens and mirror applications for concentrating photovoltaics. There are four reasons that make PLEXIGLAS® the material of choice for this special field of application:

- excellent optical properties
- excellent resistance to weathering and UV light
- precision processing
- impact strength and low weight.

Products with the PLEXIGLAS® Solar trademark are distinguished by their special transmission characteristics across the spectral range.

These are adjusted to the spectral response of high-efficiency solar cells to obtain the highest possible module efficiency when converting the photons into electricity. Evonik offers products with tailored UV transmission properties that selectively meet the demands of the various concentrating technologies. These products include optical, UV transmitting and a full complement of UV-absorbing levels (250 to 380 nm).

The PLEXIGLAS® Solar product portfolio is supplemented by the innovative and user-friendly ACRIFIX® Solar adhesives system. This UV-curable reactive resin system is perfectly adjusted to the PLEXIGLAS® Solar products.



PLEXIGLAS® Solar is synonymous with excellent optical properties and extremely accurate mold surface reproduction.

Outstanding Optical Properties

Focusing the light that impinges on a lens onto a small solar cell, with maximum efficiency and minimum absorption losses, make stringent demands on the material and its optical properties. PLEXIGLAS® has a low refractive index, a very high transmittance of more than 92 percent and high optical transparency. Besides this, PLEXIGLAS® always absorbs a very low proportion of radiation both in the visible and the UV range. And, as a crucial advantage, transparent PLEXIGLAS® shows no yellowing. This is proved by CPV systems that have been successfully operated with the protection of PLEXIGLAS® products for more than 15 years. All of these points – low refractive index, high transmittance and low yellowness index – help to focus sunlight on the solar cell with maximum energy and ensure high electrical output per incident energy.

Long Service Life

Some of a material's properties are more susceptible than others to change in the course of time. A CPV unit is designed to maintain a high consistent overall efficiency. Here too, transparency is the crucial factor, as measured by the transmittance and yellowness index. Sunlight is meant to penetrate the medium in the set orientation with the lowest possible deviation and without noticeable yellowing or clouding, over a long period of time. PLEXIGLAS® has proved its excellent weather resistance time and again in many outdoor exposure tests and in many successful applications by our customers. These applications include airplane windows, greenhouses, soundwalls, and skylights. That is why Evonik gives a 30-year guarantee that transparent sheets will show the highest possible light transmission without yellowing.



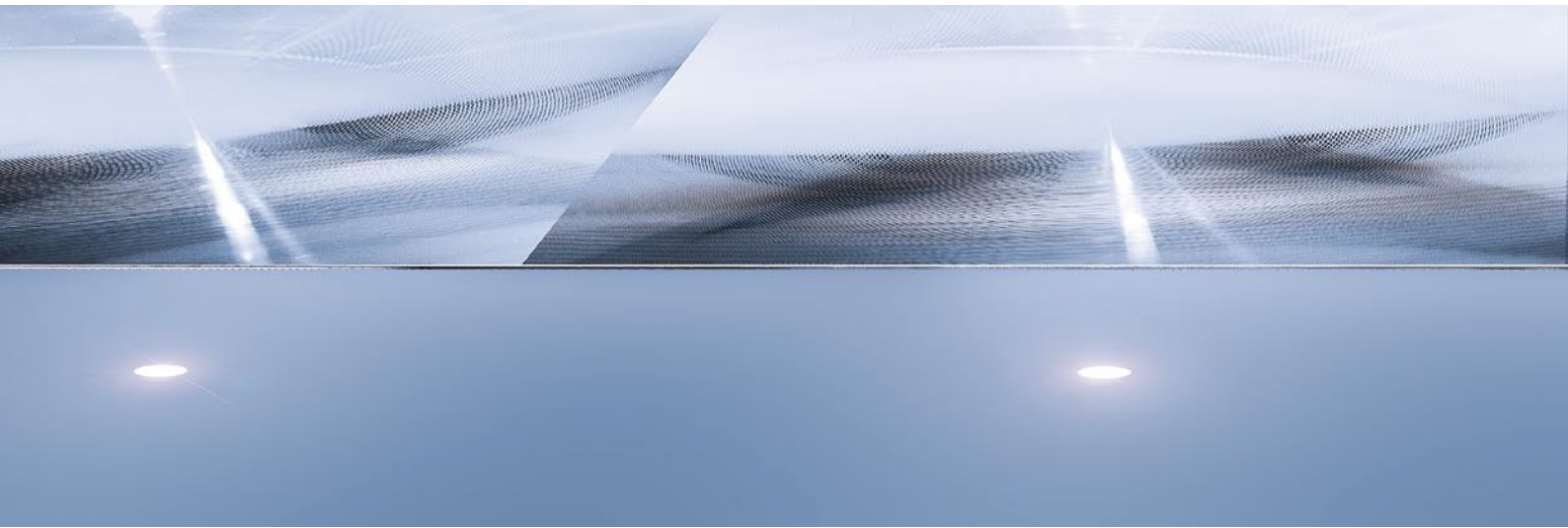
Precision Processing

The degree to which Fresnel lenses are able to focus sunlight determines the electrical output of the solar cells. The ability to concentrate light is a function of designed structures, tooling capability, processing technique, and appropriate material selection. Precise molds and dies are required to reduce light scattering in injection and compression molding, extrusion, and hot embossing processes.

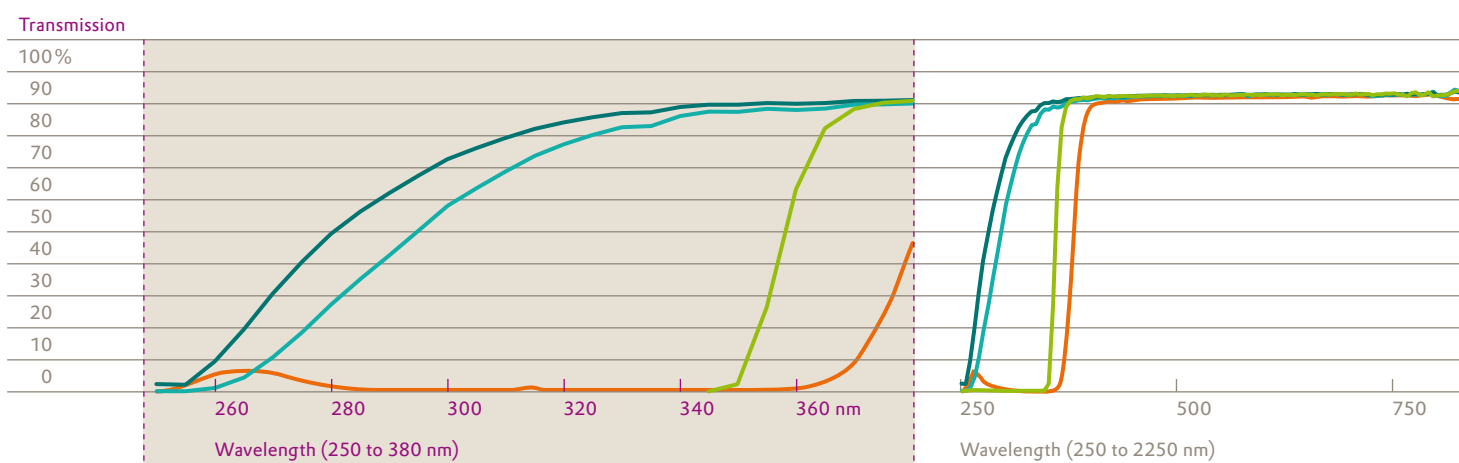
The structures of the lenses can only be precisely replicated using a material with highly accurate mold surface reproduction. PLEXIGLAS® meets this requirement. Evonik offers a comprehensive range of polymer products for this purpose, from which the processor can select the product with the best rheological properties for the intended optical design. The material must reproduce the very small tip radii of the structured mold. This is the only way to manufacture high-precision lenses and reduce optical losses.

A Durable Material

PLEXIGLAS® is not just extremely weather-resistant, it can also endure harsh treatment. It has much greater impact strength than glass, weighs less and even withstands hailstones. PLEXIGLAS® shows the greatest surface hardness and scratch resistance of all thermoplastics.



PLEXIGLAS® Solar



— PLEXIGLAS® XT 0A000 – 3mm, reference

PLEXIGLAS® Solar – Products

Evonik offers two grades of molding compounds and two grades of sheet products trademarked PLEXIGLAS® Solar with all the functions and advantages outlined above, as well as tailored transmission properties. Two grades of the ACRIFIX® adhesives system round off the product range.

All of these products are characterized by

- excellent light transmission (92%)
- outstanding weather resistance
- high mechanical strength
- very good surface hardness and scratch resistance

PLEXIGLAS® Solar Molding Compounds

PLEXIGLAS® Solar IM20

This special molding compound for injection molding and injection-compression molding is distinguished by its

- excellent flow
- low melt viscosity
- very good mold surface reproduction
- high heat deflection temperature under load

PLEXIGLAS® Solar EX30

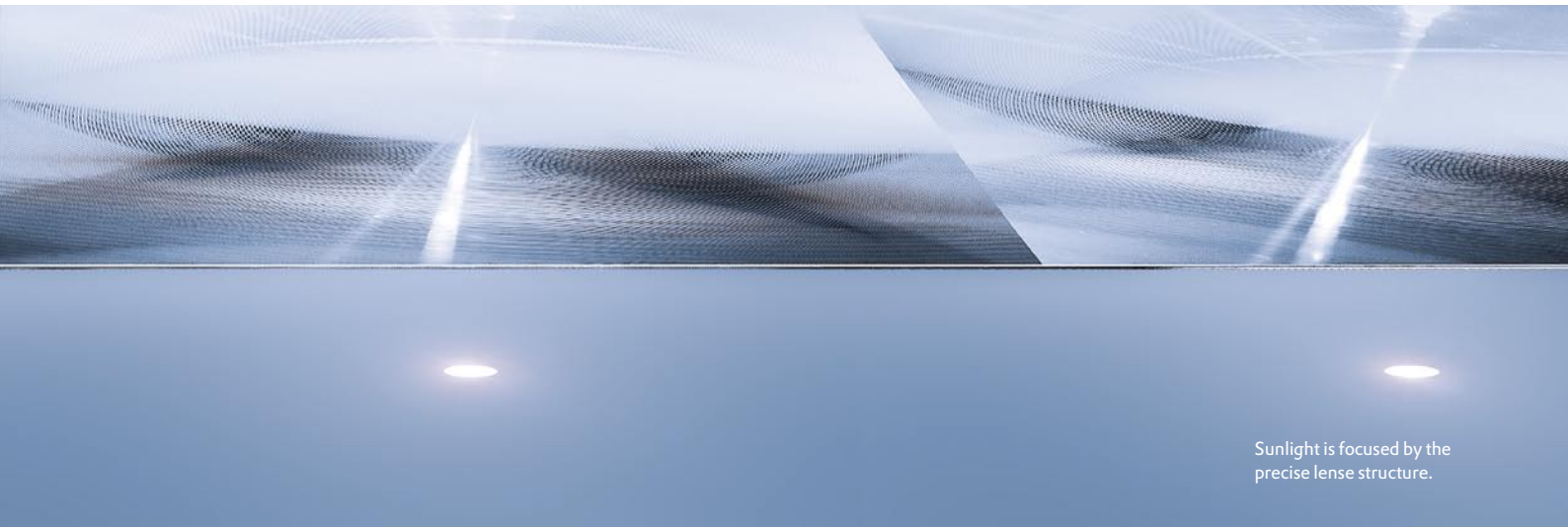
This special molding compound for extrusion offers

- good melt elasticity
- good processability
- high heat deflection temperature under load
- good mechanical properties for post-treatment (thermoforming)

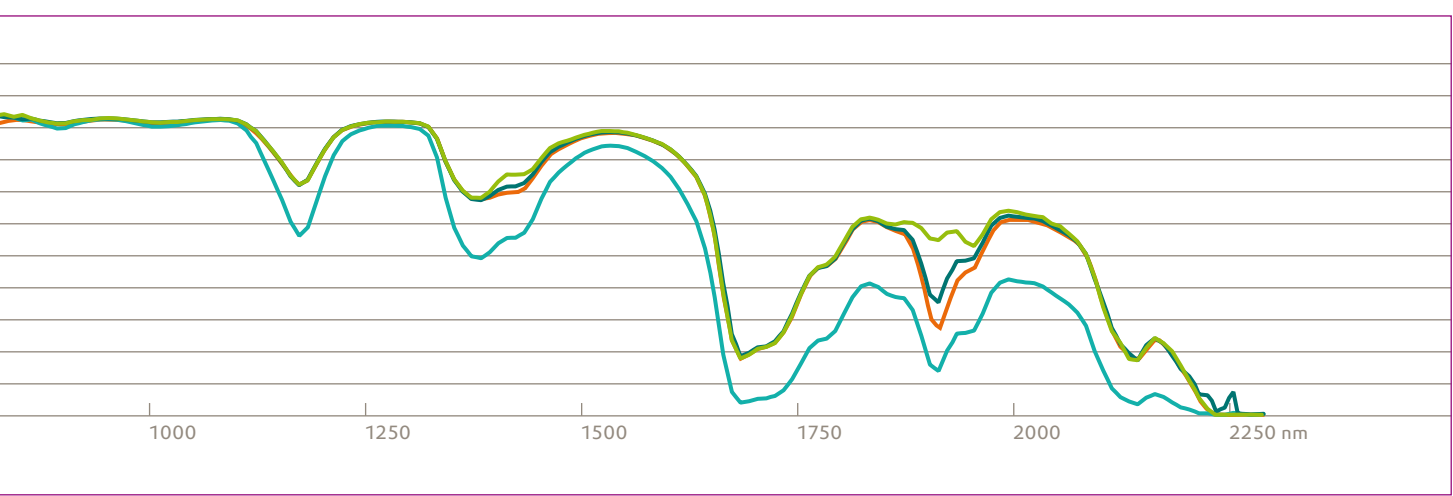
PLEXIGLAS® Solar Solid Sheets

The solid sheets are equally suitable for manufacturing structured Fresnel lenses by hot embossing and as a substrate for manufacturing laminated lenses, which involves laminating structured films or injection-molded lenses onto the sheets. Their special properties are precise mold surface reproduction, high transmittance and excellent resistance to weathering and UV light.

The two products offered – PLEXIGLAS® Solar OZ023 and PLEXIGLAS® Solar OZ370 – show different transmission in the wavelength range from 250 to 380 nm.



Sunlight is focused by the precise lens structure.



■ PLEXIGLAS® Solar 0Z023 – 3 mm / PLEXIGLAS® Solar IM20/EX30 – 3 mm
 ■ PLEXIGLAS® Solar 0Z370 – 5 mm
 ■ PLEXIGLAS® Solar 0Z370 – 3 mm
 ■ PLEXIGLAS® Solar 0Z370 – 3 mm

ACRIFIX® Solar Adhesives

ACRIFIX® Solar is a user friendly adhesives system that can be easily adjusted to various requirements. The UV-curing system ensures short process times, and the added benefit of flexibly adjustable viscosity. ACRIFIX® Solar is provided in two different grades.

ACRIFIX® 1R 9016 Solar

This one-component polymerization adhesive is highly viscous.

ACRIFIX® 1R 9019 Solar

This one-component polymerization adhesive has low viscosity.

Both adhesives can be used on their own or mixed with each other as required, enabling users to adjust specific viscosity levels and curing times.

More than just a Product

As a globally operating group with numerous sites and branches on all continents, Evonik ensures that its products are available worldwide. Our customers can rest assured that we can swiftly deliver PLEXIGLAS® Solar to any desired location.

But that is not all. We also have Technical Service Centers in Europe, Asia and North America, with experts who provide competent advice just where it is needed. Together with our customers, we seek joint solutions to any application, however complex.

On request, our materials testing department can also examine the function of lens systems. If required, we develop the ideal optical lens design for our customers, right up to the finished lens.

We know how well PLEXIGLAS® has stood the test of practical use. That is why, in coordination with the respective customer, we offer a project-related guarantee for PLEXIGLAS® for the specific application.

We also comply with international standard IEC 62108, which lays down the minimum requirements for the design and qualification approval of CPV modules and assemblies.

System Solutions

With its new PLEXIGLAS® Solar product range, Evonik offers solutions that make the best possible use of solar power to generate energy for the future.

® = reg. trademark

PLEXIGLAS and ACRIFIX are registered trademarks of Evonik Röhm GmbH, Darmstadt, Germany.

The Performance Polymers Business Unit of 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 trademark ACRYLITE® in the Americas.

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