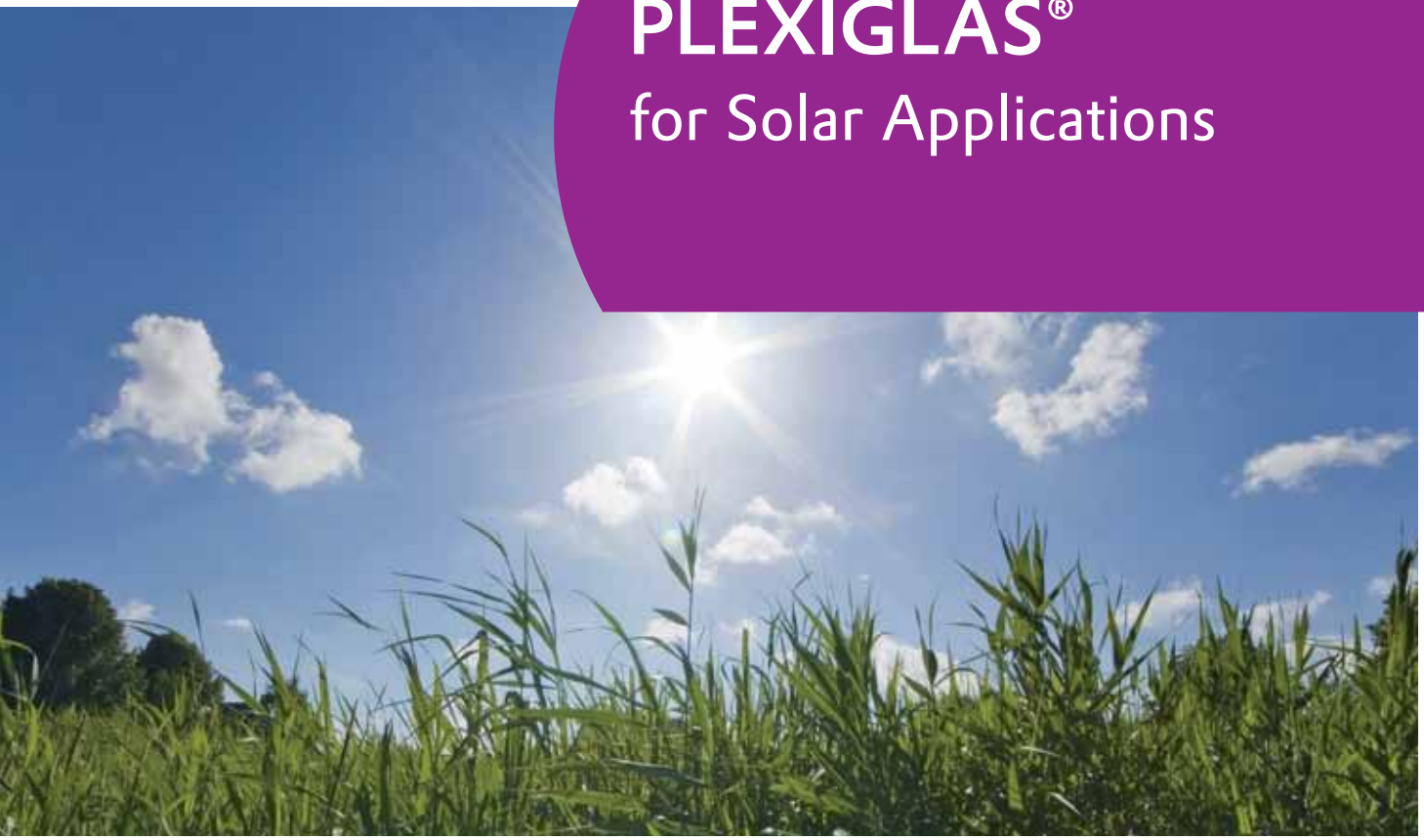
EVONIK INDUSTRIES

PLEXIGLAS®
for Solar Applications



PLEXIGLAS®

Evonik. Power to create.

The sun – an inexhaustible source of energy

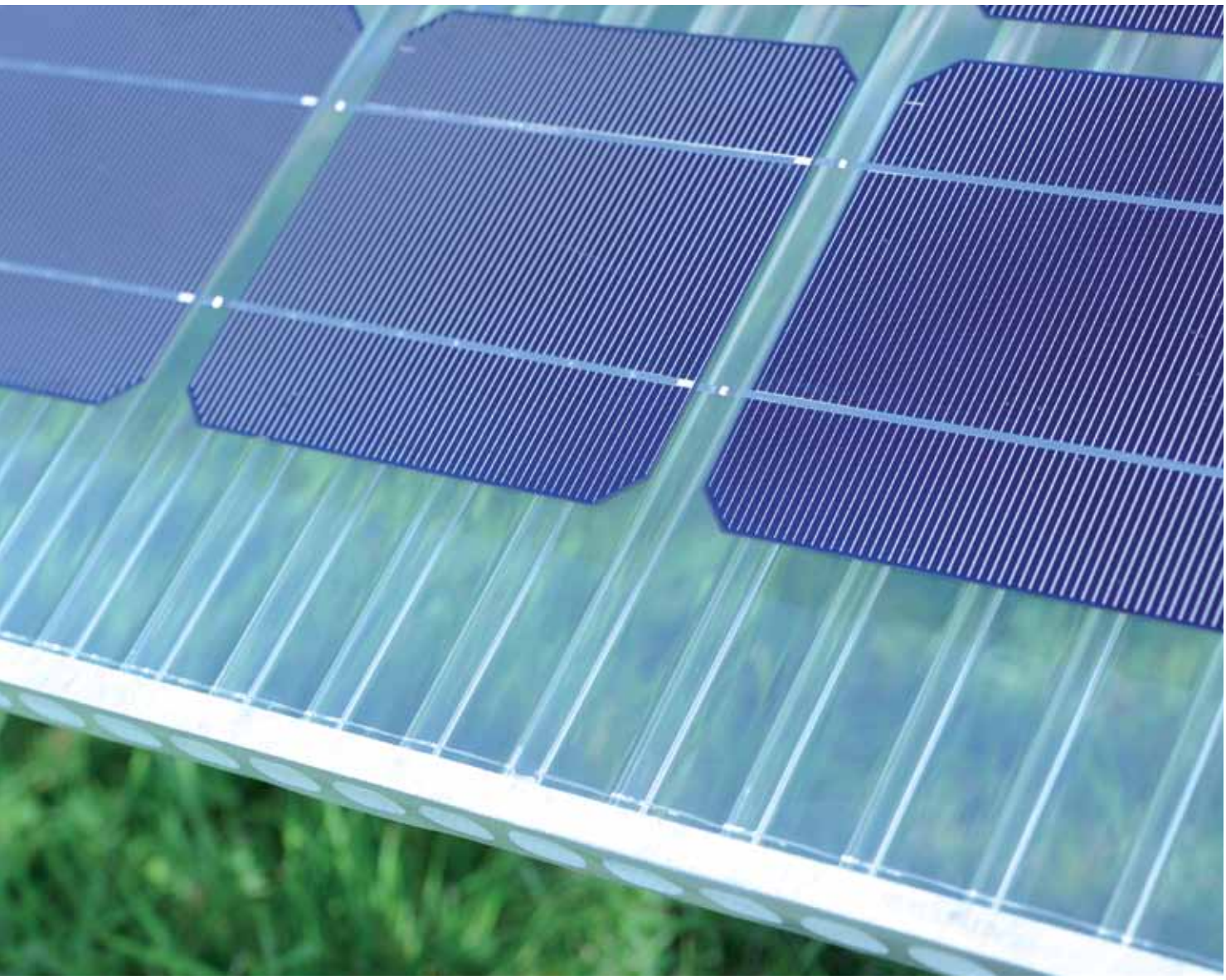
Our modern world depends on a constant supply of available energy – for lighting, electronic devices, heating and machines, and demand for such energy continues to grow. With this in mind, we recognize that fossil resources such as oil and coal are finite, and the alternative, nuclear power, has become politically undesirable in some countries. Therefore, solar power is growing in importance, as it has the potential to secure our future energy supply.

Photovoltaics and solar thermal energy are the key technologies in this context, as they have the ability to convert the sun's rays into electric current and heat. They can provide comfort in our homes and produce large volumes of electricity. To create an efficient and cost-effective use of solar energy, the relevant systems call for specially adjusted materials. This applies to cover materials, weather protection, light guides and lenses alike. PLEXIGLAS® Solar serves as such a material.

It provides high energy conversion efficiency and premium durablitity to outdoor weathering, all while being easy to machine and fabricate. In addition, the material's production leaves a smaller energy footprint than glass.

We at Evonik are among the world's leading suppliers of PMMA and acrylic products, invented in 1933 by Dr. Otto Röhm and his team. The products we market under the PLEXIGLAS® brand (and under the ACRYLITE® brand in the Americas) are available everywhere, either directly via our global sales network, via regional distributors or qualified fabricators. We also enter into development partnerships with our customers, and help them to design innovative solutions for tomorrow's world.

Join us in making the best possible use of solar power!



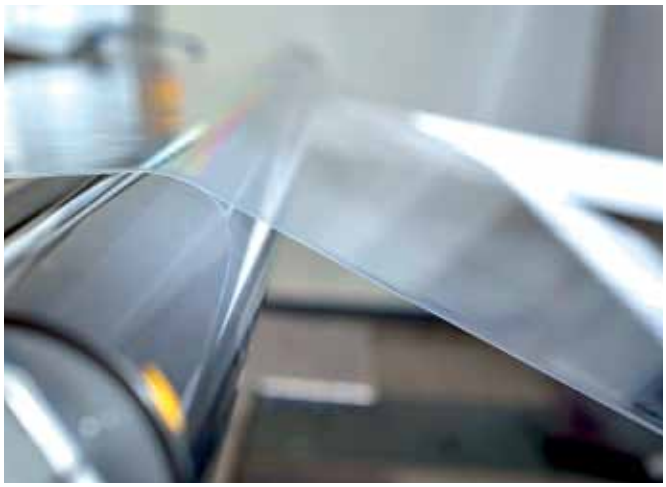
A specialized material that is reliable and durable

PLEXIGLAS® is one of the world's highest-quality and most versatile plastics. It can be provided with many different functional properties and surfaces. Are you looking for a material that is light-diffusing or light-focusing? One that offers high resistance to heat and UV radiation, or excellent scratch resistance? Take your pick! At about half the weight of glass, PLEXIGLAS® offers 11 times its impact strength, and can even withstand hailstones. It can take rough treatment, and can be precisely machined and fabricated to fit your application.

The PLEXIGLAS® Solar grade, with its selective UV transmission properties, is specially adapted to meet the requirements of solar and its associated environment. It provides excellent light transmission of over 92 % and superior weather ability, allowing our customers to meet required solar demands, while maintaining its properties over a long period of time. We provide a special guarantee for individual solar applications, in agreement with the respective customer.

When PLEXIGLAS® needs to be replaced after many years of service, it can be completely recycled, providing further support for PLEXIGLAS® as it relates to resource efficiency.

PLEXIGLAS® is supplied to the solar industry in the form of molding compounds, solid sheets and films, as well as lenses and lens panels.



PLEXIGLAS® Solar
IM20 molding compound

PLEXIGLAS® Solar
0Z023 sheet

PLEXIGLAS® film

EUROPLEX® film

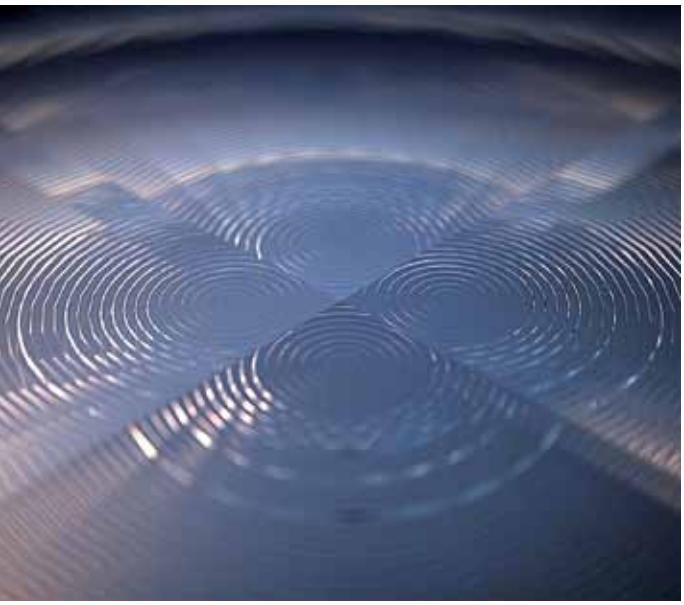
PLEXIGLAS®
a lightweight for durable efficiency

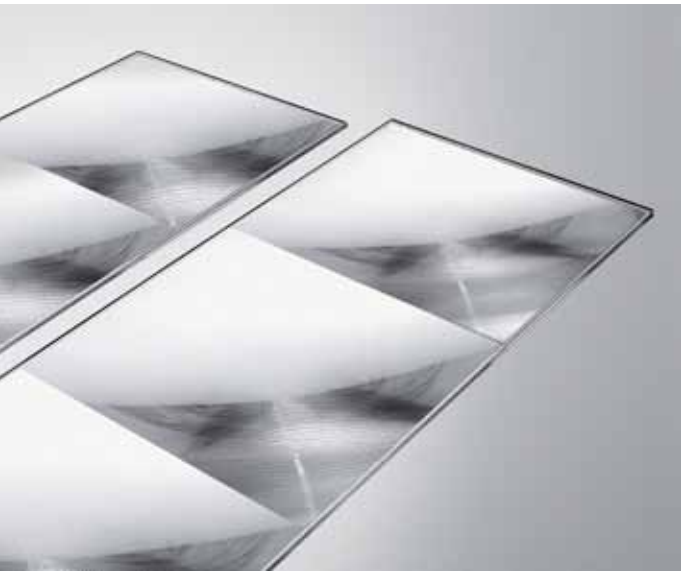
From hail, wind, rain and snow to scorching heat – solar panels are exposed to strong atmospheric influences throughout the year. Their efficiency can diminish because the quality of the chosen materials cannot withstand outdoor exposure; they may also fail completely.

That is why the sensitive technology inside a solar module requires protection, independently of whether solar power is to be converted to heat or electricity. PLEXIGLAS® serves as a perfect fit for such an application, as it can provide a "toughness" level that can even withstand the impact of hail. In addition, PLEXIGLAS® products for solar applications are also durable and resistant to harmful UV radiation that causes other materials to turn yellow and brittle.

Therefore, PLEXIGLAS® provides a level of defense, protecting the components beneath them, which is an essential requirement for efficient energy conversion and cost-effective operation. This proven capability holds true whether solar modules are installed in the desert, or on rooftops in Central Europe.

PLEXIGLAS® weighs less than glass, and is therefore highly suitable for lightweight photovoltaic modules. Thanks to its low weight, the structural requirements are less stringent, allowing the design of elegant, airy structures that nevertheless provide high energy conversion efficiency.





PLEXIGLAS® Solar
IM20 molding compound

PLEXIGLAS® Solar
0Z023 sheet

PLEXIGLAS® Solar
Pre-Fab lens panel

PLEXIGLAS®
for high energy conversion efficiency

As we are all aware, generating electricity from solar energy is good for the environment; but that alone is not enough. Solar power generation also has to be cost-effective. In this context, it is crucial for sunlight to be directed towards a solar cell with high efficiency, without losing a large share of solar energy through absorption. This idea represents the hallmark of efficient solar systems, and places great demands on the material. PLEXIGLAS® is ideal for this purpose, with its low refractive index and extremely high light transmittance of over 92 %. The transmission properties of PLEXIGLAS® Solar are specially designed to meet the requirements of solar modules. To be more specific, PLEXIGLAS® Solar allows the solar cell to use the high-energy solar radiation region in the UV range (340 to 380 nanometers). At the same time, the material also provides the best possible protection for the module and the cell by blocking the harmful portion of UV radiation. Since PLEXIGLAS® is also weather-resistant, the solar module can operate at high capacity for many years, meeting the demands of the solar industry and making a major contribution towards reducing power generation costs.

Concentrating photovoltaics requires particularly high efficiency, due to the high-precision Fresnel lenses that focus light associated with the technology. Here, PLEXIGLAS® offers precise mold surface reproduction as well as excellent transmission properties, and resistance to UV radiation and weathering. Not all Fresnel lenses are alike – the important factor is for the high-precision structures of the mold to be transferred to the finished part in order to obtain maximum optical efficiency. PLEXIGLAS® can be processed by all conventional injection molding, extrusion and injection compression molding processes to provide such lenses. Evonik also offers lenses and lens panels, and supports customers with individual lens design.

Application	Component	Product	Properties
Electricity			
PV	Cover	PLEXIGLAS® Solar molding compound and sheet	• low weight • adjusted transmission properties
Thin Film PV	Weather protection	PLEXIGLAS® film EUROPLEX® film	• high resistance to UV light and weathering • flexibility • high transmission
	Cover (if it does not need to be flexible)	PLEXIGLAS® Solar molding compound and sheet	• low weight • adjusted transmission properties
CPV, refractive			
low x CPV	Light guide sheet	PLEXIGLAS® molding compound and sheet	• low weight • adjusted transmission properties • good light guiding properties
high x CPV	Cover, lens	PLEXIGLAS® Solar molding compound, sheet and Pre-Fab lens panel	• low weight • adjusted transmission properties • highly accurate mold surface reproduction
Heat			
Solar thermal energy	Cover	PLEXIGLAS® Solar, molding compound PLEXIGLAS® sheet, (XT + GS) PLEXIGLAS® film EUROPLEX® film	• low weight • adjusted transmission properties • high resistance to UV light and weathering • good formability
Concentrating solar power (CSP)	Weather protection	PLEXIGLAS® film EUROPLEX® film	• high resistance to UV light and weathering • flexibility • high transmission over the entire solar spectrum

PLEXIGLAS® Solar meets the minimum requirements of international standard IEC 62108 for Design Qualification and Type Approval of CPV Modules and Assemblies.

Products, properties and applications

® = 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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