

SOLAR



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The ALMECO service

A Partner for solar energy industries.

*From selective **TiNOX energy absorber surfaces** to specular **vega energy**: a complete range, unparalleled quality and 360° service.*

The ALMECO GROUP is ranked among the world leaders of highly specialised surface production for solar energy applications, a sector in which the required performance in terms of reflection or absorption of solar radiation is particularly high. This recognised leadership is expressed in the technologically advanced Almecco GmbH production facilities in Bernburg, Germany, where copper and aluminium coils are subjected to the process of continuous vacuum PVD (Physical Vapour Deposition) coating. Through this process, which is managed via software and moni-

tored with the most sophisticated measuring instruments, a series of thin cermet films is deposited on the substrate, giving it characteristics of selective absorption or by raising its reflection performance, depending on the applicable sector to which the product is intended.

The main types of surfaces made are:

- **TiNOX energy** for solar thermal applications;
- **vega energy** for concentration applications.

The use of the PVD technology ensures a fully sustainable and eco-friendly process, perfectly in-



tune not just with the "green" destination of the products, but also with the philosophy of the Almecco Group which, in addition to meeting the quality standard required by the EN ISO 9001:2000 regulation, is certified with the certifications OHSAS 18001 and environmental ISO 14001, with full respect for the values of environmental protection and the well-being of the employees. The great attention to the environment and the direct contribution offered by the ALMECO GROUP for the production of renewable energy is united with the constant pursuit

of high quality for the final product and customer service. Strict checks, carried out by qualified personnel, ensure that the product performance remains unchanged over time. Thanks to the many service and cutting centres placed in the various strategic markets worldwide, the ALMECO GROUP is capable of guaranteeing delivery times in line with the most stringent customer requirements. Furthermore, the ALMECO GROUP is proposed as an ideal partner to study, engineer and implement highly personalised in-

novative surfaces. This absolutely unique service is made possible by the technical personnel's specialised know-how and the technologies used. An added value for Almecco is its organisational flexibility and comprehensiveness of its machining that ranges from industrial production to the production of special sizes and small batches. The collaboration with the client goes all the way from the planning to the production of reflectors and components for concentration plants.



TiNOX[®] energy

The highest efficiency in solar absorption.

The **TiNOX energy** surfaces guarantee an absorption of 95% of the solar radiation and an emissivity of only 4%. These values remain constant over time.



The solar thermal panels use the sun's energy to generate heat which is used for the production of hot water. What results is free energy that is environmentally friendly and reliable: energy for our future.

The core of the solar thermal panels is the absorber, which is given the unique task of collecting the energy in the form of solar radiation and converting it into heat. The more efficient the absorber is, the greater the heat produced by the panel will be.

With the **TiNOX energy** surfaces,

created indifferently on copper or aluminium, the **ALMECO GROUP** represents an important reference for the sector. These surfaces absorb 95% of incident solar energy and convert 90% into thermal energy, losing only 4% of heat in the form of radiation.

This allows solar panel manufacturers to ensure the highest quality and greatest yield to those who install them. The structure of **TiNOX energy** absorbers has been developed to optimise its function at temperatures close to those in which the solar collectors



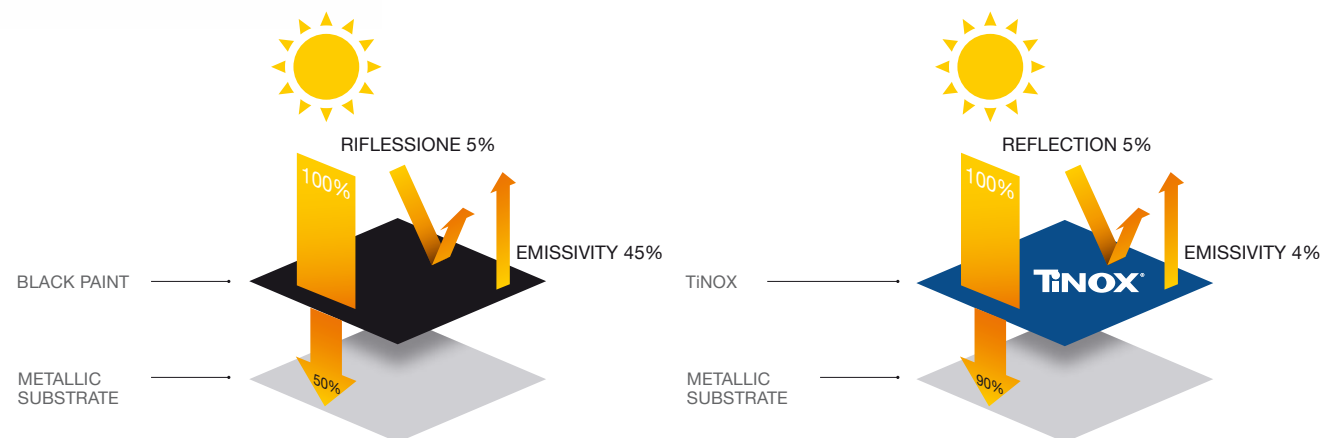
operate (approx. 100°C). For this, the special PVD multilayer is able to absorb most of the incident solar energy on the panel (propagated with wavelengths less than 2.5 micron) and to minimise the heat lost from the same material under the form of radiation (wavelengths longer than 2.5 micron). The characteristic to adapt its behavior according to the different wavelengths, or rather the selectivity, allows **TiNOX energy** products to "capture" up to 50% more energy than non-selective products.

This particular type of coating was developed for the first time in the **ALMECO GROUP** laboratories. The **TiNOX energy** surfaces were designed for the most common welding techniques. In addition, the constant focus on innovation and specialised know-how of the research and development team allows the **ALMECO GROUP** to satisfy the most demanding customer requirements. The high quality of **TiNOX energy** absorbers has been confirmed by leading certification institutes who have successfully submitted the

product to the "Task X" test, which simulates the effect of years of temperature changes and environmental exposure on the absorbers' behavior. The products that pass this test are guaranteed to deliver 95% of their original performance even after 25 years.

The **TiNOX** absorbers have obtained a certificate of approval from:

- Fraunhofer Institute for Solar Energy Systems, Freiburg (ISE)
- Institute of Technology Solar Rapperswill College (SPF)
- Institut fuer Thermodynamik und Wärmetechnik (ITW).



TiNOX[®] nano

The solution for areas with strong sunshine.

The knowledge of how to design tailor-made solutions for different application contexts has always been one of the strengths of ALMECO GROUP's research and development activities.

The TiNOX nano is an important example of this, with its specific surface for absorbers that are located in geographic areas with high levels of solar radiation, such as Mediterranean Europe, Asia, Africa or the Middle East.

TiNOX nano features an optimal balance between performance and cost efficiency, presenting itself as

an alternative to the black painted surfaces, combining the advantages of an eco-friendly process with those who offer a competitive price.

TiNOX nano has been studied to contemporarily ensure a high level of solar radiation absorption and a low emissivity level (only 5%) even in the presence of high temperatures, maintaining a low stagnation temperature and reducing the thermal stress on the collector. The high quality of the protective layer makes the absorbers built with **TiNOX nano** extremely resistant to environmental conditions.



TiNOX[®] artline

The absorber that combines aesthetics with efficiency.

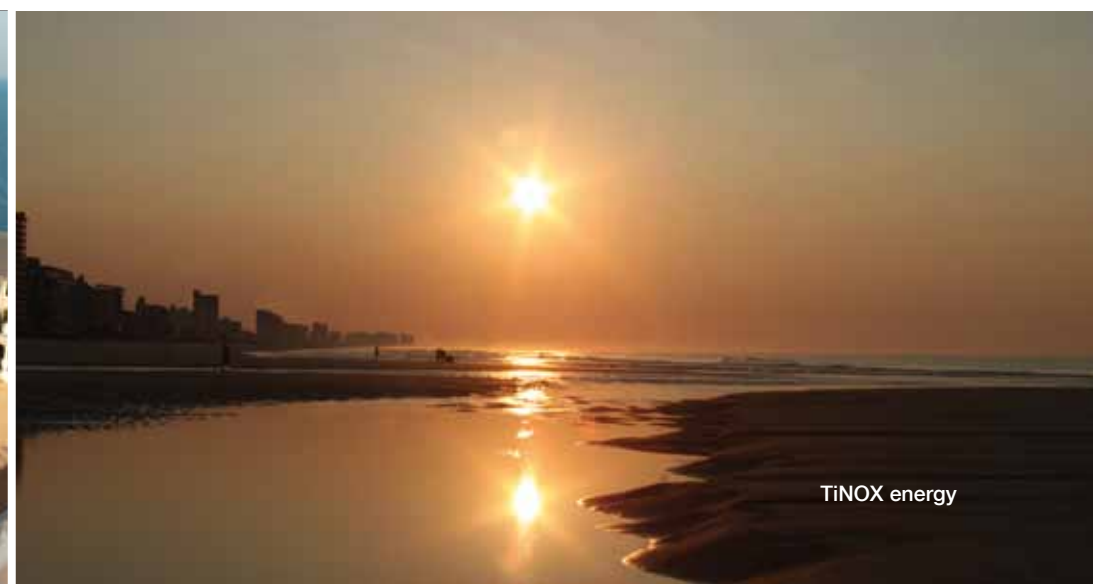
TiNOX artline is the ideal product for those looking for an alternative to traditional blue absorbers without sacrificing the advantages in terms of absorption that **TiNOX energy** can offer.

This material, in fact, combines aesthetics and efficiency in a unique way and, thanks to its color, it stands out as an excellent choice for those solar panels placed on the

roof or facade seeking a smooth integration into the landscape. With **TiNOX artline** absorbers, the manufacturers of solar thermal panels can expand their range of proposals by offering a product that guarantees high performance and exceptionally low emission levels, capable of catering even the special aesthetic needs of clients and designers.



TiNOX energy



TiNOX energy

vega energy®

A complete range with high reflective properties.

Surfaces with very high reflection (over 98%) for all applications that require high concentration.



Reflective surfaces are a key element in solar concentrating systems: these in fact should reflect the solar radiation as effectively and accurately as possible.

Valuing the know-how acquired in the lighting industry with the PVD process, the ALMECO GROUP has developed a range of vega energy specular surfaces, even with reflection higher than 98%.

Thanks to their exceptional reflective properties, the **vega energy** surfaces significantly increase the performance of:

- parabolic through collector (CSP) that convert solar energy into thermal energy, to be used in various industrial processes or in the production of electric power systems
- CPV (Concentrated Photo Voltaic) for the production of electric energy
- CPC (Compound Parabolic Concentrator), for the production of sanitary hot water
- micro CSP (Concentrated Solar Power) concentrators with systems of linear Fresnel collectors for the production of process heat in the industrial field.



To guarantee the highest efficiency in each specific application, the ALMECO GROUP has developed a series of surfaces with different characteristics within the range of vega energy:

- **vega energy SP** surfaces are made of pre-anodised aluminium with a multilayer coating, obtained by PVD process, which uses a thin film of 99.99% pure aluminium or silver
- adding a top layer of weather-

resistant, highly transparent and protective coating to vega energy SP obtains **vega WR** surfaces

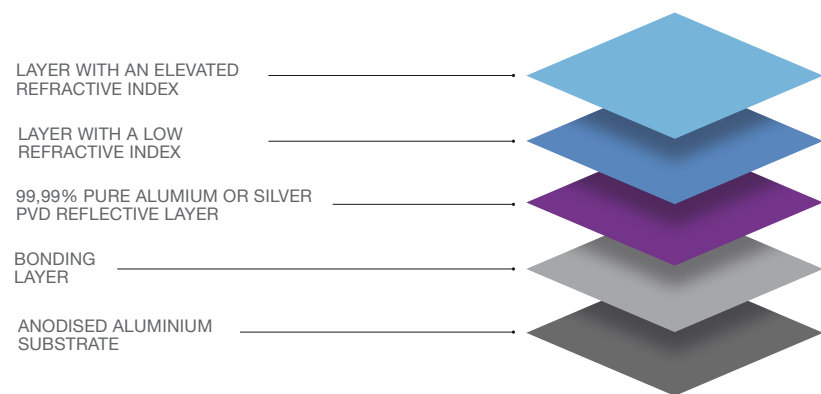
- specular **vega energy SWR** surfaces are always made with pre-anodised aluminium, protected by a special coating resistant to weathering. Almeco ensures that the reflection value of the **vega energy** surfaces will be maintained within 3% of its original value for a period of 10 years.



vega energy SP

The highest solar reflection.

The surfaces of **vega energy SP** range offer the highest levels of total and specular reflection and are used in solar system placed in glazed collectors. The optimum behavior to solar radiation results in a higher concentration and a lower diffusion of light.



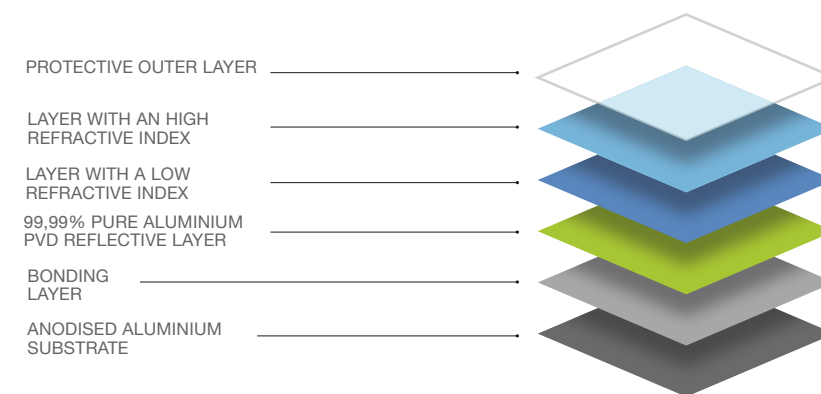
vega energy WR

Specular efficiency and protection without limits.

The surfaces of the **vega energy WR** range, developed specifically for outdoor applications, express the **ALMECO GROUP**'s commitment to combine the highest levels of reflection with maximum product durability and its resistance to atmospheric agents, thanks to the protection guaranteed by the robust surface coating.
vega WR193 energy, with 90%

solar reflection, is used in high performing large parabolic reflectors dedicated to the production of heat. Other fields of application are large reflective surfaces for the generation of solar energy for heating or air-conditioning of industrial and commercial buildings and desalination plants.
The **vega energy WR293** is preferred in large parabolic concen-

trators where the perfect focusing of solar radiation is essential: its increased specular efficiency, combined with a high level of surface protection, allows to increase by 5% the energy reflected to the absorber tube. **vega energy WR** can also be used as mirrors of photovoltaic systems at low concentration to increase the energy incident on the PV cells.

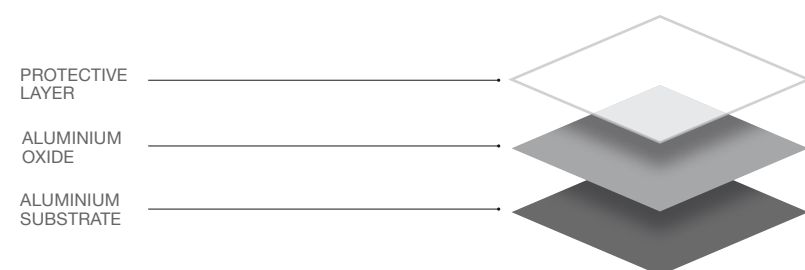


vega energy SWR

The guarantee of long durability over time.

The **vega energy SWR686** surface is mainly used for the creation of CPC (Compound Parabolic Concentrator) for vacuum tube collectors and micro-CSP systems where the optimisation of the investment, in addition to the

reflection, is essential. With 87% of total reflection, **vega energy SWR686** is the ideal solution to ensure a long life for outdoor environments, thanks to the protection offered by the specially studied coating.



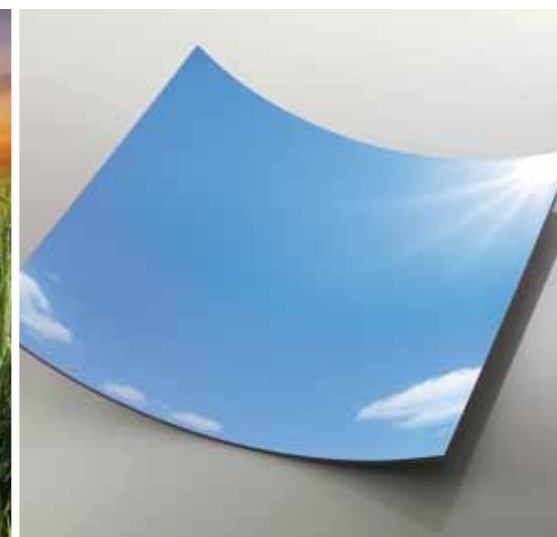
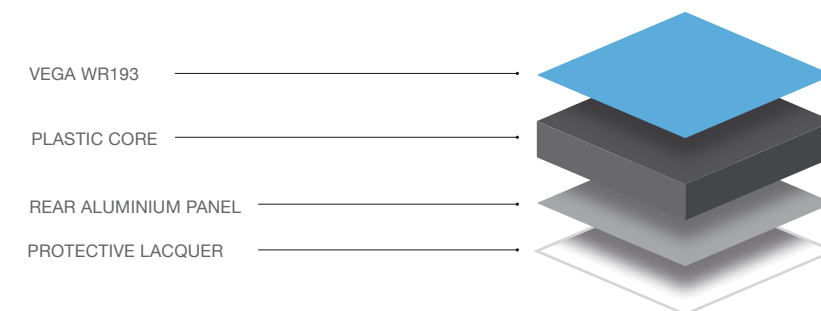
vega prime

Aluminium durability, high specularly and lightness.

Strong in the excellent performance obtained with the range of **vega energy** surfaces, the ALMECO GROUP has developed **vegaprime**, a panel composed of aluminium designed for the construction of parabolic solar concentrating systems. **vegaprime** is constructed by combining the highly reflective surface

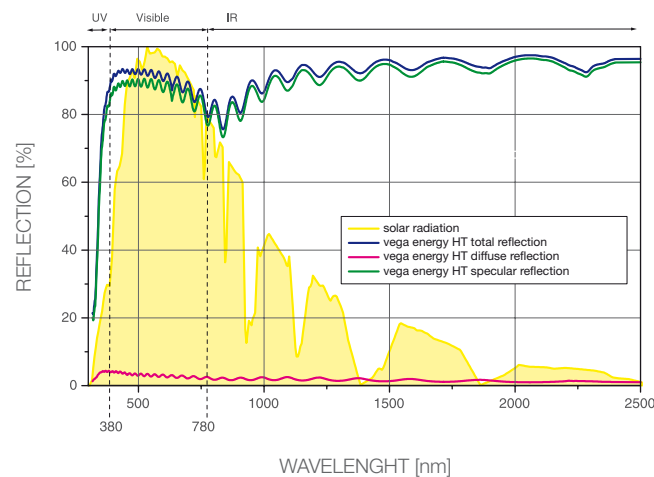
and corrosion resistant **vega WR** to a support structure consisting of a plastic and aluminium foil core. The characteristics of the **vegaprime** mirror - such as shape, size, and any curvature - can be adapted to each particular application. Its light weight and high stiffness (over

10 times compared to conventional systems) greatly simplifies the process of on-site assembly, optimising the cost of installation and transportation. These advantages are combined with the excellent workability and the absence of breakages, typical of glass mirrors.

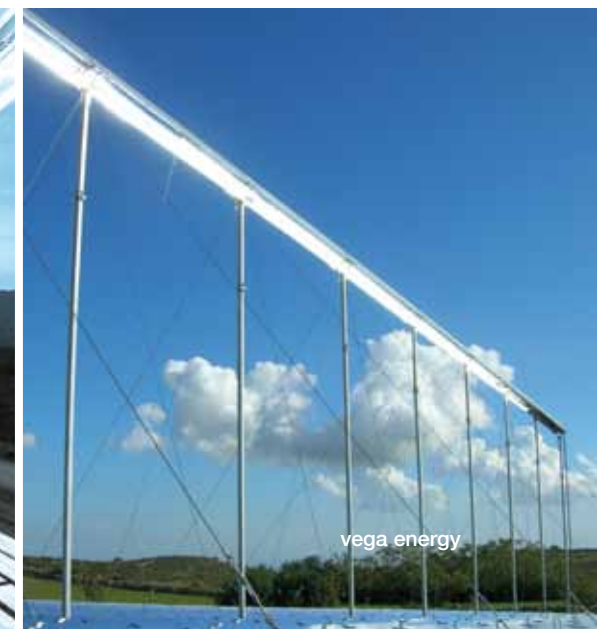


vega energy HT

The solution for Fresnel systems.



Designed to maintain constant high levels of reflection even at continuous operating temperatures of up to 250 C, **vega energy HT** is the ideal surface to be used in the secondary reflectors of the Fresnel systems. Its special coating greatly reduces the degradation phenomena of the reflecting surface, ensuring high performance over the long run.



vega energy TS

Long system life at maximum temperatures.

Almeco is one of the few companies in the world able to combine development and production of highly specialised surfaces with the production and engineering of solar reflectors. Its unique composition allows to

keep its performances of reflection constant even at operating temperatures above 300° C, minimising the losses. Not surprisingly, the acronym TS indicates its outstanding thermal stability.

PRODUCT	TOTAL REFLECTION (VISIBLE RANGE)	TOTAL REFLECTION (SOLAR RANGE)	MAX TEMPERATURE
VSP 295	> 95%	> 93%	150 °C
VHT 293	> 93%	≥ 91%	250 °C
VTS 293	> 91%	≥ 90%	300 °C



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