



Our production process guarantees **consistent quality and excellent repeatability.**

This project highlights Rioglass Solar's commitment with the solar thermal energy sector, with a substantial growth potential and an excellent outlook for the future.



Rioglass Solar Inc.

Phoenix facility
(factory space: 180,000 sqf)

Innovation providing
for a brighter future



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Glass & Sun:
A strategic alliance



Rioglass Solar,
manufacturer of high precision
mirrors for solar plants

www.rioglassolar.com

World Leader in Market Share for Solar Mirrors



Rioglass Solar is a Spanish based group with two factories located in Asturias (North of Spain) and a third one in Phoenix, Arizona (USA). Its purpose is to produce **high precision solar mirrors** for solar-thermal and CPV applications.

Taking full advantage of the extensive experience gained by Rioglass in the automotive glass market, the mirrors produced by these high-tech facilities are currently being installed in solar plants across the world, resulting in the best performances and highest yields.

Rioglass Solar's factories have a combined production capacity of 2.3 million mirrors/year (approx. 67 million sqf). **In 2010 and 2011, Rioglass is the number one mirror manufacturer in the world by market share.**

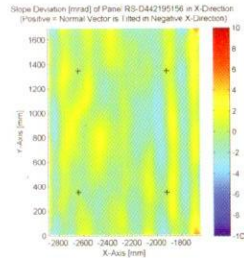
Our standard products are:

	Curved	Flat	Tempered	Annealed
Parabolic Heliostat	✓	N/A	✓	No
Fresnel	✓	✓	✓	✓
Stirling	✓	N/A	✓	No
CPV	✓	N/A	✓	No

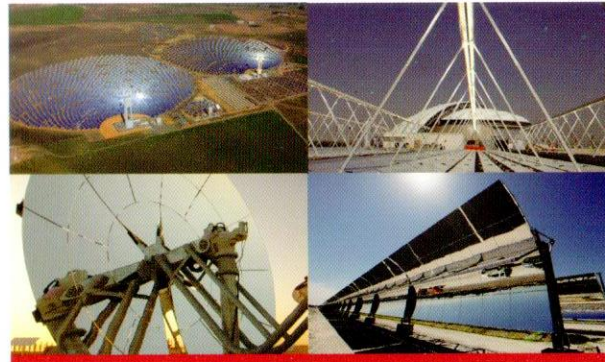
Range thickness: 0.95 - 5mm

NOTE: Custom geometries, dimensions and thickness available on demand.

To assure our mirrors continue to meet the highest performance standards, all **Rioglass Solar factories utilize the DLR Deflectometry technology** to validate our optical accuracy. These systems are continuously maintained, calibrated and certified by CSP Services.



Durability is essential, so accelerated test chambers are used to ensure proper resistance of silver and copper coatings and protective paints (CASS, NSS, Moisture and Climatic chambers).



Reflectivity Average: (ISO 9050:2003 AM1.5)

Grade A > **94.0%**

Grade A+ > **94.5%**

Optical Accuracy:

• **Intercept Factor > 99.95%** (70 mm diameter tube).

• **FDx < 7.0 mm.**

Certified by CSP Services for a one month period of real production at Rioglass Solar facilities in October 2011:

- Average FDx 6.70mm

- Bending process is stable

Rioglass Solar discards only a 5mm perimeter when measuring mirror performances, increasing the useful measured area by 3.6% (compared to the industry standard of 20 mm).

Mirrors validated by **NREL, DLR, CSP Services** and other independent agencies.



Rioglass Solar's tempered mirrors comply with demanding mechanical resistance and safety standards, as follows:

- **ANSI Z97.1:2009, Class A Safety Mirror.**
- EN12975-2:2006 Thermal solar systems and components - Solar collectors. Part 5.10, **hail test.**
- ECE-R43 A.3-2.1 y DIN 52 306, **ball drop test.**
- Wind speed resistance of **135km/h, in any position**, certified by Bureau Veritas.

Advantages of the **Rioglass Solar tempered mirrors** vs. non-tempered options:

- **Five times higher mechanical resistance** than regular annealed glass.
- Superior resistance to high **wind loads and hail storms**, allowing the collector to **remain operational** under adverse conditions.
- **Negligible breakage** during transit and installation.
- **Edge protection** system available for maximum durability in salty or polluted atmospheres.
- **Dramatic reduction of accidents during installation and operation**, avoiding personal injuries to employees when handling the mirrors (lower liability).
- **Huge reduction in O&M costs** due to practically zero breakage over the plant's lifetime.
- No risk of breakage during **high pressure water cleaning or deep brushing.**



**RIO
SOLAR**