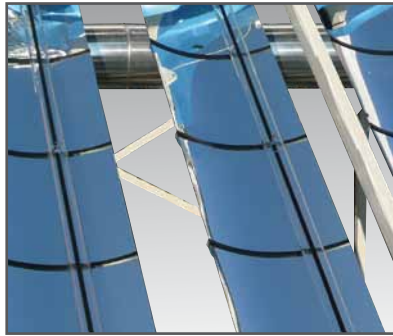
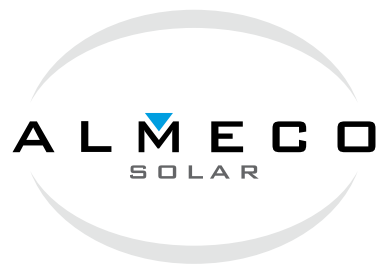


TiNOX[®] tube 2.0



Solar absorber tube





Introduction Solar energy is becoming increasingly important for the generation of process heat which, carried by appropriate heat transfer fluids, can be used to drive solar heating or cooling and seawater desalination systems and can also be converted into electricity. Combined solar systems for the simultaneous generation of heat and electrical power are also becoming more and more interesting for decentralized energy supply.

The heart of Concentrated Solar Power applications is the absorber tube: it absorbs the concentrated solar radiation and converts it into heat. The more efficient the absorber, the greater the collector's output.

Product Introduction Drawing on its 20 years long experience of absorber surfaces, ALMECO SOLAR has developed a new concept in absorber tubes, **TiNOX_{tube 2.0}**, a high efficiency aluminium alloy tube aimed at establishing a new reference point for performance, durability and cost.

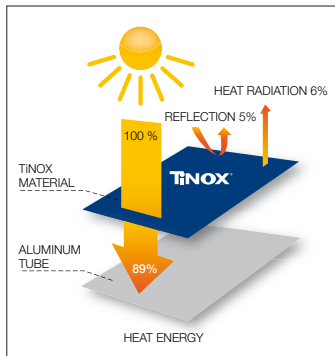
Designed for medium temperature applications up to 200°C, it is ideally suitable for almost all such CSP systems; available in different lengths and diameters it has the best optical performance currently available in the market.

Product Description Manufactured from high temperature resisting aluminium alloys, **TiNOX_{tube 2.0}** uses an improved highly selective vacuum deposited absorber coating in order to guarantee the lowest thermal emissivity in the market while maintaining excellent absorption of solar energy for conversion to heat.

Innovative Aluminium solution The aluminium tubes are produced by combining a special drawing process with a high temperature and pressure resistant aluminium alloy giving an outstanding performance that guarantees:

- ▼ High corrosion stability for water and oil based heat exchanger fluids
- ▼ High heat conductance
- ▼ High pressure resistance (up to 30bar depending on diameter and wall thickness)
- ▼ Excellent brazing and welding properties

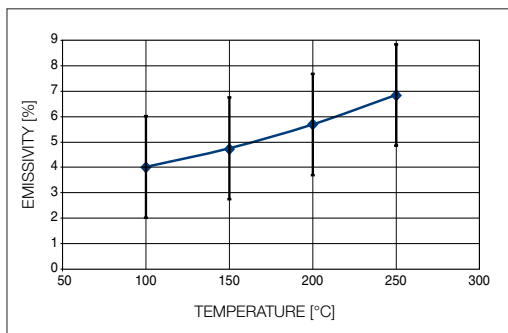




Like an “energy trap”, the highly selective blue coating of **High performance TINOX[®] tube 2.0** absorbs 95% of the concentrated solar radiation while its extremely low thermal emissivity of less than 6% at 200°C minimises loss of the captured solar energy as heat radiation.

Over 89% of the incoming solar radiation energy can be used as heat at an operating temperature of 200°C. Due to the high heat conduction of the aluminium tubes compared to stainless steel tubes this heat is transferred very efficiently to the heat exchanger fluid.

The tubes can be easily brazed or welded, but for more convenient installation on site, appropriate **Easy installation** fittings are available for easier assembly and dismantling.



Emissivity dependence on the temperature of the TINOX tubes 2.0

Optical performance	
Solar absorption α	95%±2%
Thermal emissivity ϵ at 200°C	6%±2%
Main technical data	
Material	Aluminum
Standard diameter	35mm (different diameter on request)
Length	Up to 6 meter
Thickness	On demand

Technical data

Mechanical properties		
Outer diameter + absorber layer	[mm]	35,7
Outer diameter without absorber layer	[mm]	35
Wall thickness	[mm]	2
Inner diameter	[mm]	31
Alloy*		EN AW-5049
Temper		H18 - Hard
R _{p 0,2} min	[MPa]	240
R _m min	[MPa]	280
A min	[%]	2
Theoretical burst pressure	[bar]	22,86
Creep time resistance 200°	[h]	100.000

*Alloy 5049 according to DIN EN 573-3
Mechanical properties according to DIN EN 754-2

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