

Technical Data for the PolyTrough 1200B



General Description

The PolyTrough 1200B is a roof and ground-mountable parabolic trough collector developed for:

- High performance up to 200°C outlet temperature
- Ease of installation without lifting equipment
- Flexible configurations
- Efficient shipping in ISO compliant containers
- Low cost per kWh delivered

The solar heat is used in thermal applications such as:

- Industrial processes (steam, water or oil)
- Solar cooling systems
- Desalination
- Organic Rankine Cycles (ORC) for power generation

Technical Data for the Base Module

Geometry

Refer to Drawing PTC3-000-PolyTrough1200 GA for a detailed drawing of the collector module.

Aperture area: 28.8 m²

Aperture width: 1.2 m

Length: 25 m

Height: 1.63 m

Focal length: 0.65 m

Rim angle: 50°

Weight

Weight of complete module: 730 kg (26 kg/m² aperture area).

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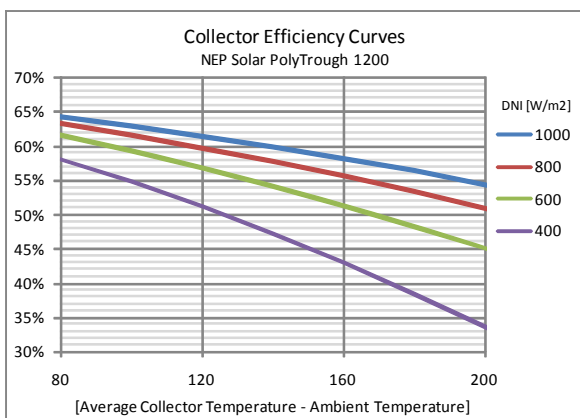


Performance Testing and Modelling

The PolyTrough 1200 collector has undergone performance testing throughout 2008 at the Commonwealth Scientific and Industrial Research Organisation in Australia (CSIRO). Test results confirm the modelled nominal efficiency of above 55% in its operating range of 120—200°C outlet temperature and at 1000 W/m² direct normal radiation.

Annual thermal yield of an installed collector field is calculated by NEP Solar on a project specific basis with sophisticated and validated hourly simulation models.

The PolyTrough1200B design is currently undergoing performance testing at SPF (Solartechnik Prufung Forschung) in Rapperswil Switzerland.



Energy Performance

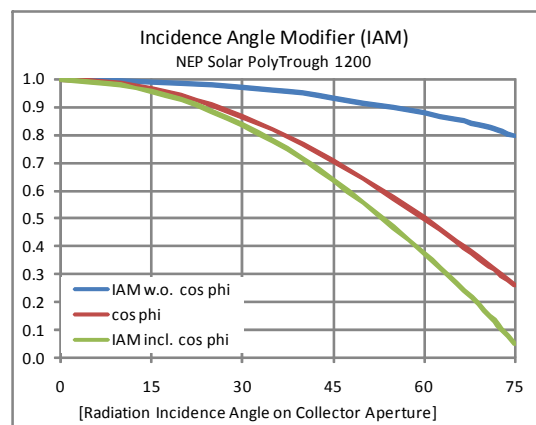
Nominal Thermal Performance

Thermal Efficiency: >55% at 200°C mean collector temperature and 1000 W/m² DNI. Collector efficiency curves for a range of DNI radiation are shown below (α release January 2009). The curves represent the test results achieved at CSIRO Solar Energy Centre

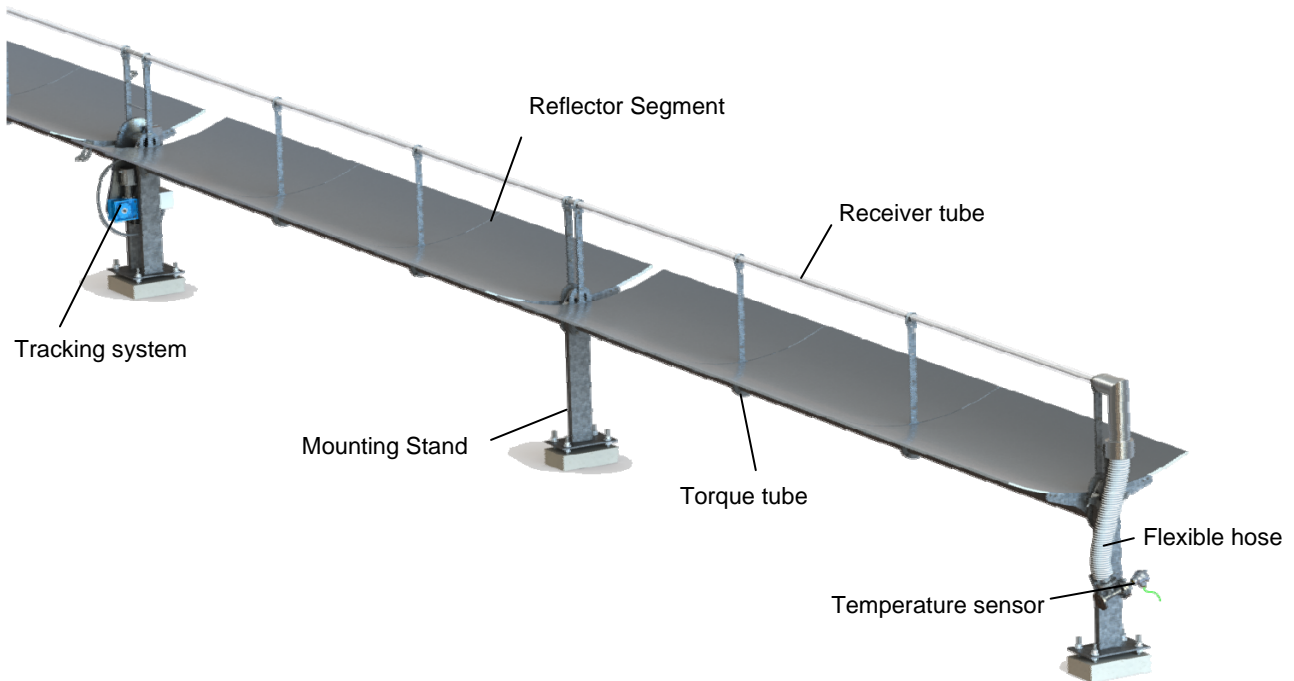
Nominal Output: 15.8 kW per base module or 0.55 kW per m² in nominal conditions and 200°C mean collector temperature.

Annual Yield

Annual yield depends on site and project characteristics and will be modelled by NEP Solar upon client request.



Component Details



Components of the Base Module

Reflector Segment (12 segments per module)

Length: 1991 mm

Width: 1208 mm (projected aperture)

Depth: 140 mm

Materials: Speciality Aluminium mirror with self supporting sandwich structure of polymer and aluminium. The mirror panel is a structural element of the collector and carries the bending load (wind) to the torque tube.

Mirror: Coated highly reflective and weather resistant aluminium reflector.

Mirror Area: 2.4 m² per segment (12 segments per module)

Reflectivity (DIN 5036-1 and -3):

Degree of total light reflection (Rho) $\geq 93\%$

Degree of solar reflection (AM 1.5) $\geq 89\%$

Mounting: Reflector mounted to torque tube by galvanised end plates which also mount the receiver tube ensuring accurate alignment of receiver in collector focal point.

Torque Tube

Length: 2m sections so as to fit easily in standard 20' ISO Container (12 tubes per module).

Materials: Hot dip galvanised steel tube. Carries the torsional load efficiently.

Support Structure

Mounting Stands: Mounting stand assemblies support the torque tube cranks and contain polymer bearings to allow torque tube rotation.

Materials: Hot dip galvanised steel.

Tracking System

Motor Drive: Stepper motor.

Chain Drive: Reduction chain drive with 19 mm pitch heavy duty chain.

Reduction Gearbox: Worm reduction gearbox.

Controller: Industrial controller employing the NREL solar position algorithm.

Inclinometer: High precision inclinometer directly mounted to torque tube.

Receiver

Absorber Tube: Diameter 28 mm by 1.5 mm wall thickness by 2 m lengths fully welded.

Pressure Rating: 96 bar at 200°C

Material: 1.4307 (EN1088) Stainless Steel tubing [AISI 304L] with mirror polished finish.

Selective Coating: Black chrome.

Absorber tube mounting: In focal length by thermal isolating Teflon ® bushes.

Cover: Diameter 45 mm borosilicate glass tube with 3 mm wall thickness by 2 m lengths with seals on Teflon ® bushes.

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Additional Components

Additional Components per Basic Module

Measurement and Control Technology

Temperature Sensors: Industrial PT-100 temperature sensors at outlet end of each module's receiver tube.

Temperature sensors used during commissioning to balance flow and during operation to protect against over temperature.

Isolation and Bleed Valves

Ball type shut-off valve and globe valves per module supplied by client to isolate each module and balance the flow through the rows during commissioning.

Bleed valve on receiver tube to bleed entrapped air from hydraulic circuit.

Additional Components in each Field

Supply, Return and Distribution Piping

Pipe sizes selected to suit the field size and layout. All components to be pressure rated to 20 bar and thermally insulated (lagged) and cladded. Normally in the client's scope of supply.

Field and Hydraulic Control System

Industrial PLC based and proprietary programmed collector field master controller for autonomous operation of the solar field according to temperature flow and heat demand from the client system.

Interface with client control system through industry standard protocols.



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