PREMIER EFFICIENCY COLLECTORS

PRODUCT DESCRIPTION

- High-performance flat-plate collectors
- Selective absorber coating and serpentine tube configuration
- Collectors, pipe connectors and mounting components designed for quick installation in modules of up to 10 collectors.
- Internal header simplifies plumbing
- Optional sheet-metal flashing kit available for installations on sloped roofs. Flashing covers pipe connections and provides a "clean" look. Flashing easily slides into slot on side of collector frame. (Note: flashing not recommended for collectors mounted on racks due to wind loads.)
- Modules can be mounted on sloped roofs, and on racks for flat roofs, ground or walls

KEY FEATURES AND BENEFITS

- Rated by the EcoEnergy Program as the highest efficiency collector

- EnerWorks Premier Efficiency Collectors are designed and assembled in North America using best available components from the USA, Canada and Europe

- All components are of the highest quality, assembled in a partly-automated, quality-monitored process

- Each collector is leak-tested

- Major components assembled using RGS7700 silicone, an adhesive used in highrise curtain-wall window manufacturing. Adhesive is resistant to very high and very low temperatures, is strong, and remains flexible under all operating conditions.

- Serpentine copper tubing fixed to aluminum absorber sheet using unique laser stitch, cold-welding technology, thoroughly tested for strength, thermal shock and corrosion-resistance

- Internal spacing between glass and absorber carefully optimized for best performance with minimum panel thickness

- Collector shipped with reflective foil cover to prevent overheating during installation and commissioning

- Collectors have undergone extensive testing and exceed SRCC and CSA requirements

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PRODUCT TECHNICAL SPECIFICATIONS

- Size, excluding connections: 46.25" wide x 96.25" long x 3.25" thick (1175 mm x 2445 mm x 83 mm). Header tubes extend 0.375" (9.5 mm) past frame. 47" (1194 mm) gross width
- Gross area 30.93 ft^2 (2.873 m^2), net aperture area 28.97ft^2 (2.691 m^2)
- Dry weight 111 lb (50.5 kg), operational weight (fluid and mounting + connecting hardware) 115 lb (52.2 kg); fluid content 0.502 US gallons (1.9 L)
- Pressure rating: 6.90 bar / 100 psi
- Serpentine tube: copper, 0.393" (10 mm) OD x 0.354" (9 mm) ID, silver-soldered to internal header tube
- Header tube: 0.866" (22 mm) OD, 0.787" (20 mm) ID – top and bottom
- Connection: brass flange suitable for V-clamps
- **Collector connectors:** flexible, bellow-type, 321 stainless steel; allow thermal expansion of header tube, and easy removal of individual collectors
- **Glazing:** low-iron, tempered glass, textured to limit reflection and maximize transmittance. Average transmittance: 91%. Glass thickness 0.125" (3.2 mm)
- Steel frame 0.040" (1 mm) thick
- Galvalume® corrosion-resistant, mill-painted on both sides with AKZO Nobel Polydure® 1000 baked polyester-based coating system originally developed for roofing applications
- **Outside color:** "Medium Bronze PS4W41387", a neutral dark brown hue to blend with most roof colors; special pigmentation confers durability under prolonged, extreme UV exposure
- Inside color is off-white that reflects radiation back to reduce heat loss
- Manufactured using high-precision roll-forming technology for high stiffness and low weight
- Single strip of steel, folded in rectangular shape with ends joined using "toggle-lock" crimping process and rounded corners to prevent injury
- Mounting points, 2 on each side of collector, are via "nutsert" riveted nuts, having internal threads, 5/16-18 (7.9375-7.05 mm) UNC, coated with zinc yellow dichromate; nuts are spaced 48" (1219 mm) apart on long edges and 44" (1118 mm) apart on short edges
- Glazing caps made out of the same material as frame to protect long edges of glass
- EPDM rubber grommets at header/frame penetration prevent thermal-bridging
- **Absorber:** aluminum sheet, 0.020" (0.5 mm) thick
- Top coating is Miro-Therm® selective optical coating 150 nanometer thick, applied by physical vapour deposition "air-to-air" process in three layers: an anti-reflective top layer, a metal oxide middle layer for high absorption properties, and an infrared retentive/reflective bottom layer to reduce IR losses
- Optical properties: absorptance α = 0.94 ± 0.02; emittance ε = 0.05 ± 0.02 at 212 °F (100 °C)

- Deep, dark blue in color, selective coating's weathering capability conforms to Standard ISO CD 12952.2 (Task X), and to EN12975 and Solar Keymark standards
- Chromium coating on back of absorber prevents galvanic corrosion between aluminum absorber and copper tube
- **Back insulation:** 1.375" (35 mm) mineral fiber
- Mineral fiber is fire-resistant – good up to 1200 °F (650 °C), safe to handle, and does not shrink at any temperature
- Conforms to CAN/ULC S702.2 standard for dimensional, thermal properties, density and fire-retardant properties
- Surface burning characteristics: Flame Spread 5, Smoke Developed 0
- Low water-absorption < 0.01%; insulating properties not affected when wet
- R-value is 5.8 (R 4.2/inch)
- Outer weather and puncture protection by 0.016" (0.4 mm)- thick, textured aluminum sheet
- Frame edge insulation is 1" (25 mm) iso-cyanurate foam having R-value of 7
- Unique "hook" brackets used in conjunction with standard strut channels for efficient, easy and fast installation
- Brackets have tabs that "hook" into channel, allowing installers to position and secure collector without supporting its weight
- Mounting brackets and hardware coated for corrosion protection
- Space between collectors only 3" (76 mm) for efficient use of space

SRCC quadratic efficiency equation in SI units:

$\eta = 0.7622 - 3.2787\,(Ti - T\alpha)/I - 0.0129\,(Ti - T\alpha)^2/I$
Linear Y-intercept is 0.7683; Slope is -4.0348 W/(m$^2 \cdot$ °C)

SRCC quadratic efficiency equation in IP units:

$\eta = 0.7622 - 0.5778\,(Ti - T\alpha)/I - 0.0013\,(Ti - T\alpha)^2/I$
Linear Y-intercept is 0.7683; Slope is -0.711 Btu/(hr $\cdot$ ft$^2 \cdot$ °F)

Incident Angle Modifier (IAM), for 0° $\leqslant \Theta \leqslant$ 60°

Quadratic fit K$\alpha\tau$ = 1.0 + 0.0566 (1/cos Θ) – 0.2167 (1/cos Θ)^2
Linear fit K$\alpha\tau$ = 1.0 – 0.17 (1/cos Θ)

CSA quadratic efficiency equation (average of two collectors tested) in SI units is:

$\eta = 0.694 - 3.875\,(Ti - T\alpha)/I - 0.0011\,(Ti - T\alpha)^2/I$
Linear Y-intercept is 0.695; Slope is -3.9448 W/(m$^2\cdot$°C)
Nominal thermal power at 1100 W/m^2 or 348.7 Btu (hr $\cdot$ ft^2) solar radiation perpendicular to collector plan is 2.06 kW$_{th}$ or 7,029 Btu/hr
Collector stagnation temperature under 1100 W/m^2 and 68 °F (20 °C) is 405 °F (207 °C)