



## ETC SOLAR COLLECTOR PRODUCT OVERVIEW



### Product Highlights

- High Efficiency Evacuated Tube Solar Thermal Collector
- Suitable for Residential and Commercial Projects
- Steam-back and Drain-back Compatible Header Design
- Cyclone Rated, Marine Grade Mounting Frame and Fasteners
- Comprehensive 15 Year Limited Warranty\*



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## BASIC SPECIFICATIONS

Apricus ETC range of evacuated tube solar thermal collectors are suitable for both residential and commercial applications.



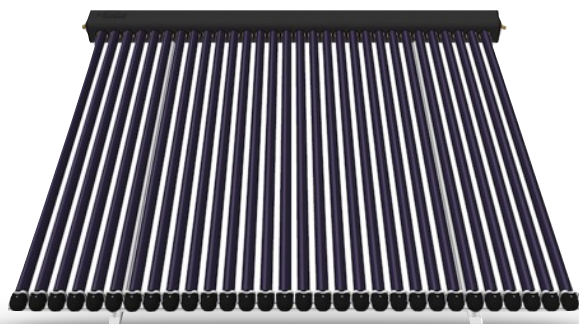
### ETC-10

<b>Dimensions (LxWxH) *</b>	78.9 x 31.3" x 5.35"
<b>Category C High Rating**</b>	14.8 kBtu/day
<b>Aperture Area</b>	10.26 ft <sup>2</sup>
<b>Gross Area</b>	17.13 ft <sup>2</sup>
<b>Gross Dry Weight</b>	77 lbs
<b>Fluid Capacity</b>	0.08 gal
<b>Flow Rate</b>	0.2 gpm (max 4gpm)
<b>Max Operating Pressure</b>	116 psi
<b>Stagnation Temperature</b>	442°F



### ETC-20

<b>Dimensions (LxWxH) *</b>	78.9 x 58.9" x 5.35"
<b>Category C High Rating**</b>	27.9 kBtu/day
<b>Aperture Area</b>	20.52 ft <sup>2</sup>
<b>Gross Area</b>	32.3 ft <sup>2</sup>
<b>Gross Dry Weight</b>	141 lbs
<b>Fluid Capacity</b>	0.14 gal
<b>Flow Rate</b>	0.33 gpm (max 4 gpm)
<b>Max Operating Pressure</b>	116 psi
<b>Stagnation Temperature</b>	442°F



### ETC-30

<b>Dimensions (LxWxH) *</b>	78.9 x 86.4" x 5.3"
<b>Category C High Rating**</b>	40.9 kBtu/day
<b>Aperture Area</b>	30.77 ft <sup>2</sup>
<b>Gross Area</b>	47.33 ft <sup>2</sup>
<b>Gross Dry Weight</b>	209 lbs
<b>Fluid Capacity</b>	0.2 gal
<b>Flow Rate</b>	0.5 gpm (max 4 gpm)
<b>Max Operating Pressure</b>	116 psi
<b>Stagnation Temperature</b>	442°F



An ARRA compliant *Made in the USA* version of the 30 tube collector (ETC-30C), is available for government funded commercial projects.

\* Height does not include mounting frame.

\*\* Data from SRCC OG-100 reports

## COMPONENT MATERIALS

Component	Material Specifications
Evacuated Tubes	<b>Material:</b> Borosilicate 3.3 <b>Tube style:</b> Twin wall all glass <b>Dimensions:</b> Ø2.28" outer tube; Ø1.85" inner tube; 1.8m / 71" length, 1.8mm / 0.07" outer tube wall thickness <b>Absorber Material:</b> Cu-Al/N-SS <b>Absorptance:</b> >93% (AM1.5); <b>Emittance:</b> <8% (176°F) <b>Vacuum:</b> $P < 5 \times 10^{-3}$ Pa; <b>Heat loss:</b> <0.14 Btu/hr/ft <sup>2</sup> /°F
Heat Pipes	<b>Material:</b> High purity "oxygen free" copper (ASTM: C10200) <b>Working fluid:</b> Non-toxic liquid (Apricus' proprietary mixture) <b>Maximum heat transfer capacity:</b> 750 Btuh <b>Operating angle:</b> 20-80° <b>Startup temperature:</b> ~86°F
Copper Header Pipe	<b>Material:</b> Copper (ASTM: C1100); <b>Brazing rod material:</b> 45% Silver (BAg45CuZn, NSF 61 potable water tested) <b>Maximum pressure:</b> 116 psi <b>Connection options:</b> 3/4" M NPT; 3/4" SWEAT (7/8" OD US Copper Pipe);
Heat Transfer Fins	<b>Material:</b> High purity aluminum
Rubber Components	<b>Material:</b> HTV Silicone Rubber (UV stabilized)
Mounting Frame	<b>Material:</b> 6005-T5 Aluminum Alloy with Anodized Finish (Stainless Steel frame available upon special request)
Tube Clips	<b>Material:</b> 316 Stainless Steel
Fasteners	<b>Material:</b> 316 Stainless Steel
Manifold Casing	<b>Material:</b> 3003 Aluminium with PVDF coating.
Manifold Insulation	<b>Material:</b> Glass Wool (0.058 Btu/hr.ft.°F) <b>Thickness:</b> Average >2"

## CERTIFICATIONS

Standard	Report Number	Region
SRCC OG-100	10001909/10/11	USA
IAPMO USEC	S-5995	USA
ISO9001:2008	100633	Global
AS/NZ: 2712:2007	100633	Australia and New Zealand
Solarkeymark	011-7S2323R	Europe



## SOLAR COLLECTOR COMPONENTS

### Manifold & Header Pipe

Insulated box housing the copper header pipe (heat exchanger) that the system fluid circulates through.

The header pipe is designed for both efficient heat transfer and reliability with only 4 brazing points. Brazing is 45% silver material for optimal strength and corrosion resistance.

The header pipe drains effectively making it compatible with steam-back and drain-back systems.

A thick layer of glass wool made from recycled glass insulates the header pipe to reduce heat loss and is able to withstand high temperatures.

### Evacuated Tube (ET)

Evacuated tubes are made from two glass tubes that are fused at the top and the bottom. The space between the tubes is evacuated to form an insulating vacuum. The inner tube is coated with a special absorber material which absorbs 95% of sunlight, converting it into usable heat.

The contoured aluminium heat transfer fin holds the heat pipe close to the inner glass wall enhancing heat transfer.

### Heat Pipe (HP)

The copper heat pipe absorbs heat from the glass wall and the heat transfer fin.

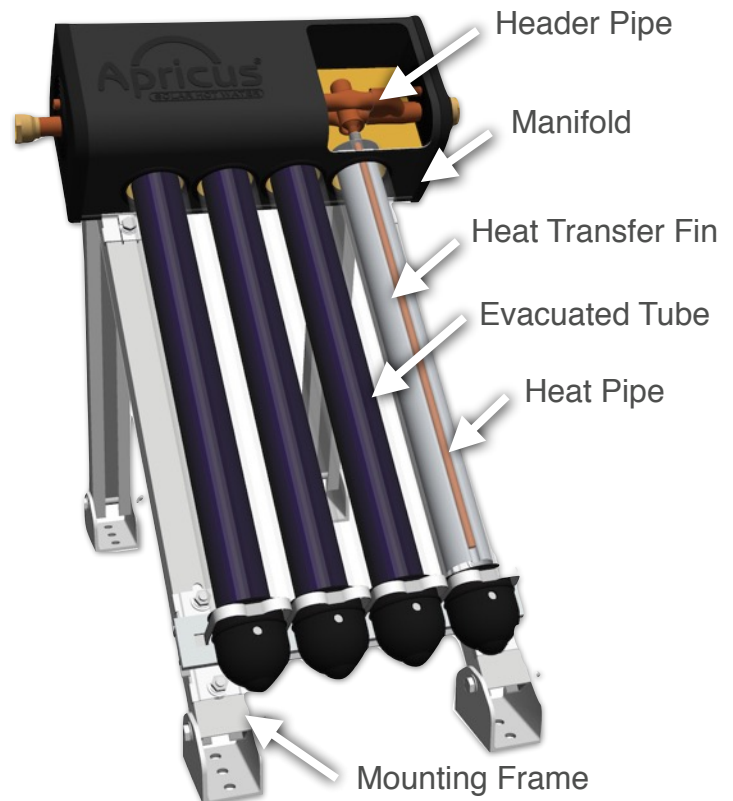
A small amount of water inside the heat pipe turns to steam at only around 86°F, rapidly transferring heat up to the header pipe. Liquid circulates through the header pipe carrying away the heat.

### Mounting Frame

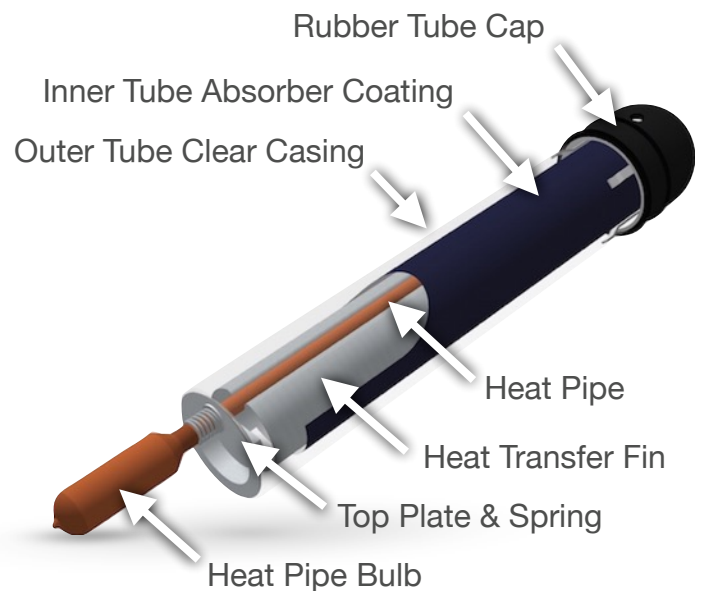
Frame components are made from high tensile and corrosion resistant anodized aluminum, with marine grade 316 stainless steel fasteners. The aluminum frame extrusions are designed to withstand extreme wind and snow loading with only 2 mounting rails, greatly speeding up the installation process.

A range of components are available to mount on almost any roof type and at various angles.

### Complete ETC Collector



### Evacuated Tube & Heat Pipe





## EVOLUTIONARY DESIGN

The ETC solar collector is the successor to Apricus' flagship product, the AP evacuated tube solar collector. Tens of thousands of AP collectors have been installed worldwide over the past 8 years.

Internal R&D, 3rd party lab testing and feedback from installers have resulted in a range of incremental improvements. The same overall dimensions have been maintained, so most ETC components maintain backward compatibility with AP collectors. Below are just some of the key improvements.

### *Manifold Casing*

The manifold casing has been upgraded from an electroplated finish after folding, to PVDF coated aluminium sheets.

The 500m / 1640' long rolls of the coated metal are produced in a fully automated state of the art production line. The rolls are cut into sheets, stamped and folded into manifold case shape.

PVDF is widely used for roofing and wall panels due to its excellent performance in harsh outdoor environments.



### *Freeze Resistant Heat Pipes*

Many Apricus' collectors are installed in cold regions and so freeze resilience is vital.

Apricus has developed a new generation of freeze protected heat pipes that have passed European (Solarkeymark) testing as well as Apricus internal, more stringent, freeze cycle tests.

Cycles simulating over 10 years of harsh winters have been completed without freeze related damage.



### *Header Pipe Connections*

Apricus has supplied collectors to Australia for more than seven years with DRZ brass flared compression fittings that provide an extremely reliable, leak free metal to metal seal.

This reliable fitting is now being implemented to all regions with the new ETC design. Adaptors are offered by Apricus that provide standard 3/4" male NPT thread or sweat connections. This format also provides a union connection between collectors connected in series.



### *Mounting Frame*

The new mounting frame is made from high tensile 6005-T5 grade anodised aluminum alloy. The frame strength and mounting format has been certified as meeting Australian region D (196mph) cyclonic wind loading requirements.

The anodised frame treatment combined with marine grade 316SS attachment plates, tube clips, nuts, bolts and washers make the collector extremely durable even in coastal installations.



## CHOICE OF MATERIALS

Materials used in the Apricus ETC solar collector have been chosen to provide optimum efficiency while ensuring reliability, longevity and excellent end of life recyclability.

### *Silicone Rubber*

HTV Silicone rubber is used for the manifold seals and tube caps due to its excellent stability through a wide temperature range and excellent UV stability.

### *Tube Attachment*

Plastic tube caps that clip into the frame are widely used by many other brands, but they become brittle and degrade in UV radiation.

In contrast, Apricus ETC solar collectors use a high tensile 316 grade stainless steel clip that ensures the tubes are held firmly and able to withstand extreme wind loads.



### *High Purity Copper*

Apricus manufactures heat pipes in house using high purity C10200 grade copper combined with an ageing process that ensure long term vacuum stability and optimum heat transfer.

Using a lower purity grade copper such as C12200 reduces the cost of the heat pipes considerably but can reduce the longevity as impurities in the copper leach out over time (3-5 years) to form an air pocket in the bulb, compromising heat transfer.



### *Folded Aluminum Manifold Casing*

Rather than using thick extruded aluminium for the manifold casing, the ETC collector uses folded 0.8mm thin high tensile PVDF coated aluminum alloy sheet. This provides a very strong, rigid casing that provides a total assembled manifold weight of only 20.2 lbs for ETC-30, half that of most competitors' designs.

That extra weight makes life a lot harder for installers carrying the manifold up a ladder! Prototypes of an extruded manifold casing design were developed by Apricus in 2008, but rejected by installers in field trials simply due to the extra weight it added.



### *Evacuated Tubes*

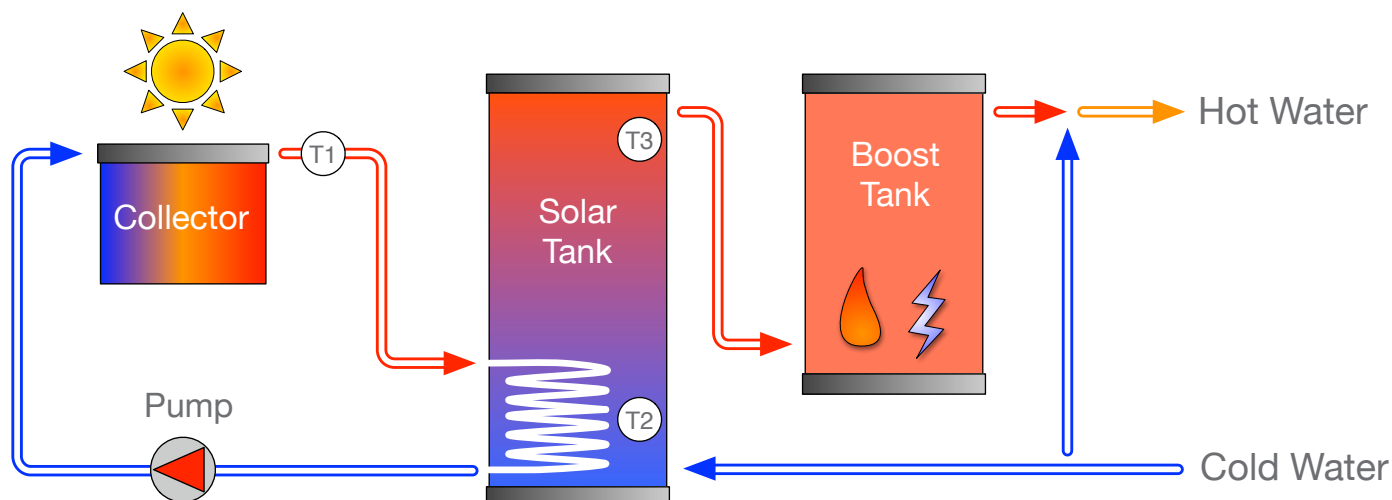
Apricus uses extremely durable twin-glass tubes with a high efficiency selective coating. Each batch of tubes undergoes random selection steel ball impact testing and 100% visual inspection. In addition Apricus tubes have passed Australian, European (Solarkeymark) and Swiss hail stone impact testing.

### *End of Life Recyclability*

Ease of recycling was a key consideration when selecting the materials for the ETC solar collector, so ensuring minimal end of life environmental impact.



## SOLAR SYSTEM OPERATION



### System Operation Overview

1. The ETC solar collector converts sunlight into usable heat, heating the liquid in the header pipe.
2. Once the temperature in the header pipe up is measured to be hotter than the water in the bottom of the storage tank (T2), the pump turns on. The liquid is slowly circulated through the header pipe in the collector, heating by ~13°F during each pass.
3. Depending on the location, the climate, and local requirements, water may be circulated directly from the storage tank, or through an internal coil (as shown) or external heat exchanger. Gradually throughout the day, the water in the storage tank is heated up.
4. The temperature in the top of the solar tank (T3) is monitored and the solar system is shut down (or excess heat is dissipated) once a maximum temperature (~170°F) has been reached.
5. If the water is not already hot enough from solar input, the traditional heating system boosts the solar pre-heated water up to the required temperature. The boosting may be an electrical element inside the main storage tank (solar tank), or a secondary tank (gas or electric). Since the water has already been heated by solar energy, less energy is consumed.
6. In hot climates up to 80% of domestic hot water can be provided by solar energy, with 55-60% provided in cold climates.



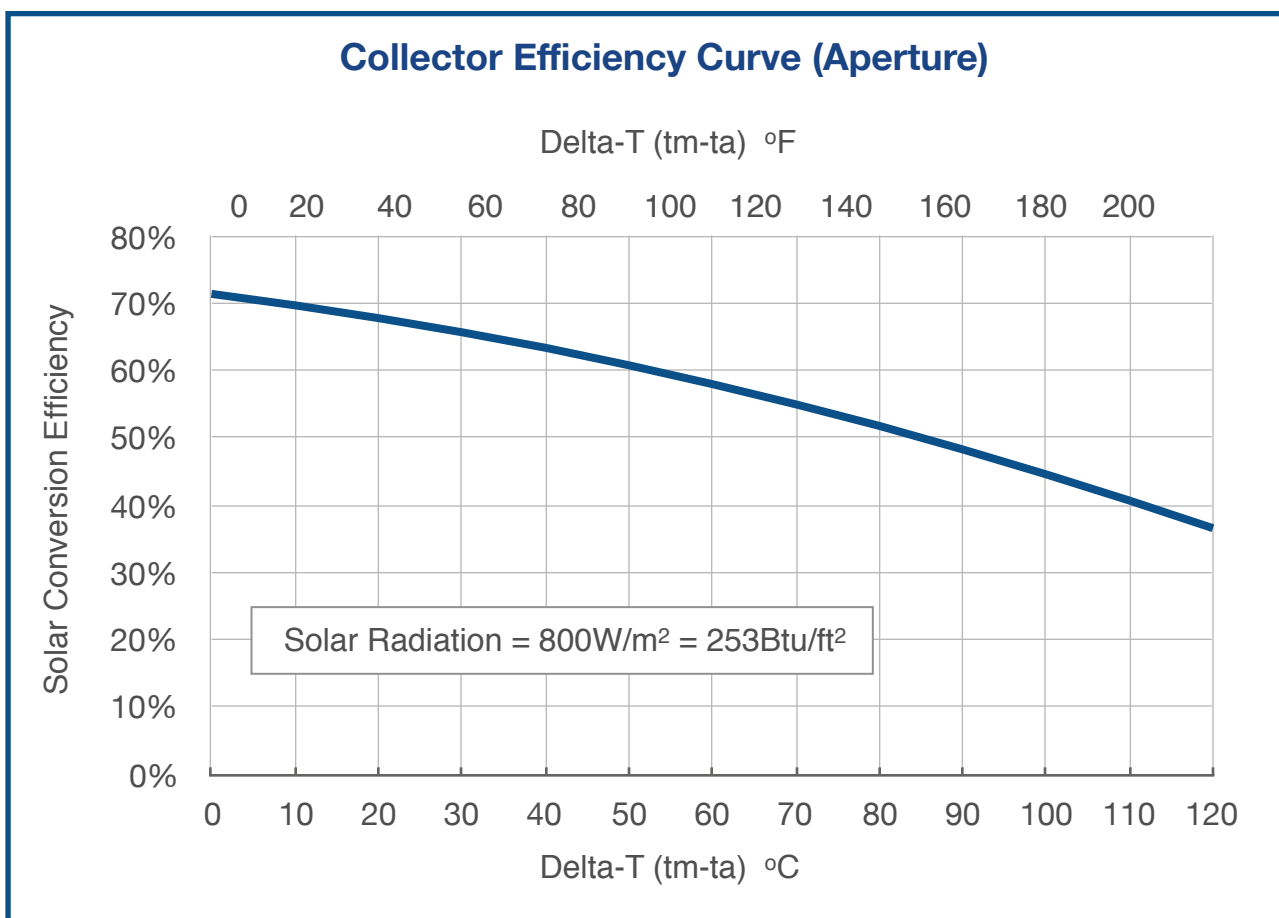


## COLLECTOR EFFICIENCY

Below are the SRCC OG-100 reports for the ETC 30 tube collectors. For other models please refer to their SRCC OG-100 reports.

Category (Ti-Ta)	High Radiation (2000 Btu/ft <sup>2</sup> /day)	Medium Radiation (1500 Btu/ft <sup>2</sup> /day)	Low Radiation (1000 Btu/ft <sup>2</sup> /day)
A (-9°F)	45.3 kBtu/day	34.2 kBtu/day	23 kBtu/day
B (9°F)	43.7 kBtu/day	32.6 kBtu/day	21.5 kBtu/day
C (36°F)	40.9 kBtu/day	29.8 kBtu/day	18.6 kBtu/day
D (90°F)	34.4 kBtu/day	23.5 kBtu/day	12.5 kBtu/day
E (144°F)	26.7 kBtu/day	15.8 kBtu/day	5.9 kBtu/day

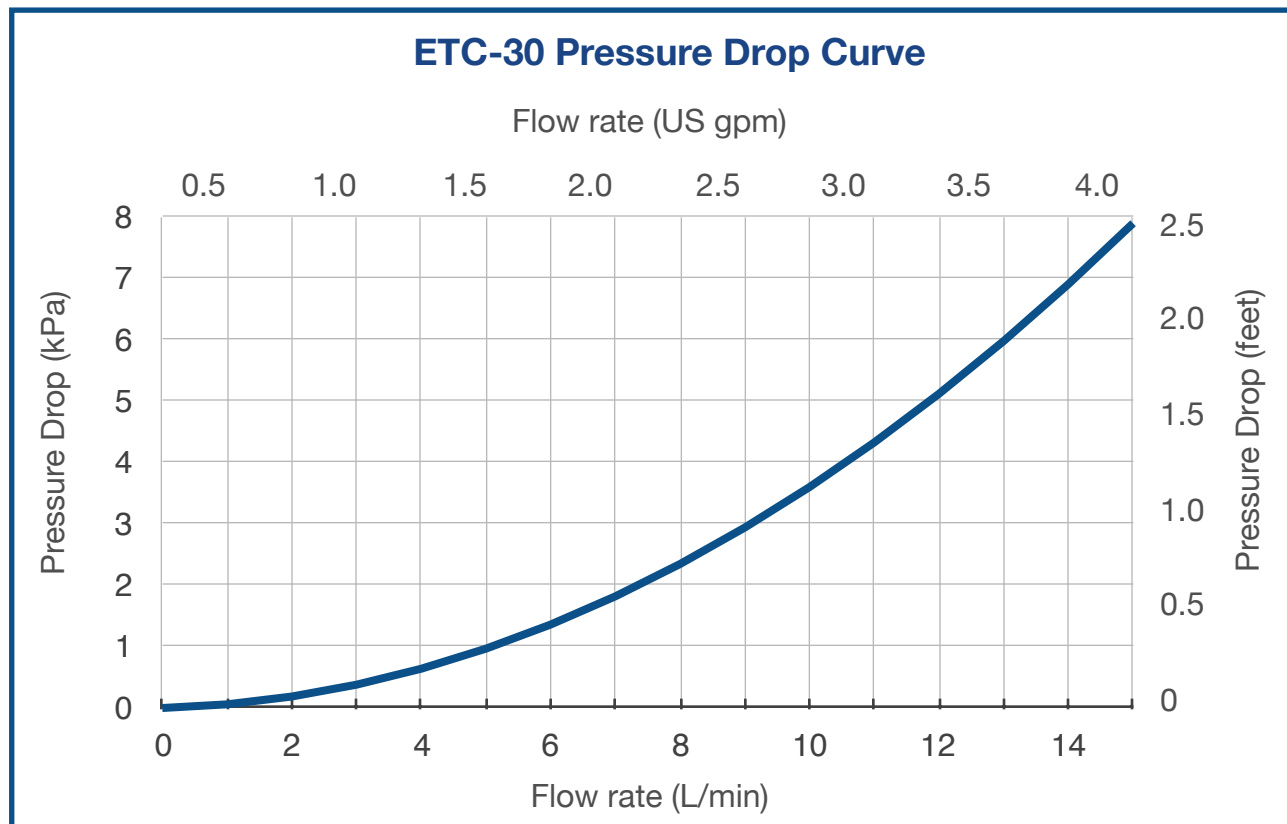
A- Pool Heating (Warm Climate); B- Pool Heating (Cool Climate); C- Water Heating (Warm Climate)  
D- Space & Water Heating (Cool Climate); E- Commercial Hot Water & Cooling



*It is important to consider BOTH efficiency conversion and IAM to evaluate a collector's true daily or annual heat output.*

## PRESSURE DROP

The following curves provides the pressure drop values for an ETC-30 collectors. This can be used to help determine pump sizing when installing a number of collectors in series.

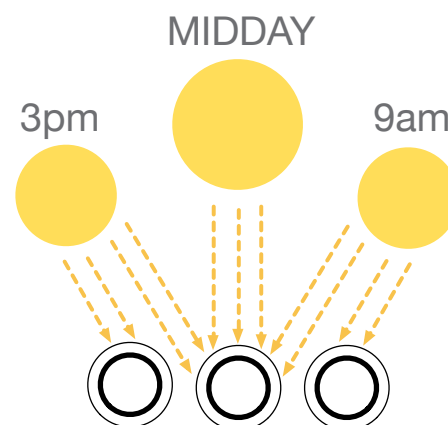


## INCIDENCE ANGLE MODIFIER (IAM)

IAM is a measure of the change in collector output as the sun angle changes. Longitudinal IAM is the path of the sun in the sky throughout the year. Transversal IAM represents the sun's path over the collector each day from morning to afternoon and is very different for Apricus evacuated tubes compared to flat absorbers due to the round shape.

The round shaped evacuated tube absorber passively tracks the sun throughout the day. The transversal IAM values are also referred to as "angle modifiers" and are multiplied by efficiency calculations to get the actual total output of the solar collector.

The values in the table are required if using Polysun, TRNSYS or other solar thermal output modelling calculators.



Angle	0°	10°	20°	30°	40°	50°	60°	70°
Longitudinal	1	1	1	0.99	0.98	0.97	0.94	0.88
Transversal	1	1.03	1.07	1.16	1.31	1.4	1.44	1.3

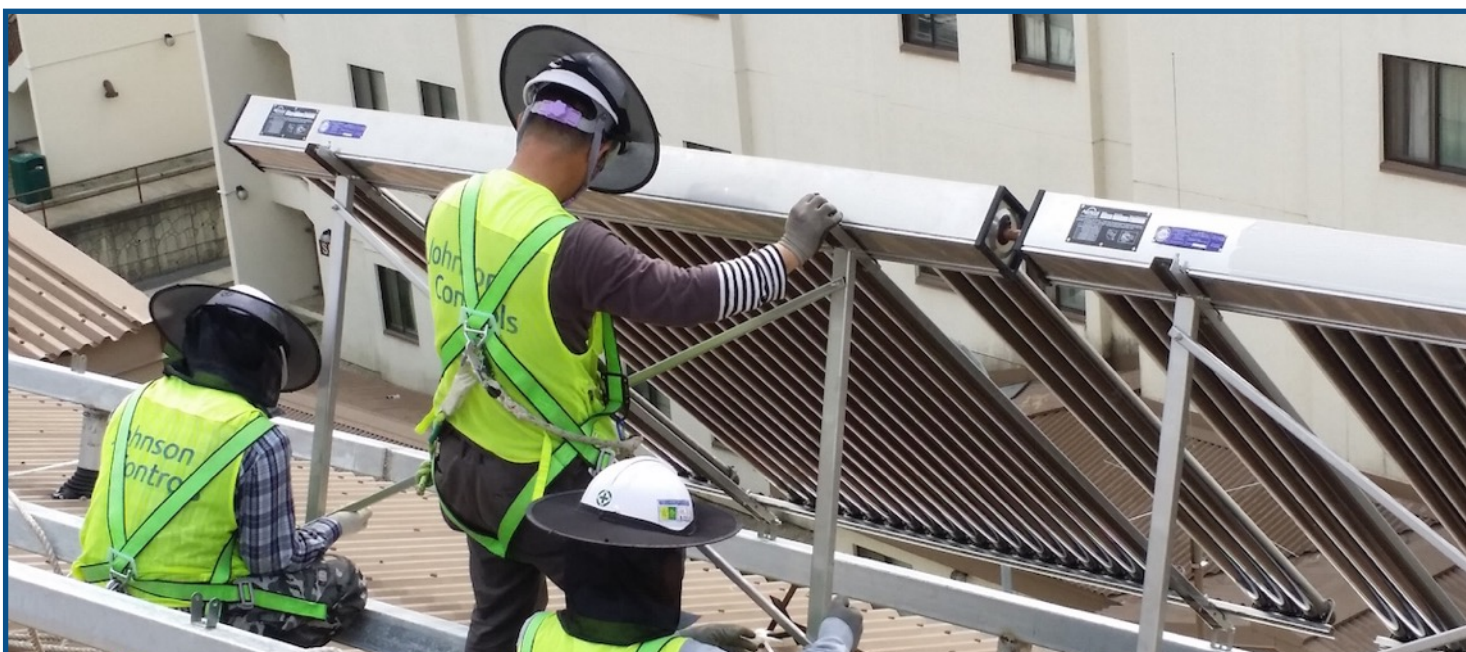
## SNOW LOADING

ETC solar collectors are rated for up to 60 lbs/ft<sup>2</sup> snow loading. The roof and attachment points must also be suitably rated. In snow prone regions the installation angle should be 45° or higher and the collector raised off the roof by a suitable amount to prevent snow build-up on the tubes.



## WIND LOADING

Apricus ETC aluminium solar collector mounting frames have been independently reviewed by structural engineers and confirmed to be strong enough for wind gusts up to 196 mph. Conditions apply, so always consult with a local structural engineer to review the roof structure to ensure a suitable strength attachment method is implemented. Refer to the full ETC solar collector installation manual for more information on frame design and mounting.





## STANDARD PACKAGE CONTENTS

The following diagrams shows the standard parts that are packed together. Refer to the following page for more detailed product listing, part numbers, packing dimensions and weights.

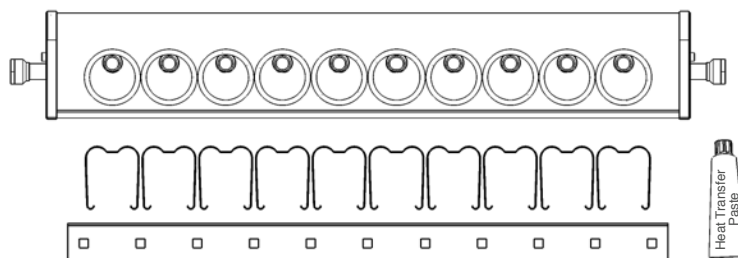
### Box/Package

### Package Contents

#### Manifold Box

##### Contents:

- 1 x ETC manifold
- 1 x Bottom Track
- Tube Clips
- Heat Transfer Paste



#### Front Tracks

##### Contents:

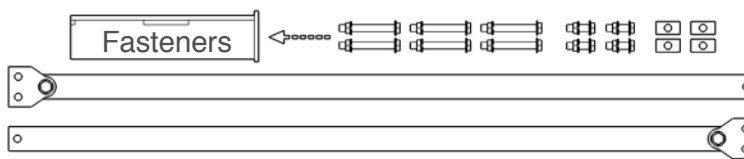
- 2 x Front Tracks
- 8 x Attachment Plates (on tracks)



#### Rear Legs

##### Contents:

- 2 x Rear Legs
- 4 x Tri-plates (attached)
- 1 x Box of nuts, bolts etc.



#### X Braces

##### Contents:

- 1 x X-brace
- Bolts packed with rear legs



#### U Feet

##### Contents:

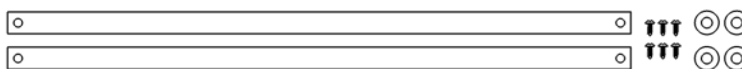
- 4 x U Feet
- 4 x Bolts (in plastic bag)



#### Leg Extensions

##### Contents:

- 2 x Leg Extensions
- 6 x Screws
- 4 x Washers



#### Roof Rails

##### Contents:

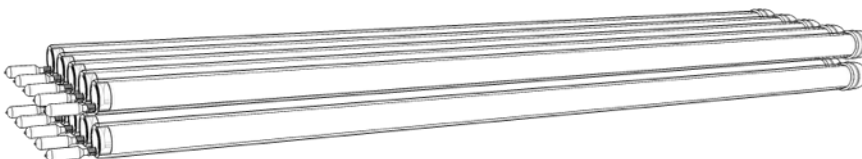
- 2 x Roof Rails
- 8 x L Brackets (on rails)
- 4 x Bolts (attached to L brackets)



#### ET & HP Box

##### Contents:

- Evacuated Tubes & Heat Pipes
- 3 packing formats:  
(10/10-ET/HP, 12/12-ET/HP or 10 ET)



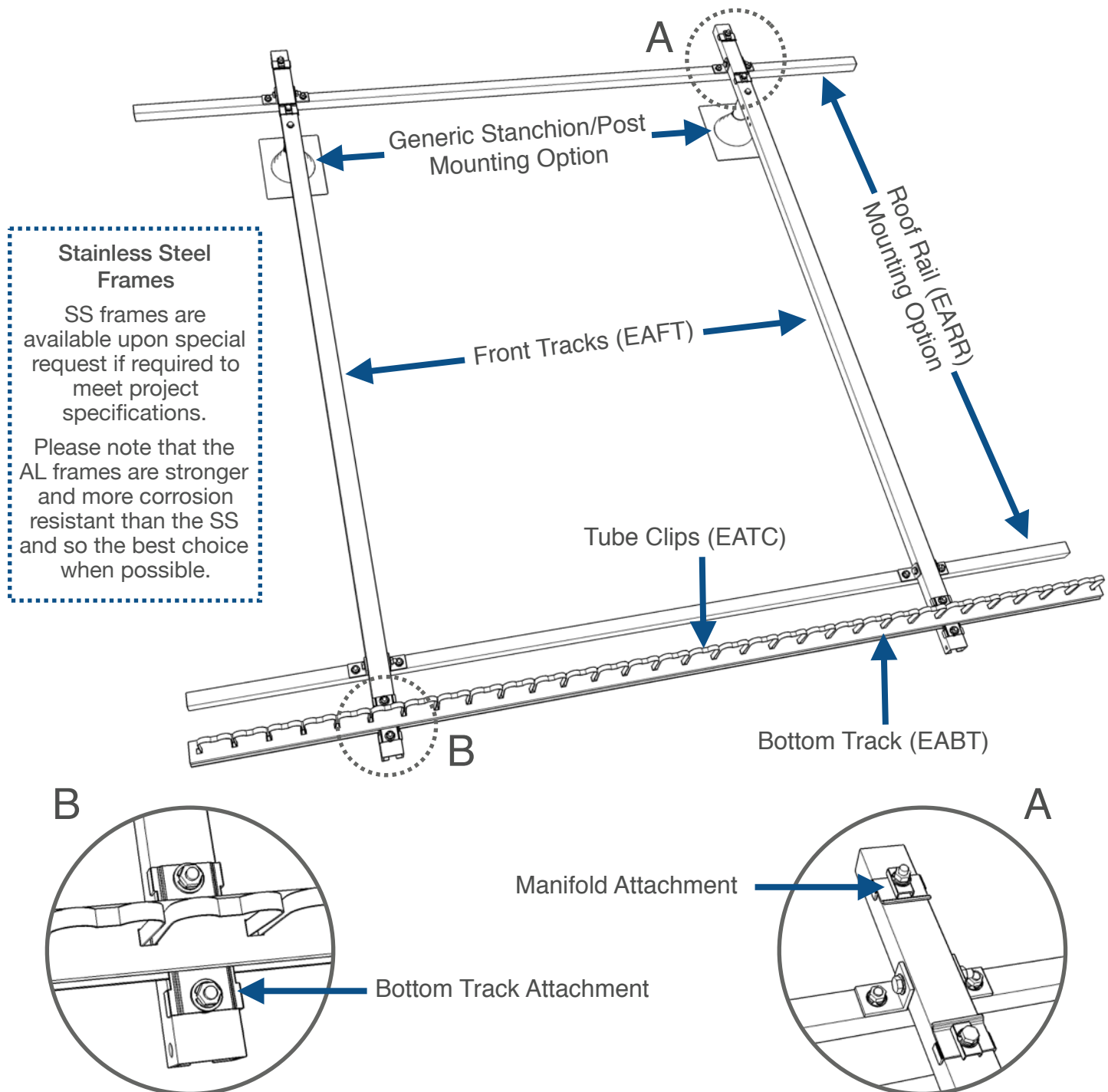


## PACKING DIMENSIONS & WEIGHTS

Product Type	Packing List (1 Set)	Sets/ Box	Box Dimensions LxWxH	Set G. Wt Box G. Wt
<b>10T Manifold Box</b>	<ul style="list-style-type: none"> <li>• 1 x ETC-10T (Manifold)</li> <li>• 1 x AEBT-10T (Bottom Track)</li> <li>• 10 x ETC-FR-TC (Tube Clips)</li> <li>• 1 x HTP-25G (Heat Transfer Paste)</li> </ul>	1	35.4*7.3*6.3"	11 lbs
<b>20T Manifold Box</b>	<ul style="list-style-type: none"> <li>• 1 x ETC-20T (Manifold)</li> <li>• 1 x EABT-20T (Bottom Track)</li> <li>• 20 x ETC-FR-TC (Tube Clips)</li> <li>• 1 x HTP-25G (Heat Transfer Paste)</li> </ul>	1	65.4*7.1*6.3"	22 lbs
<b>30T Manifold Box</b>	<ul style="list-style-type: none"> <li>• 1 x ETC-30T (Manifold)</li> <li>• 1 x EABT-30T (Bottom Track)</li> <li>• 30 x ETC-FR-TC (Tube Clips)</li> <li>• 1 x HTP-25G (Heat Transfer Paste)</li> </ul>	1	91.7*7.1*6.3"	31.1 lbs
<b>Box of 10*ET &amp; HP</b>	• 10 x Evacuated Tubes & Heat Pipes	1	77.4*14.5*7.5"	61.6 lbs
<b>Front Tracks</b>	• 2 x EAFT (Front Tracks)	4	81.9*10*5.9"	10.7 lbs 46.3 lbs
<b>20D Rear Legs</b>	<ul style="list-style-type: none"> <li>• 2 x EARL-20D (20° Rear Legs)</li> <li>• 1 x 316SS Bolt Set in Plastic Box</li> </ul>	8	27.6*12.8*6.9"	3.2 lbs 27.6 lbs
<b>30D Rear Legs</b>	<ul style="list-style-type: none"> <li>• 2 x EARL-30D (30° Rear Legs)</li> <li>• 1 x 316SS Bolt Set in Plastic Box</li> </ul>	8	37*12.8*6.9"	4.2 lbs 36.2 lbs
<b>45D Rear Legs</b>	<ul style="list-style-type: none"> <li>• 2 x EARL-45D (45° Rear Legs)</li> <li>• 1 x 316SS Bolt Set in Plastic Box</li> </ul>	8	48.4*12.8*6.9"	5.5 lbs 47.8 lbs
<b>60D Rear Legs</b>	<ul style="list-style-type: none"> <li>• 2 x EARL-60D (60° Rear Legs)</li> <li>• 1 x 316SS Bolt Set in Plastic Box</li> </ul>	8	58.1*12.8*6.9"	6.6 lbs 56.9 lbs
<b>10T X Brace</b>	• 1 x EAXB-10T (X Braces)	8	30.1*10*1.8"	0.44 lbs 4.6 lbs
<b>20T X Brace</b>	• 1 x EAXB-20/22T (X Braces)	8	50*10*1.8"	0.66 lbs 6.6 lbs
<b>30T X Brace</b>	• 1 x EAXB-30T (X Braces)	8	59.6*10*1.8"	0.77 lbs 8.6 lbs
<b>U Feet</b>	<ul style="list-style-type: none"> <li>• 4 x EAUF-45 (U Feet)</li> <li>• 4 x 316SS Bolt Set</li> </ul>	1	5.1*3.1*3.5"	1.5 lbs
<b>10T Roof Rails</b>	• 2 x EARR-10T (Roof Rails)	8	30.5*11.6*7.5"	3.5 lbs 30 lbs
<b>20T Roof Rails</b>	• 2 x EARR-20T (Roof Rails)	8	63.6*11.6*7.5"	6.5 lbs 55.1 lbs
<b>30T Roof Rails</b>	• 2 x EARR-30T (Roof Rails)	4	85.6*11.6*3.9"	8.5 lbs 37.5 lbs
<b>Leg Extension</b>	<ul style="list-style-type: none"> <li>• 2 x EARL-EXT (Leg Extensions)</li> <li>• 6 x Screws</li> <li>• 4 x Washers (Use with EAUF-45 or EARR)</li> </ul>	8	27.4*11*5.9"	2.9 lbs 24.6 lbs

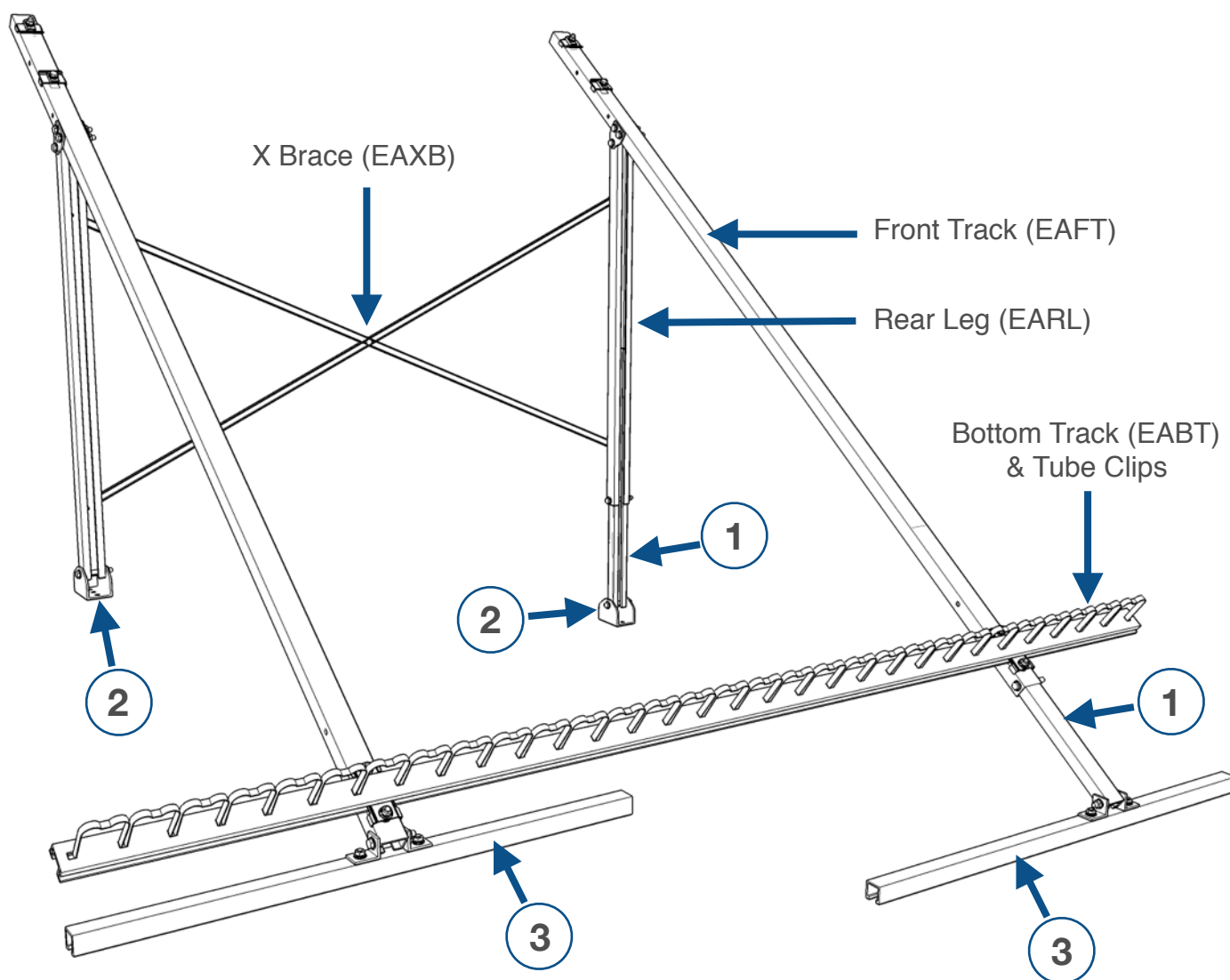
## FLUSH MOUNTING FRAME

- ETC collectors are supplied with a Standard Frame suitable for flush mounting on a  $>20^\circ$  pitched roof.
- Depending on the roof type, there are many methods of attachments formats that can be used, bolted through the sides or top of the Front Tracks. Additional holes may be drilled as required.
- Apricus Roof Rails are an excellent method for attaching to the roof.
- 3rd party mounting hardware such as stanchions/posts may also be used.



## ANGLED MOUNTING FRAME

- Two Rear Legs and an X Brace are added to the Standard Frame to raise the rear of the collector.
- A range of leg lengths are available to achieve angles from ~20° up to ~60°.
- Leg Extensions can also be used to extend the Front Track to raise the collector in snowy regions.
- Diagram below shows various different mounting and adjustment hardware offered by Apricus.



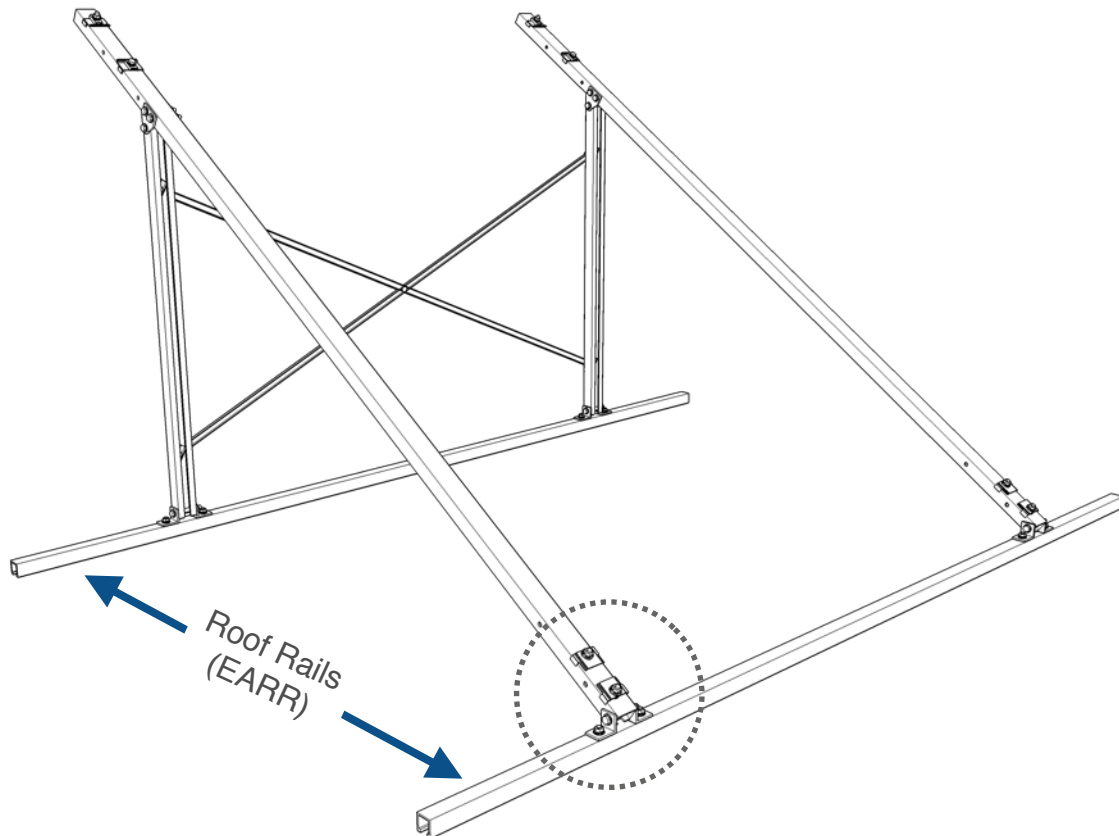
1. Leg Extension (EARL-EXT) \*
2. U Foot (EAUF-45)
3. Roof Rail (EARR) \*\*

\* Leg Extensions ordered separately from Angled Frames.

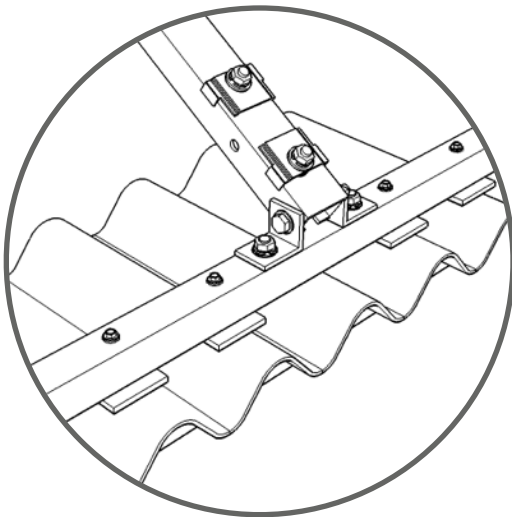
\*\* Roof rails always run the full width of the collector, not half as shown.

## ROOF RAILS

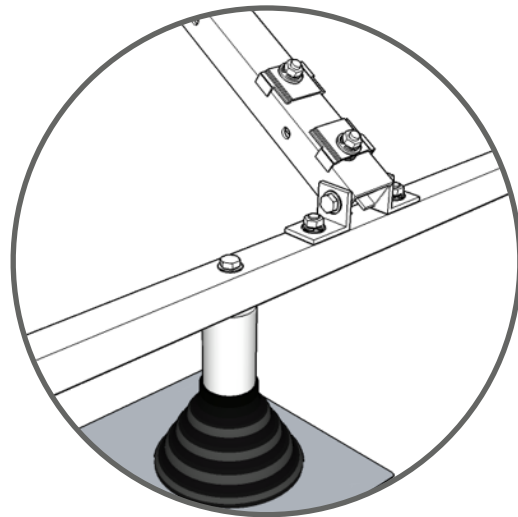
- Designed for use where Front Tracks cannot be aligned neatly with roof mounting points or where many attachment points are required to ensure suitable strength.
- Can be used on the standard frame in a flush mounting format, or on high angle frames (shown below)
- Attached to the Rear Legs or Front tracks using L brackets (supplied) for optimal strength and stability.
- Holes can be drilled in the top or sides of the Roof Rails as required for mounting.



Sheet Metal Roofing



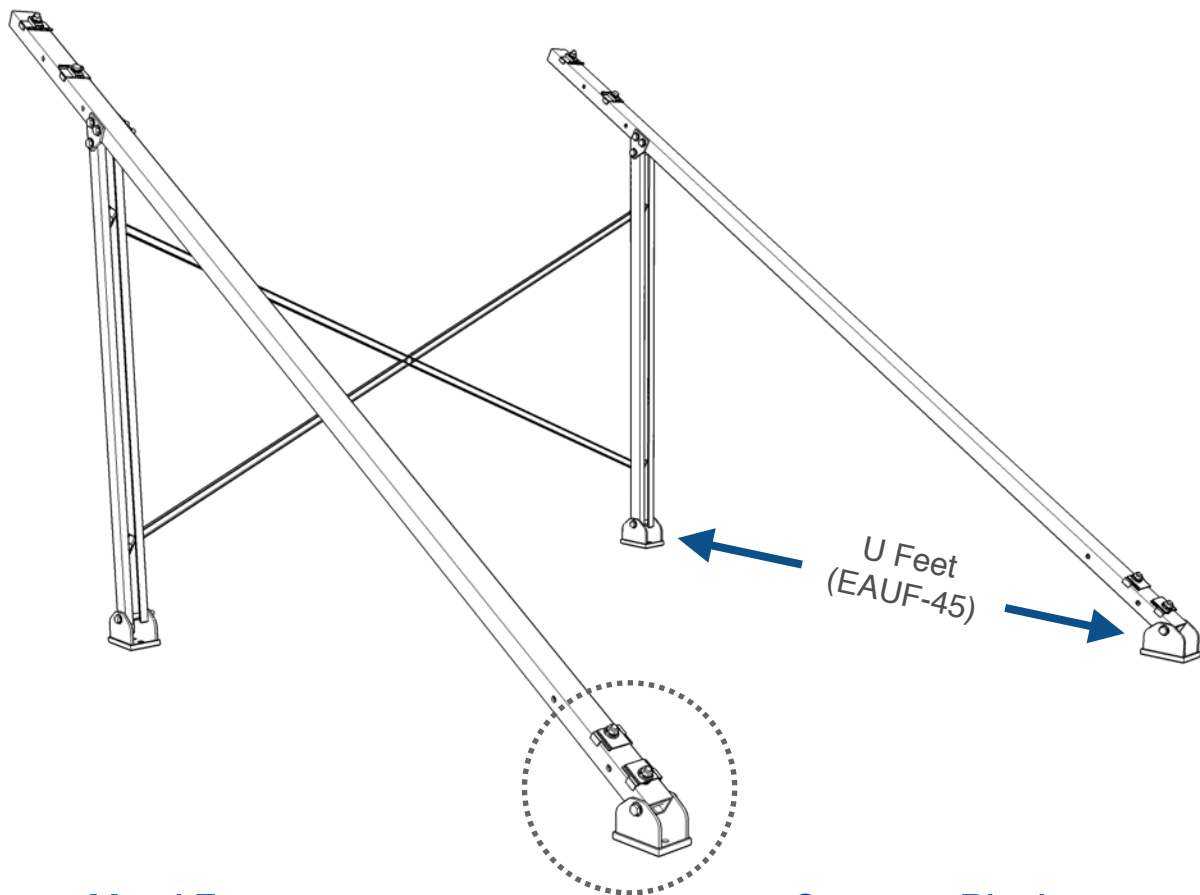
Stanchions / Posts



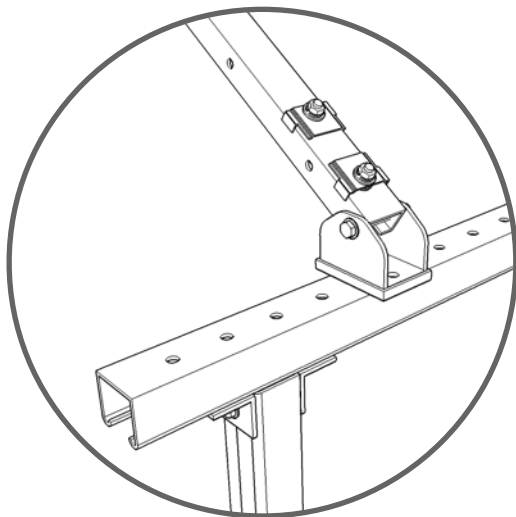


## U FEET

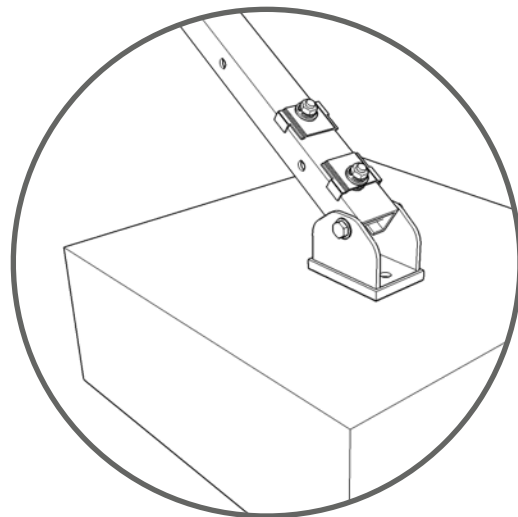
- Standard attachment method for both flush mount and angled frames.
- Attach directly beneath the Front Tracks for flush mounted systems, bolted to stanchion/posts
- Attach to end of end of Rear Legs, Front tracks or Leg Extensions.
- Include a silicone rubber pad to protect other metal surfaces, provide basic sealing.



**Metal Frame**

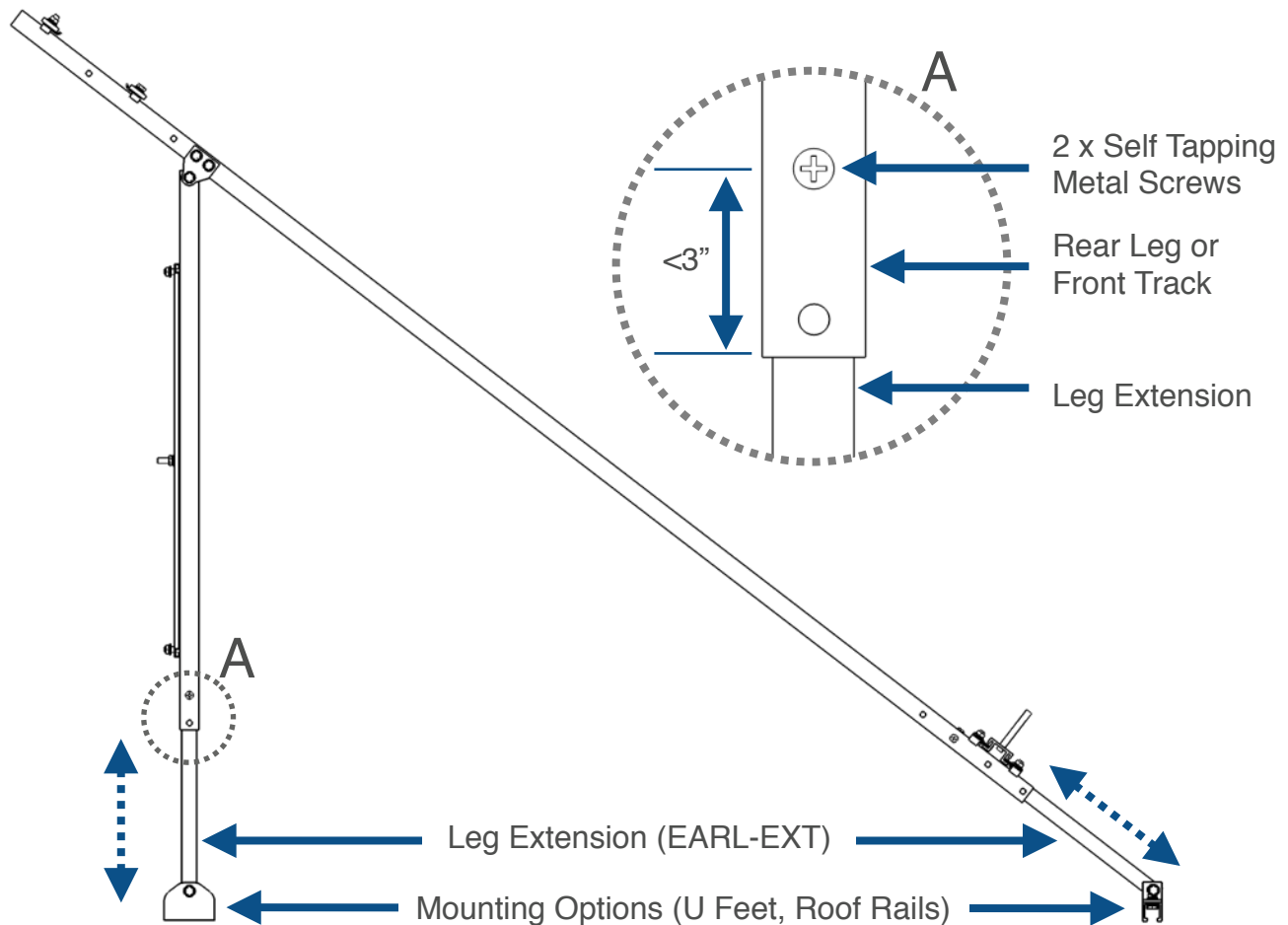


**Concrete Block**

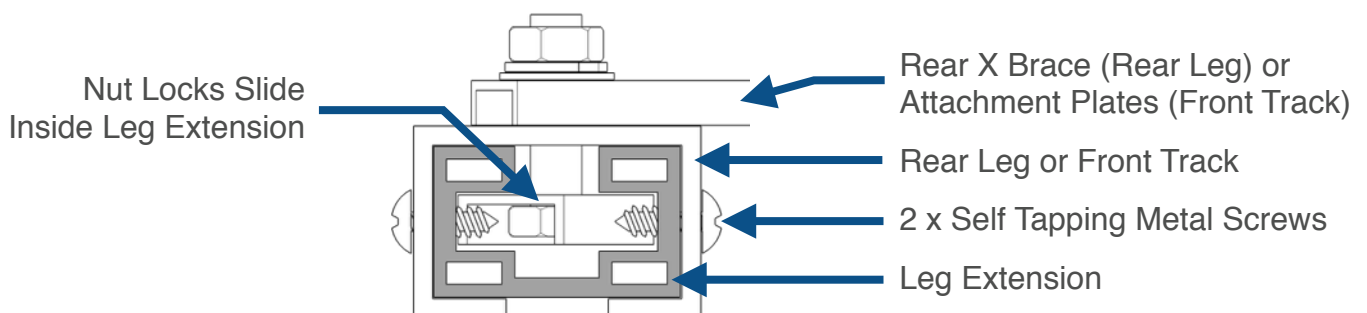


## LEG EXTENSIONS

- Extend rear legs (RL) to achieve larger installation angle or extend front tracks (FT) to lift front of collector off roof in high snowfall regions.
- Leg Extensions are NOT supplied as standard with Rear Legs and must be ordered separately.
- Leg Extension slide inside RL or FT for fully adjustable position.
- Must insert minimum of 4" into RL or FT to ensure sufficient strength.
- Secured using 2 supplied stainless steel screws (drill #28 size pilot holes) plus existing RL or FT bolt(s).
- Screws should be located within 3" of the end of the RL or FT.

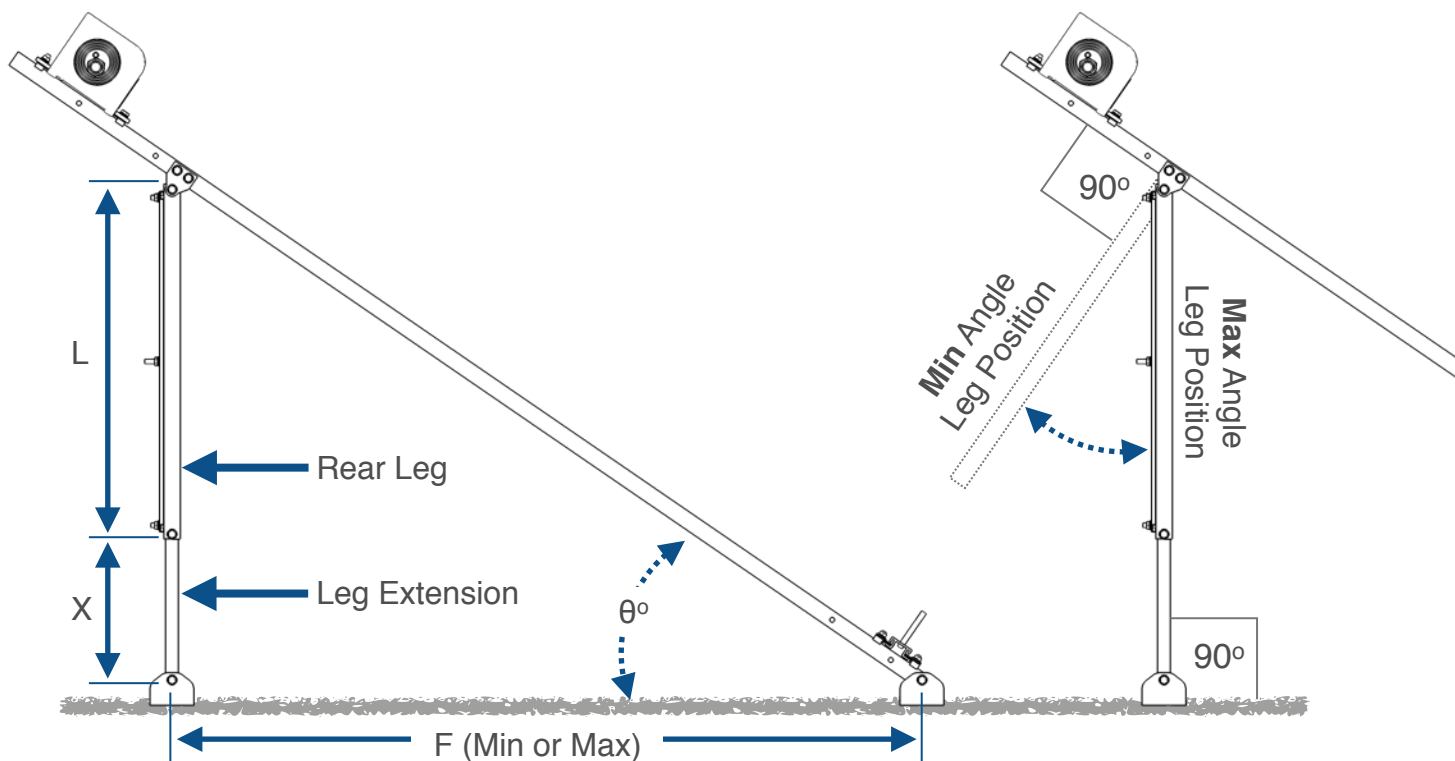


### Cross Sectional View



## MOUNTING ANGLE & DIMENSIONS

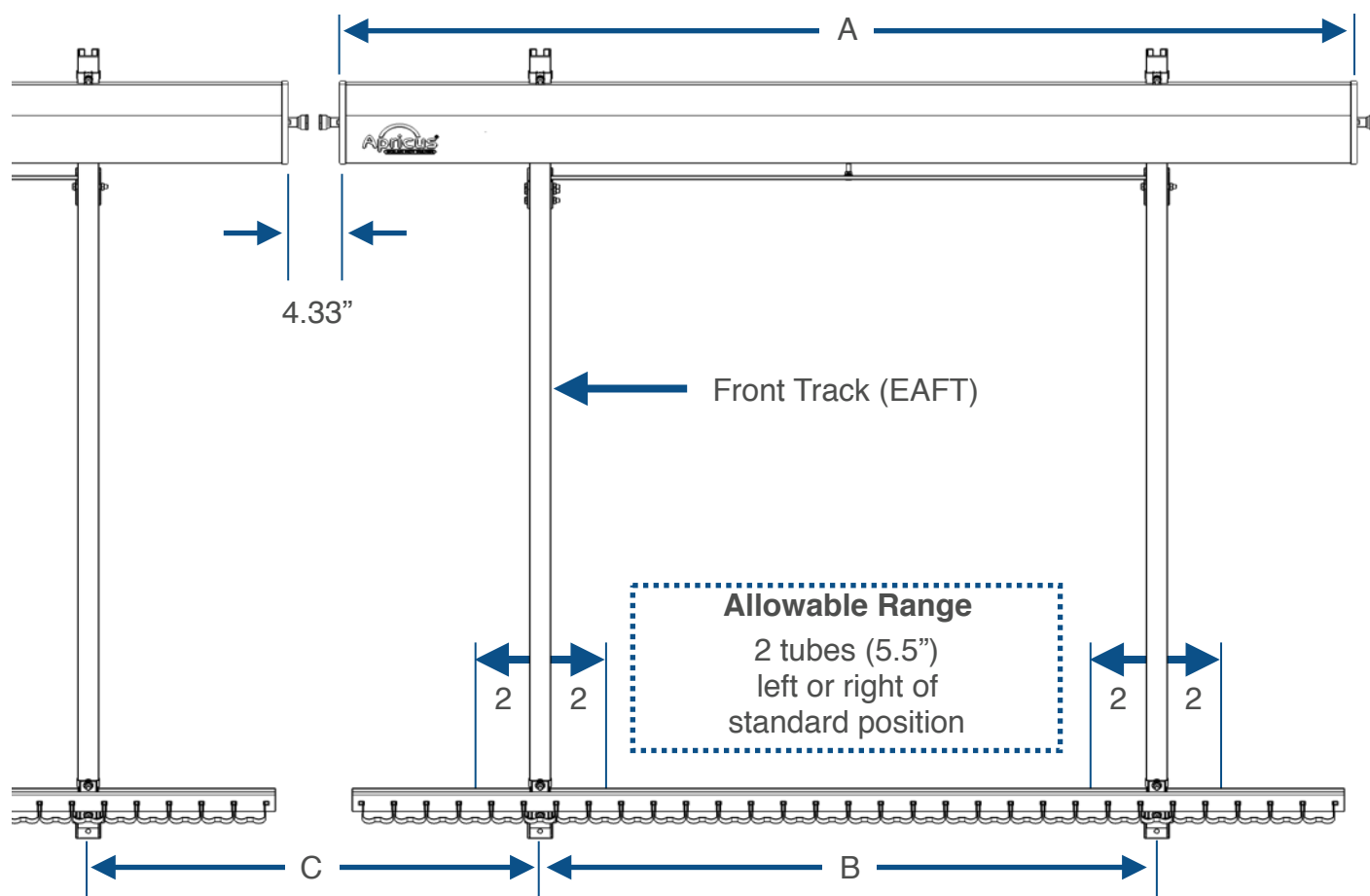
- Rear Legs can be adjusted between Min & Max positions to make small adjustments to the angle.
- Leg positions outside this range are not structurally sound and should not be used.



L (Leg Length)	X (Extension)	F (Min)	F (Max)	$\theta^\circ$ (Min)	$\theta^\circ$ (Max)
EARL-20D (25.6")	No Extension	69.7"	59.6"	22°	23°
	4"	71.3"	57.8"	25°	27.6°
	8"	73.1"	55.7"	28°	31.6°
	12"	75"	53.1"	30.5°	35.8°
	16"	77.2"	50.2"	33°	40.3°
	20"	79.5"	46.6"	35.4°	45°
EARL-30D (35")	No Extension	73.6"	54.8"	28°	33°
	4"	75.6"	52.1"	30.5°	37°
	8"	77.8"	49"	33.1°	42°
	12"	80.1"	45.2"	35.5°	47°
	16"	82.5"	40.7"	37.8	52°
	20"	85.1"	35.3"	40°	58°
EARL-45D (46.4")	No Extension	79.8"	45.8"	35.2°	46
	4"	75.7"	41.4"	30.5°	51.3°
	8"	77.8"	36.1"	33.1°	57.2°
EARL-60D (56.1")	No Extension	85.8"	33.4"	50°	60°

## MOUNTING ANGLE & DIMENSIONS

- The following diagram and table provides the Front Track spacing (and Rear Leg for angled frames) for each collector size (10, 20 & 30 tube).
- Front Tracks can be positioned up to 2 tubes left or right of standard position as required for mounting.
- The standard frame spacing (B) positions the Front Tracks underneath the evacuated tubes:
  - 10T: 2nd & 9th tubes
  - 20T: 3rd & 18th tubes
  - 30T: 6th & 25th tubes



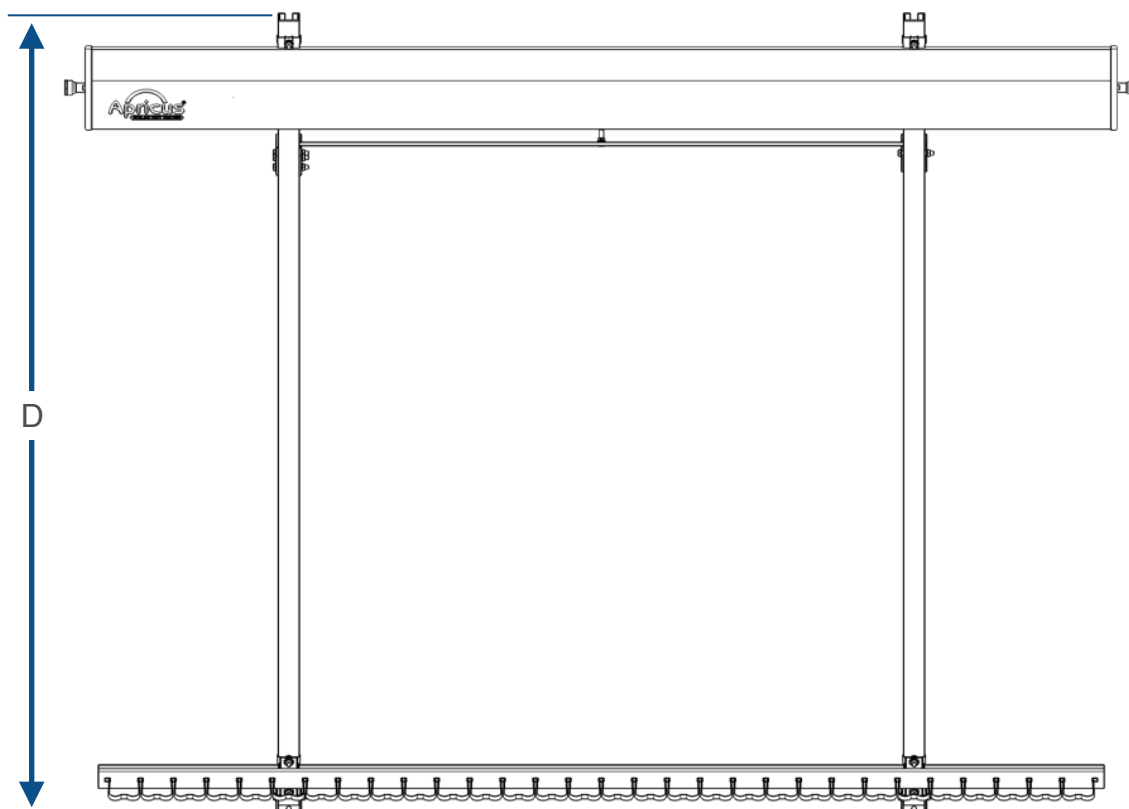
# Tubes	A (Manifold Width)	B (FT Spacing)	C (Next FT Spacing)
10	31.3"	19.3"	16.4"
20	58.9"	41.5"	21.9"
30	86.4"	52.4"	38.4"

\* Height does not include attachment components such as U Feet or Roof Rails

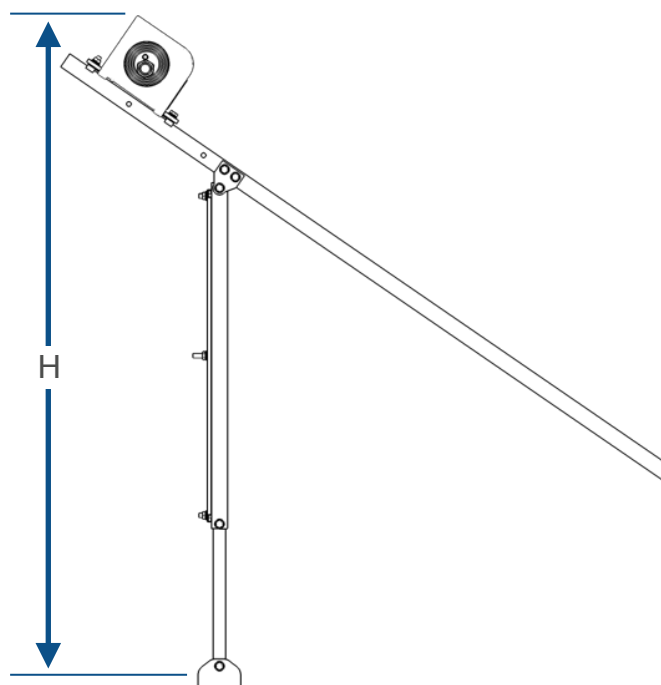


## MOUNTING ANGLE & DIMENSIONS

The following diagram and table provides the overhead depth (D) and height (H) of the collector at each 5° incremental angle between the allowable 20-80° range.



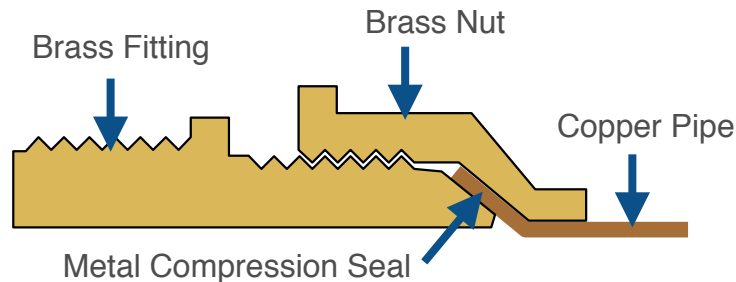
Angle	D (Depth)	H (Height) *
20°	76.3"	31.6"
25°	73.7"	37.6"
30°	70.6"	43.3
35°	66.9"	48.7"
40°	62.7	53.7"
45°	58.1"	58.3"
50°	53"	62.4"
55°	47.6"	66.1"
60°	41.7"	69.3"
65°	35.6"	72.2"
70°	29.3"	74.7"
75°	22.6"	76.8"
80°	15.9"	78.2"



\* Height does not include U foot or Roof Rail height.

## BRASS FITTINGS

- The inlet and outlet of the ETC collector header pipe are factory fitted with a brass flared pipe nut. This connection forms a metal-metal-metal seal which is far more reliable than o-rings or washers when considering the high temperatures that the solar collectors experience during operation.



### Brass Fitting Options

#### Collector-Collector Fitting (BS-FF-CC)

Used between two collectors when connected in series.



#### Male NPT Thread Fitting (BS-FF-075-NPT)

Provides 3/4" male NPT thread (US standard).



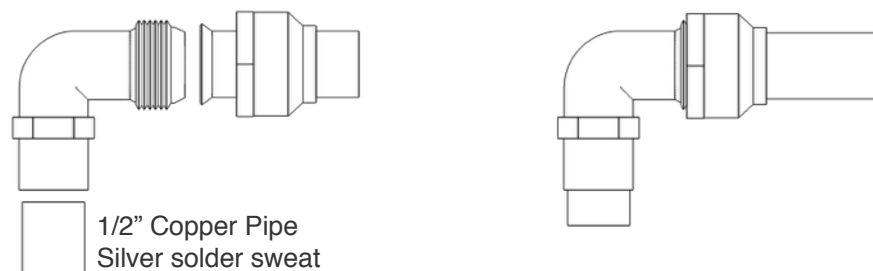
#### 3/4" Copper Pipe Sweat Fitting (BS-FF-075-SWT)

Sweat connection of 3/4" copper pipe (actually 7/8" OD pipe).



#### 1/2" Copper Pipe Sweat Elbow Fitting (BS-FF-050-L)

Sweat connection of 1/2" copper pipe (actually 5/8" OD pipe).  
Suitable for 1/2" pipe run; Max 90 tubes (1.5 gpm)



## LIMIT OF LIABILITY

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Apricus assumes no responsibility under this Limited Warranty for any damage to the Products caused after they have left the control of Apricus, including but not limited to damages caused by any trades people or visitors on the job site, or damage caused as a result of post-installation work. This Limited Warranty shall be invalidated by any abuse, misuse, misapplication or improper installation of the Products.

## GENERAL

Apricus warrants its Solar Collectors and Accessories (the "Products") to be free from defects in workmanship under normal usage for the applicable Warranty Period from the date of installation. This Limited Warranty extends to the End-User of the product at the original installation location, and is not transferable.

In the event of a defect, malfunction or other failure of the Products occurring within the applicable Warranty Period which is not caused by any misuse or damage to the Product while in the possession of the End-User, Apricus will remedy the failure or defect within a reasonable amount of time. The remedy will consist of repair or replacement of the Products, or refund of the purchase price, in Apricus's sole discretion. However, Apricus will not elect to refund the purchase price unless it is unable to provide a replacement, and repair is not commercially practical and cannot be made within a reasonable timeframe. After a reasonable number of attempts by Apricus to remedy any defects or malfunction, the End-User will be entitled to either a refund or replacement of the product or its component parts. The remedies stated herein are the sole remedies for defects within the applicable warranty period.

## WARRANTY PERIOD

The "Effective Date" of warranty coverage is the installation date as recorded on the installation record form, purchase invoice date, or, if neither are available, the date of manufacture plus sixty (60) days.

Components	Failure Type	Coverage
Manifold Box	Manifold Box Leaking	Ten years parts
	Rubber Seal Cracking	
	Manifold Case Colour Fading	One year parts
Header Pipe	Manifold Case Coating Pitting or Peeling	Three year parts
	Leaking	Fifteen years parts
	Brass Fittings	Ten years parts
Evacuated Tube	Complete Loss of Vacuum	Ten years parts
Heat Pipe	Not Transferring Heat	Ten years parts
Mounting Frame	Structural Failure	Fifteen years parts
	Dimensional Errors Effecting Operation	
Tube Clips	Structural Failure	Ten years parts
Tube Caps	Cracking	Ten years parts

## WARRANTY EXCLUSIONS

This warranty shall be void and shall have no effect if:

### General

- The design or structure of the Products are attempted to be modified or altered in any way, including but not limited to attaching non-Apricus approved appliances or equipment;
- The Products are not installed or repaired in accordance with applicable local codes;
- The Products are not installed by qualified, suitably licensed persons;
- The installer had not received Product installation training by an authorized Apricus distribution partner;
- The installation was not completed in line with the guidelines of the then current Apricus installation manual;
- Failure due to vibrations or movement of the piping connected to the collector, such as when valve or faucet/tap is closed.
- Failure is due to wind, hail, storms or other acts of God;
- Failure or loss of efficiency is due to lime-scale formation;
- Product serial tag or other identification is defaced or removed;

- Product is relocated from its original point of installation;
- Collector is not commissioned and is left to dry stagnate for a period exceeding 14 consecutive days;
- Any operation or environmental conditions that exceed documented design limits of the system components or materials.

### Manifold Casing

- Damage to the manifold casing during or after installation;
- Failure to seal insulation up to manifold casing for rear port manifolds;
- Piping connected to the inlet/outlet is not properly supported causing rubber seal to be pulled out of shape;
- Gradual colour fade
- Damage due to attacks by insects or animals
- Piping connected to the inlet/outlet is "hung" off the collector.

### Header Pipe

- Leakage from any connection to header inlet or outlet;
- Exposure of the manifold header pipe to pressure exceeding 0.8Mpa/8bar/116psi;
- Exposure to flow rates exceeding 15 L/min or 4gpm;
- Freezing of the liquid contained in the manifold header pipe;
- Leakage of the manifold header pipe as a clear result of metallic corrosion and not structural braze failure;
- Poor heat transfer, excessive pressure drop, or blockage of header as a result of scale formation;
- Installation of more than five end port manifolds in series without at least one suitably flexible connection that allows longitudinal expansion and contraction of the header pipe(s);
- Piping connection on the inlet/outlet of the collector that restricts longitudinal expansion and contraction of the header pipe(s).
- Piping connected to the inlet/outlet is "hung" off the collector.
- Brass fitting has been over torqued, indicated by deformation marks on corners of the HEX of the nut, crossed thread or other clear evidence of incorrect use;
- Spanner/wrench with teeth (rather than flats) has been used to tighten the fitting;
- Non Apricus supplied nipple has been used with the flared nut;
- Copper flare has been deformed from original manufacturer shape.

### Evacuated Tubes

- Heat pipes are not correctly installed full depth into header ports, indicated by deformation of the evacuated tube top plate;
- Heat pipes are not running straight up and down the top side of the evacuate tube due to excessive rotation of the evacuated tube during installation;
- Collector mounting frame is installed in twisted (not squared or even) position putting stress on evacuated tubes;

### Heat Pipes

- Heat pipes are installed outside of the required 20-80deg installation angle;
- Heat pipes have been bent or damaged causing rupture to the copper pipe.

### Mounting Frame & Tube Clips

- Failure attributable to any modification to the mounting frame components;
- Failure when not installed in accordance with Apricus installation guidelines;
- Failure of non-Apricus fastening components or the structure to which mounting frame is attached;
- Failure due to wind loading when the mounting frame has not been installed in line with installation guidelines and local structural codes for high wind regions.
- Failure due to wind loading in areas that experience >205km/h / 127mph where local structural engineering approval has not been obtained;
- Failure due to excessive snow loading;

### Tube Caps

- Damage is due to attacks by insects or animals.

## END USER OBLIGATIONS

In order to obtain performance of any obligation under this warranty, the End-User must:

- Firstly determine if the Product is within the applicable Warranty Periods. This can be determined by referring to the installation record form, or alternatively the original purchase invoice. If neither documents are available, the serial number and manufacturing date will need to be read off the Product serial tag. Some Products may be installed in a location that is not accessible to the End-User and so the information may only be obtained by a qualified service technician.
- Contact the company who installed the original Product, or, if unknown or unable to be contacted, contact Apricus directly.

The following information may be required to determine if the Product issue is eligible for coverage under the terms of this Limited Warranty.

- Information related to the manner in which the Product(s) were installed.
- The history of operation.
- Any repairs that may have been made.
- Evidence that the Product(s) were installed by a qualified, licensed contractor.
- Evidence that the Product(s) were installed in accordance with the applicable Products Installation Manuals and any special written design or installation guidelines by Apricus for this project.
- Evidence that the Product(s) were installed in accordance with all applicable local building, plumbing and electrical codes.

## CUSTOMER SATISFACTION

We believe you will be fully satisfied by the service you receive from the local Apricus representatives and from Apricus. However, because our aim is your complete and lasting satisfaction, Apricus adds another feature to your warranty's protection. In the unlikely event that you feel our response to a warranty service request is not satisfactory, Apricus offers you an opportunity to air your complaint in an impartial Mediation process. The opportunity to mediate any complaint made by an End-User is hereby extended to all End-Users. If you are a Consumer End-User, the provisions of the federal Magnuson-Moss Warranty Act provide that you may not file suit against Apricus until your claim has been submitted to Mediation for an informal dispute settlement and a decision has been reached.