August 2009 FSEC # 00341N

MANUFACTURER

Collector Model

C15ts12

Techno-Solis Inc.

301 20th Street South

St. Petersburg, Florida 33712

This solar collector was evaluated by the Florida Solar Energy Center (FSEC) in accordance with prescribed methods and was found to meet the minimum standards established by FSEC. This evaluation was based on solar collector tests performed at Bodycote Materials Testing Canada Inc., Mississauga, Ontario, Canada. The purpose of the tests is to verify initial performance conditions and quality of construction only. The resulting certification is not a guarantee of long term performance or durability.

		DESCRIPTION		
Gross Length	3.627	meters	11.90	feet
Gross Width	1.210	meters	3.97	feet
Gross Depth	0.006	meters	0.02	feet
Gross Area	4.407	square meters	47.43	square feet
Transparent Frontal Area	4.407	square meters	47.43	square feet
Volumetric Capacity	15.3	liters	4.0	gallons
Weight (empty)	13.2	kilograms	29.0	pounds
Recommended Flow Rate	147	ml/s	2.3	gpm
Test Pressure	241	kPa	35	psig
Number of Cover Plate	37-24-5	None		
Flow Pattern		Parallel	Forced	circulation
Number of Tubes		104		
		MATERIALS		

Enclosure

Glazing

None None

Absorber

Co-polymer plastic with UV stabilization

Absorber Coating Insulation

None None

Testing per ISO 9806-3

Test Flow Rate

147.0 ml/s

Κτα

 $(T_i-T_a)/I$

 $(T_i-T_n)/I$ -

2.33 gpm

 $[(T_i-T_a)/I]^2$

Incident Angle Modifier

1.0 - 0.07 $([1/\cos \theta] - 1)$

THERMAL PERFORMANCE

Efficiency Equations

SI Units °C / Watt/m2

English Units °F / Btu/hr-ft2

82.2

 $(T_i-T_a)/I$

33

82.3 -1670 822 -

1634

82.3 - 294

287

 $(T_i-T_a)/I$

 $[(T_i - T_n)/I]^2$

RATING

This collector has been rated for energy output on measured performance and an assumed standard day. Total solar energy available for the standard day is 5045 Watt-hour/m2 (1600 Btu/ft2) distributed over a 10 hour period.

Output energy rating for this collector based on the second-order efficiency curve are:

1076

Collector Temperature

ENERGY OUTPUT

Low	35 °C	(95 °F)	50,200	Kilojoules/day	47,700	Btu/day
Intermediate	50 °C	(122 °F)	22,200	Kilojoules/day	21,100	Btu/day
High	100 °C	(212 °F)	0	Kilojoules/day	0	Btu/day



August 2009 FSEC # 00340N

MANUFACTURER

Collector Model

C15ts10

Techno-Solis Inc. 301 20th Street South

St. Petersburg, Florida 33712

This solar collector was evaluated by the Florida Solar Energy Center (FSEC) in accordance with prescribed methods and was found to meet the minimum standards established by FSEC. This evaluation was based on solar collector tests performed at Bodycote Materials Testing Canada Inc., Mississauga, Ontario, Canada. The purpose of the tests is to verify initial performance conditions and quality of construction only. The resulting certification is not a guarantee of long term performance or durability.

	DESCRIPTION		
3.008	meters	9.87	feet
1.210	meters	3.97	feet
0.006	meters	0.02	feet
3.677	square meters	39.58	square feet
3.677	square meters	39.58	square feet
13.5	liters	3.6	gallons
10.9	kilograms	24.0	pounds
147	ml/s	2.3	gpm
241	kPa	35	psig
	None		
	Parallel	Forced	circulation
	104		
	1.210 0.006 3.677 3.677 13.5 10.9	3.008 meters 1.210 meters 0.006 meters 3.677 square meters 3.677 square meters 13.5 liters 10.9 kilograms 147 ml/s 241 kPa None Parallel	3.008 meters 9.87 1.210 meters 3.97 0.006 meters 0.02 3.677 square meters 39.58 3.677 square meters 39.58 13.5 liters 3.6 10.9 kilograms 24.0 147 ml/s 2.3 241 kPa 35 None Parallel Forced

MATERIALS

Enclosure

None Glazing None

Absorber

Co-polymer plastic with UV stabilization

Absorber Coating Insulation

None None

THERMAL PERFORMANCE

Testing per ISO 9806-3

Test Flow Rate

147.0 ml/s

2.33 gpm

Incident Angle Modifier

1.0 - 0.07 $([1/\cos \theta] - 1)$ Κτα

Efficiency Equations

SI Units °C / Watt/m2 82.3 -

English Units °F / Btu/hr-ft2

1670 $(T_i - T_n)/I$

- 294 82.3

 $(T_i-T_a)/I$

82.2 $\eta =$

1634 $(T_i-T_a)/I$ -

1076 $[(T_i-T_a)/I]^2$

82.2 287 $\eta =$

 $(T_i-T_n)/I$ -

[(T;-Ta)/1]2

RATING

This collector has been rated for energy output on measured performance and an assumed standard day. Total solar energy available for the standard day is 5045 Watt-hour/m² (1600 Btu/ft²) distributed over a 10 hour period.

Output energy rating for this collector based on the second-order efficiency curve are:

Collector Temperature

ENERGY OUTPUT

Low	35°C	(95 °F).
Intermediate	50 °C	(122 °F)
High	100 °C	(212 °F)

41,900	Kilojoules/day
18,600	Kilojoules/day
0	Kilojoules/day

39,800 Btu/day Btu/day 17,600 Btu/day

33



FLORIDA SOLAR ENERGY CENTER*

SUMMARY INFORMATION SHEET

August 2009 FSEC # 00339N

MANUFACTURER

Collector Model

C15ts08

Techno-Solis Inc.

301 20th Street South

St. Petersburg, Florida 33712

This solar collector was evaluated by the Florida Solar Energy Center (FSEC) in accordance with prescribed methods and was found to meet the minimum standards established by FSEC. This evaluation was based on solar collector tests performed at Bodycote Materials Testing Canada Inc., Mississauga, Ontario, Canada. The purpose of the tests is to verify initial performance conditions and quality of construction only. The resulting certification is not a guarantee of long term performance or durability.

		DESCRIPTION		
Gross Length	2.414	meters	7.92	feet
Gross Width	1.210	meters	3.97	feet
Gross Depth	0.006	meters	0.02	feet
Gross Area	2.928	square meters	31.52	square feet
Transparent Frontal Area	2.928	square meters	31.52	square feet
Volumetric Capacity	11.7	liters	3.1	gallons
Weight (empty)	8.6	kilograms	19.0	pounds
Recommended Flow Rate	147	ml/s	2.3	gpm
Test Pressure	241	kPa	35	psig
Number of Cover Plate		None		
Flow Pattern		Parallel	Forced	circulation
Number of Tubes		104		
Tumour or Fuebo		MATERIALS		

Enclosure

Glazing

Absorber

Absorber Coating Insulation

None None

Co-polymer plastic with UV stabilization

None None

THERMAL PERFORMANCE

Testing per ISO 9806-3

Test Flow Rate

147.0 ml/s 2.33 gpm

energy available for the standard day is 5045 Watt-hour/m2 (1600 Btu/ft2) distributed over a 10 hour period.

0.07

Incident Angle Modifier

Κτα

 $([1/\cos \theta] - 1)$

Efficiency Equations

SI Units °C / Watt/m2 82.3 -

English Units °F / Btu/hr-ft2

- 287

- 294 82.3

 $(T_i-T_a)/I$

 $(T_i-T_a)/I$

33

 $[(T_i-T_a)/I]^2$

$(T_i-T_a)/I$ - $[(T_i-T_a)/I]^2$

 $(T_i - T_n)/I$

RATING This collector has been rated for energy output on measured performance and an assumed standard day. Total solar

Output energy rating for this collector based on the second-order efficiency curve are:

Collector Temperature

ENERGY OUTPUT

Low	35 °C	(95 °F).
Intermediate	50 °C	(122 °F)
High	100 °C	(212 °F)

1670

33,400	Kilojoules/day
14,800	Kilojoules/day
	**** 1 /1

31,700.	Btu/day
14,000	Btu/day
0	Rtu/day



August 2009 FSEC # 00338N

MANUFACTURER

Collector Model

C20ts12

Techno-Solis Inc. 301 20th Street South

St. Petersburg, Florida 33712

This solar collector was evaluated by the Florida Solar Energy Center (FSEC) in accordance with prescribed methods and was found to meet the minimum standards established by FSEC. This evaluation was based on solar collector tests performed at Bodycote Materials Testing Canada Inc., Mississauga, Ontario, Canada. The purpose of the tests is to verify initial performance conditions and quality of construction only. The resulting certification is not a guarantee of long term performance or durability.

	DESCRIPTION		
3.658	meters	12.00	feet
1.210	meters	3.97	feet
0.006	meters	0.02	feet
4.434	square meters	47.72	square feet
4.434	square meters	47.72	square feet
15.6	liters	4.1	gallons
13.6	kilograms	30.0	pounds
147	ml/s	2.3	gpm
241	kPa	35	psig
	None		
	Parallel	Forced	circulation
	104		
	1.210 0.006 4.434 4.434 15.6 13.6	3.658 meters 1.210 meters 0.006 meters 4.434 square meters 4.434 square meters 15.6 liters 13.6 kilograms 147 ml/s 241 kPa None Parallel	3.658 meters 12.00 1.210 meters 3.97 0.006 meters 0.02 4.434 square meters 47.72 4.434 square meters 47.72 15.6 liters 4.1 13.6 kilograms 30.0 147 ml/s 2.3 241 kPa 35 None Parallel Forced

MATERIALS

Enclosure

None None

Glazing Absorber

Co-polymer plastic with UV stabilization

Absorber Coating

None

Insulation

None

THERMAL PERFORMANCE

Testing per ISO 9806-3

Test Flow Rate

147.0 ml/s 2.33 gpm

 $[(T_i - T_a)/I]^2$

Incident Angle Modifier

Κτα

 $(T_i-T_a)/I$ $(T_i-T_a)/I$ -

- 0.07

 $([1/\cos \theta] - 1)$

Efficiency Equations

82.2

SI Units °C / Watt/m2 82.3 -

1670

1634

English Units °F / Btu/hr·ft2

287

82.3 - 294

82.2

 $(T_i-T_a)/1$ $(T_i-T_a)/I$

33 $[(T_i-T_a)/I]^2$

RATING

This collector has been rated for energy output on measured performance and an assumed standard day. Total solar energy available for the standard day is 5045 Watt-hour/m2 (1600 Btu/ft2) distributed over a 10 hour period.

Output energy rating for this collector based on the second-order efficiency curve are:

1076

Collector Temperature

ENERGY OUTPUT

Low 35 °C (95 °F) 50,600 Kilojoules/day 48,000 Intermediate 50 °C (122 °F) 22,400 Kilojoules/day 21,200 Kilojoules/day High 100 °C (212 °F)

Reference 00060N



Btu/day

Btu/day

Btu/day

FLORIDA SOLAR ENERGY CENTER*

SUMMARY INFORMATION SHEET

August 2009 FSEC # 00337N

MANUFACTURER

Collector Model

C20ts08

Techno-Solis Inc.

301 20th Street South

St. Petersburg, Florida 33712

This solar collector was evaluated by the Florida Solar Energy Center (FSEC) in accordance with prescribed methods and was found to meet the minimum standards established by FSEC. This evaluation was based on solar collector tests performed at Bodycote Materials Testing Canada Inc., Mississauga, Ontario, Canada. The purpose of the tests is to verify initial performance conditions and quality of construction only. The resulting certification is not a guarantee of long term performance or durability.

	DESCRIPTION		
2.438	meters	8.00	feet
1.210	meters	3.97	fect
0.006	meters	0.02	feet
2.955	square meters	31.81	square feet
2.955	square meters	31.81	square feet
12.1	liters	3.2	gallons
9.1	kilograms	20.0	pounds
147	ml/s	2.3	gpm
241	kPa	35	psig
	None		* 30.00
	Parallel	Forced	circulation
	104		
	1.210 0.006 2.955 2.955 12.1 9.1 147	2.438 meters 1.210 meters 0.006 meters 2.955 square meters 2.955 square meters 12.1 liters 9.1 kilograms 147 ml/s 241 kPa None Parallel	2.438 meters 8.00 1.210 meters 3.97 0.006 meters 0.02 2.955 square meters 31.81 2.955 square meters 31.81 12.1 liters 3.2 9.1 kilograms 20.0 147 ml/s 2.3 241 kPa 35 None Parallel Forced

MATERIALS

Enclosure

None Glazing None

Absorber

Co-polymer plastic with UV stabilization

Absorber Coating Insulation

None None

THERMAL PERFORMANCE

Testing per ISO 9806-3

Test Flow Rate

147.0 ml/s

2.33 gpm

Incident Angle Modifier

Κτα 1.0 - 0.07 $([1/\cos \theta] - 1)$

Efficiency Equations

SI Units °C / Watt/m2

English Units °F / Btu/hr·ft2

- 294 82.3

 $(T_i-T_a)/I$ 33 $[(T_i - T_a)/I]^2$

82.2

82.3 -1670 $(T_i-T_a)/I$

1634

(Ti-Ta)/I -1076

 $[(T_i-T_a)/I]^2$

82.2 287 $\eta =$

(Ti-Ta)/I

RATING

This collector has been rated for energy output on measured performance and an assumed standard day. Total solar energy available for the standard day is 5045 Watt-hour/m2 (1600 Btu/ft2) distributed over a 10 hour period.

Output energy rating for this collector based on the second-order efficiency curve are:

Collector Temperature

ENERGY OUTPUT

Low 35 °C (95 °F). Intermediate 50 °C (122 °F) High 100 °C (212 °F)

Kilojoules/day 33,700 14,900 Kilojoules/day Kilojoules/day

32,000 Btu/day 14,100 Btu/day Btu/day



August 2009 FSEC # 00060N

MANUFACTURER

Collector Model

C20ts10

Techno-Solis Inc. 301 20th Street South

St. Petersburg, Florida 33712

This solar collector was evaluated by the Florida Solar Energy Center (FSEC) in accordance with prescribed methods and was found to meet the minimum standards established by FSEC. This evaluation was based on solar collector tests performed at Bodycote Materials Testing Canada Inc., Mississauga, Ontario, Canada. The purpose of the tests is to verify initial performance conditions and quality of construction only. The resulting certification is not a guarantee of long term performance or durability.

		DESCRIPTION			
Gross Length	3.048	meters	10.00	feet	
Gross Width	1.210	meters	3.97	feet	
Gross Depth	0.006	meters	0.02	feet	
Gross Area	3.672	square meters	39.52	square feet	
Transparent Frontal Area	3.672	square meters	39.52	square feet	
Volumetric Capacity	13.9	liters	3.7	gallons	
Weight (empty)	11.3	kilograms	25.0	pounds	
Recommended Flow Rate	147	ml/s	2.3	gpm	
Test Pressure	241	kPa	35	psig	
Number of Cover Plate		None		, ,	
Flow Pattern		Parallel	Forced	circulation	
Number of Tubes		104			

MATERIALS

Enclosure

Glazing

None None

None

1670 (T₁-T₂)/I

Absorber

Co-polymer plastic with UV stabilization

Absorber Coating Insulation

None

THERMAL PERFORMANCE

Testing per ISO 9806-3

Test Flow Rate

147.0 ml/s

2.33 gpm

Incident Angle Modifier

Κτα 1.0 0.07 $([1/\cos \theta] - 1)$

Efficiency Equations

SI Units °C / Watt/m2 82.3 -

English Units °F / Btu/hr-ft2

82.2

- 294

82.3

 $(T_i-T_n)/I$

33

 $(T_i-T_a)/I$ η =

 $[(T_i-T_a)/I]^2$

- 287

 $(T_i-T_n)/I$

 $[(T_i - T_a)/I]^2$

RATING

This collector has been rated for energy output on measured performance and an assumed standard day. Total solar energy available for the standard day is 5045 Watt-hour/m² (1600 Btu/ft²) distributed over a 10 hour period.

Output energy rating for this collector based on the second-order efficiency curve are:

Collector Temperature

ENERGY OUTPUT

Low	35 °C	(95 °F).	41,900	Kilojoules/day	39,700	Btu/day
Intermediate	50°C	(122 °F)	18,500	Kilojoules/day	17,600	Btu/day
High	100 °C	(212 °F)	0	Kilojoules/day	0	Btu/day

