

DISPLAY THIS CARD ON PRINCIPAL FRONTAGE OF WORK



# CITY OF PORTLAND BUILDING PERMIT

This is to certify that DATAENTRY 21 LLC

Located At 231 YORK ST

Job ID: 2012-10-5173-ALTCOMM

CBL: 044-E-003-001

has permission to 16 solar panels on roof

provided that the person or persons, firm or corporation accepting this permit shall comply with all of the provisions of the Statutes of Maine and of the Ordinances of the City of Portland regulating the construction, maintenance and use of the buildings and structures, and of the application on file in the department.

Notification of inspection and written permission procured before this building or part thereof is ~~labeled~~ or otherwise closed-in. 48 HOUR NOTICE IS REQUIRED.

A final inspection must be completed by owner before this building or part thereof is occupied. If a certificate of occupancy is required, it must be

Fire Prevention Officer

  
Code Enforcement Officer / Plan Reviewer

THIS CARD MUST BE POSTED ON THE STREET SIDE OF THE PROPERTY  
PENALTY FOR REMOVING THIS CARD

## BUILDING PERMIT INSPECTION PROCEDURES

Please call 874-8703 or 874-8693 (ONLY)

or email: [buildinginspections@portlandmaine.gov](mailto:buildinginspections@portlandmaine.gov)

With the issuance of this permit, the owner, builder or their designee is required to provide adequate notice to the city of Portland Inspections Services for the following inspections. Appointments must be requested 48 to 72 hours in advance of the required inspection. The inspection date will need to be confirmed by this office.

- **Please read the conditions of approval that is attached to this permit!! Contact this office if you have any questions.**
- **Permits expire in 6 months. If the project is not started or ceases for 6 months.**
- **If the inspection requirements are not followed as stated below additional fees may be incurred due to the issuance of a "Stop Work Order" and subsequent release to continue.**

Footings/Setbacks prior to pouring concrete

Close In Elec/Plmb/Frame prior to insulate or gyp

Final Inspection

The project cannot move to the next phase prior to the required inspection and approval to continue, REGARDLESS OF THE NOTICE OF CIRCUMSTANCES.

IF THE PERMIT REQUIRES A CERTIFICATE OF OCCUPANCY, IT MUST BE PAID FOR AND ISSUED TO THE OWNER OR DESIGNEE BEFORE THE SPACE MAY BE OCCUPIED.



# PORTLAND MAINE

*Strengthening a Remarkable City, Building a Community for Life • [www.portlandmaine.gov](http://www.portlandmaine.gov)*

Director of Planning and Urban Development  
Jeff Levine

Job ID: 2012-10-5178-ALTCOMM

Located At: 231 YORK ST

CBL: 044- E-003-001

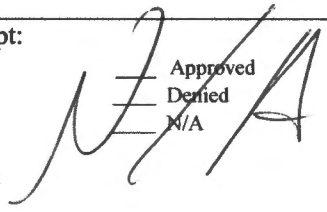
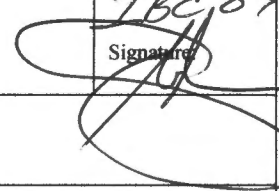
## **Conditions of Approval:**

### **Building**

Separate permits are required for any electrical, plumbing, sprinkler, fire alarm HVAC systems, heating appliances, commercial hood exhaust systems and fuel tanks. Separate plans may need to be submitted for approval as a part of this process.

**City of Portland, Maine - Building or Use Permit Application**

389 Congress Street, 04101 Tel: (207) 874-8703, FAX: (207) 8716

Job No: <b>2012-10-5178-ALTCOMM</b>	Date Applied: <b>10/15/2012</b>	CBL: <b>044- E-003-001</b>	
Location of Construction: <b>231 YORK ST</b>	Owner Name: <b>DATAENTRY 21 LLC</b>	Owner Address: <b>16 HEARON POINT ROAD FALMOUTH, ME 04105</b>	Phone:
Business Name: <b>Outlier's Eatery</b>	Contractor Name: <b>ReVision Energy</b>	Contractor Address: <b>142 PRESUMPCOT ST PORTLAND MAINE 04103</b>	Phone: <b>(207) 221-6342</b>
Lessee/Buyer's Name:	Phone:	Permit Type: <b>BLDG</b>	Zone: <b>B-1</b>
Past Use: <b>Restaurant (under construction)</b>	Proposed Use: <b>Same: Restaurant – to add 16 panels on roof for solar hot water and solar electric</b>	Cost of Work: <b>\$30,000.00</b>	CEO District:
		Fire Dept: <div style="text-align: center;">Approved Denied N/A</div>	Inspection: Use Group: <b>A</b> Type: <b>SB</b> <b>TBC 09</b>
		Signature: 	Signature: 
Proposed Project Description: <b>16 solar panels on roof</b>		Pedestrian Activities District (P.A.D.)	
Permit Taken By: <b>Gayle</b>		<b>Zoning Approval</b>	

1. This permit application does not preclude the Applicant(s) from meeting applicable State and Federal Rules.
2. Building Permits do not include plumbing, septic or electrical work.
3. Building permits are void if work is not started within six (6) months of the date of issuance. False informatin may invalidate a building permit and stop all work.

**Special Zone or Reviews**

- ☐ Shoreland  
☐ Wetlands  
☐ Flood Zone  
☐ Subdivision  
☐ Site Plan

\_\_\_ Maj \_\_\_ Min \_\_\_ MM

Date:

**CERTIFICATION****Zoning Appeal**

- ☐ Variance  
☐ Miscellaneous  
☐ Conditional Use  
☐ Interpretation  
☐ Approved  
☐ Denied

Date:

**Historic Preservation**

- ☒ Not in Dist or Landmark  
☐ Does not Require Review  
☐ Requires Review  
☐ Approved  
☐ Approved w/Conditions  
☐ Denied

Date:

I hereby certify that I am the owner of record of the named property, or that the proposed work is authorized by the owner of record and that I have been authorized by the owner to make this application as his authorized agent and I agree to conform to all applicable laws of this jurisdiction. In addition, if a permit for work described in the appication is issued, I certify that the code official's authorized representative shall have the authority to enter all areas covered by such permit at any reasonable hour to enforce the provision of the code(s) applicable to such permit.

SIGNATURE OF APPLICANT

ADDRESS

DATE

PHONE

RESPONSIBLE PERSON IN CHARGE OF WORK, TITLE

DATE

PHONE

**From:** Jean Fraser  
**To:** Schmuckal, Marge; Munson, Tammy  
**CC:** Barhydt, Barbara  
**Date:** 10/18/2012 9:54 AM  
**Subject:** Re: Fwd: 231 York Street

Tammy

Planning has signed off on this.

Jean

>>> Tammy Munson 10/18/12 9:21 AM >>>

So, just to be clear, am I all set to issue this permit?

>>> Marge Schmuckal 10/18/2012 9:20 AM >>>

At this point I am not seeing a zoning issue with the proposal and have signed off for zoning.  
Marge

>>> Jean Fraser 10/17/2012 2:45 PM >>>

Tammy

Further to our conversation this morning, I am forwarding the additional info that I received from the applicant when I called to get a better idea of what they were proposing (first 2 attachments).

I have discussed with Barbara and we are OK with these as di minimus amendments to the site plan. I will put something on our files.

Based on the info we received, I do not see any issue re the B1 design guidelines.

However, under B1 zone requirements there is the following:

(d) Glare, radiation or fumes: Glare, radiation or fumes shall not be emitted to an obnoxious or dangerous degree beyond lot boundaries.

Since we do not have any info on whether there will be reflective glare created by the 4 (electrical solar) panels on the back, and since these panels face towards the 2 story uphill apartment building (with lots of windows - see last 2 photos) immediately abutting and overlooking the rear of this site, I am wondering whether Marge might want to consider a condition along these lines:

"If there are any adverse impacts from reflective glare into living space windows, as verified by the City, the applicant shall take action to mitigate the impacts or relocate the panels".

I am not an expert on "glare" and I think its a zoning issue, but the angle of these and the proximity of the apartment makes me wonder.

thanks  
Jean

>>> Jennifer Hatch 10/16/2012 2:43 PM >>>

Jean,

It was good speaking with you today. Please see drawing attached outlining where the panels will go. All panels will be flush mounted against the roof - no panels will stick out above the ridge line. As you can see the hot water panels and solar electric panels will be on separate roofs. Let me know if you have any



# General Building Permit Application

If you or the property owner owes real estate or personal property taxes or user charges on any property within the City, payment arrangements must be made before permits of any kind are accepted.

Location/Address of Construction: <u>231 York St</u>			
Total Square Footage of Proposed Structure/Area		Square Footage of Lot	
Tax Assessor's Chart, Block & Lot Chart# <u>044</u> Block# <u>E</u> Lot# <u>003</u>		Applicant * <u>must</u> be owner, Lessee or Buyer* Name <u>Revision Energy</u> Address <u>142 Presumpscot St</u> City, State & Zip <u>Portland ME 04103</u>	
Telephone: <u>221-6342</u>			
Lessee/DBA (If Applicable) <b>RECEIVED</b> <b>OCT 15 2012</b> Dept. of Building Inspections City of Portland Maine		Owner (if different from Applicant) Name <u>OUTLIER'S ENTRY</u> Address <u>231 York St</u> City, State & Zip <u>Portland, ME 04102</u>	
Cost Of Work: \$ <u>30,000</u>		C of O Fee: \$ _____	
Total Fee: \$ <u>320.00</u>			
Current legal use (i.e. single family) <u>Commercial</u> If vacant, what was the previous use? _____ Proposed Specific use: _____ Is property part of a subdivision? _____ If yes, please name _____ Project description: <u>Solar hot water &amp; solar electric panels</u> <u>on roof of building, 16 Panels</u>			
Contractor's name: <u>Applicant</u> Address: _____ City, State & Zip: _____ Telephone: _____ Who should we contact when the permit is ready: <u>Jon Hatch</u> <u>221-6342</u> Telephone: _____ Mailing address: _____			

**Please submit all of the information outlined on the applicable Checklist. Failure to do so will result in the automatic denial of your permit.**

In order to be sure the City fully understands the full scope of the project, the Planning and Development Department may request additional information prior to the issuance of a permit. For further information or to download copies of this form and other applications visit the Inspections Division on-line at [www.portlandmaine.gov](http://www.portlandmaine.gov), or stop by the Inspections Division office, room 315 City Hall or call 874-8703.

I hereby certify that I am the Owner of record of the named property, or that the owner of record authorizes the proposed work and that I have been authorized by the owner to make this application as his/her authorized agent. I agree to conform to all applicable laws of this jurisdiction. In addition, if a permit for work described in this application is issued, I certify that the Code Official's authorized representative shall have the authority to enter all areas covered by this permit at any reasonable hour to enforce the provisions of the codes applicable to this permit.

Signature: Jon Hatch

Date: 10/15/2012

**This is not a permit; you may not commence ANY work until the permit is issued.**



**ARRAY ORIENTATION:**  
220° (True)

**ARRAY PITCH:**  
40° angle

Solar hot water collectors to be mounted in landscape orientation above skylights in a 2 over 2 configuration.

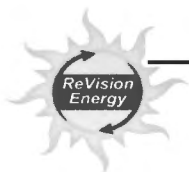
## Project Summary

System	Performance	Cost	Incentives	Net Cost
Four Wagner Eco C20 flat plate solar hot water collectors with solar storage tank for heating domestic hot water supply	<ul style="list-style-type: none"> <li>Produce roughly 23,688,000 Btu's of clean, renewable energy annually.</li> <li>Offset roughly 4,088 lbs. of CO2 emissions annually.</li> </ul>	\$14,013 Installed	-(\$4,204) 30% Federal Tax Credit  -(\$3,694) Rebate from Efficiency Maine	\$6,115

## Economic & Environmental Return on Investment

The system we are proposing is guaranteed to pay for itself by harvesting abundant solar energy to replace finite, polluting and increasingly costly fossil fuels. Once you get 100% of your initial investment returned through government financial incentives and energy savings, the system will continue to deliver a revenue stream for decades to come. Plus, the system will eliminate thousands of pounds of CO2 emissions each year, delivering a powerful environmental benefit.

ReVision Energy's mission is to eliminate over-reliance on fossil fuels and the associated emissions. We are succeeding in this mission by installing solar energy systems that are as robust and reliable as traditional mechanical systems. To ensure maximum performance and longevity in a harsh climate, each system is designed by our in-house engineers (Brown, Dartmouth, MIT, UNH) and installed by our experienced team of certified solar professionals. Please join us in the mission to create a clean energy future--we promise to deliver the peace of mind that comes from knowing you have made one of the best investments of your life.



# System Overview

Based on an evaluation of your domestic hot water demand and rooftop solar gain, ReVision Energy proposes a closed loop antifreeze solar hot water system, consisting of the following major components:

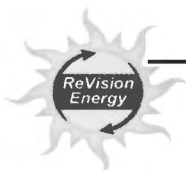
- (4) Wagner EURO C20 AR flat plate solar thermal collectors with Sunarc solar glass.
- (1) Wagner Euro Tric A Flush Mounting System
- (1) Stiebel Eltron 105 gallon super insulated solar hot water storage tank with 1 heat-exchange coil ([www.stiebel-eltron-usa.com](http://www.stiebel-eltron-usa.com))
- (1) Flowstar solar pump station by Stiebel Eltron; includes temp. gauge, flow meter, and PRV
- (1) Stiebel Eltron SOM 7 plus Differential Temperature Controller with variable speed pump control
- (1) Caleffi Series 521 anti-scald mixing valve
- (1) Caleffi Series 251 Air Separator
- (1) Extrol SX30-V Solar Expansion Tank

On a good sunny day, the solar system will produce a 60 degree temperature rise in the solar tank and will be sufficient to provide most of your domestic hot water needs in the spring, summer and fall. In the winter, when less solar energy is available, the existing hot water tank will supplement as necessary to ensure a consistent supply of domestic hot water.

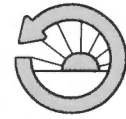
## System Operation

Whenever the temperature at the solar hot water collectors is hotter than that of the tank, the circulating pump in the pump station will begin circulating fluid (a blend of water and non-toxic antifreeze) to the rooftop collectors. The solar-heated antifreeze then cycles back to the storage tank and through the solar heat exchange coil in the bottom of the tank. After passing its thermal energy on to the domestic hot water stored in the tank, the antifreeze is then pumped back to the roof to continue the process. The variable speed pump controller maintains the ideal pump speed to optimize the collection of solar energy under all sun light conditions.

Whenever there is a call for hot water, cold water will flow into the solar storage tank from the cold water lines, pick up heat from the tank, and then flow into the propane fired on demand hot water heater. If the thermal storage tank has been warmed sufficiently from the sun, the indirect water heater will not need to come on at all. If the solar preheated water is not quite at the hot water setpoint, the hot water heater will add supplemental heat as needed to meet the required setpoint.







**Wagner & Co**

SOLAR TECHNOLOGY

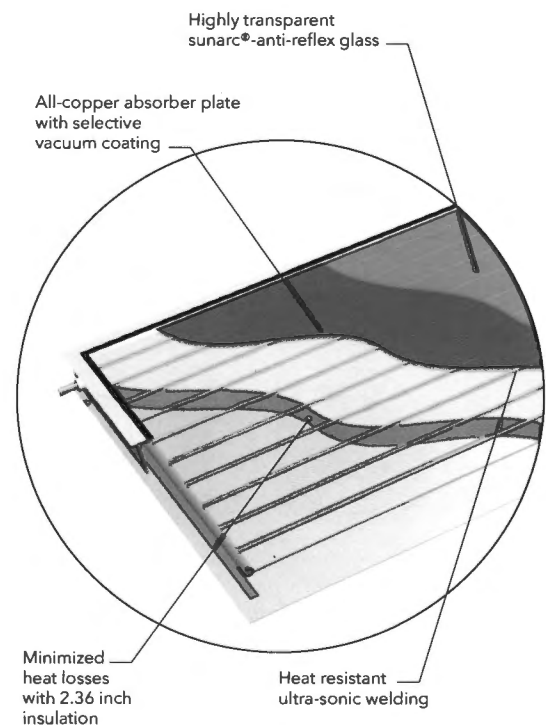
# EURO C20 AR-M Flat Plate Collector

Top Performance with Anti-Reflex Glass



## 12 Years of Collector Engineering

- sunarc® anti-reflex glass with an ultrafine nano surface structure increases the light transmissivity from 91 % to 96 %. The energy output improves by 6 to 10 %.
- Selective vacuum coating of the absorber plate captures maximum solar heat and minimizes radiation losses.
- The all-copper absorber plate is ultrasonically welded to a double harp register.
- The 2.36 inch of insulation at the back side minimizes heat losses and assures high temperatures.
- Vertical and horizontal installation either on-roof or free-standing using TRIC.





**ARRAY ORIENTATION:**  
130° (True)

**ARRAY PITCH:**  
40° angle

Solar electric panels to be mounted in portrait orientation in two rows of 8 panels each above the skylights.

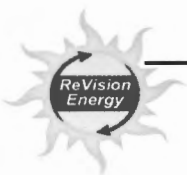
## Project Summary

System	Performance	Cost	Incentives	Net Cost
Grid-tied photovoltaic array with CSI modules and Enphase micro-inverters	<ul style="list-style-type: none"> <li>Produce roughly 4,425 kWhrs of clean, renewable energy annually.</li> <li>Offset roughly 5,753 lbs. of CO2 emissions annually.</li> </ul>	\$15,267 Installed	-(\$4,580) 30% Federal Tax Credit  -(\$2,221) Rebate from Efficiency Maine	\$8,466

## Economic & Environmental Return on Investment

The system we are proposing is guaranteed to pay for itself by harvesting abundant solar energy to replace finite, polluting and increasingly costly fossil fuels. Once you get 100% of your initial investment returned through government financial incentives and energy savings, the system will continue to deliver a revenue stream for decades to come. Plus, the system will eliminate thousands of pounds of CO2 emissions each year, delivering a powerful environmental benefit.

ReVision Energy's mission is to eliminate over-reliance on fossil fuels and the associated emissions. We are succeeding in this mission by installing solar energy systems that are as robust and reliable as traditional mechanical systems. To ensure maximum performance and longevity in a harsh climate, each system is designed by our in-house engineers (Brown, Dartmouth, MIT, UNH) and installed by our experienced team of certified solar professionals. Please join us in the mission to create a clean energy future--we promise to deliver the peace of mind that comes from knowing you have made one of the best investments of your life.



# Major System Components

Based on a professional evaluation of your available roofspace, site configuration, and energy demand, ReVision Energy proposes a roof-mounted photovoltaic array of 3.84 kilowatts (nominal).

The system features these major components:

- (16) 240 watt Monosilicon Canadian Solar photovoltaic panels; CS6P-240M or equivalent ([www.canadian-solar.com](http://www.canadian-solar.com))
- (16) Enphase Energy M215 microinverters (<http://enphase.com>)
- (1) Enphase Envoy Energy Management Unit, which enables remote data monitoring
- (109) Feet of Iron Ridge extruded aluminum solar mounting rail with hardware
- (1) Flashed Metallic Junction Box

## System Operation

Whenever sun shines on the solar electric panels, they will generate direct current (DC) electricity. That DC electricity is converted to AC electricity by individual Enphase inverters, affixed to the underside of each panel. The advantage of microinverters is that the output of the rest of the array is not affected if a portion of panels are shaded.

The AC electricity created by the inverters will then feed directly into the building's load center. Any electric loads (lights, computers, etc.) operating while the sun is shining will use available solar electricity, any excess will flow out to the grid and you will receive a credit for the production.

Whenever the sun is not out, you will continue to purchase grid electricity as you do now. The local utility company will record electricity you feed into the grid. If at the end of the month your generation is greater than your consumption, you will earn a credit on your next bill. You can bank your surplus from month to month for up to a year.

## System Diagram



### 1 - EnPhase Microinverters

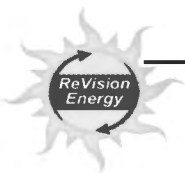
Micro-inverters are installed beneath each rooftop solar panel, maximize energy harvest

### 2 - Envoy Gateway

Performance of individual panels are send to you as well as ReVision Energy in real-time using the Internet

### 3 - Enlighten Software

Real-time web based monitoring allows you to evaluate system performance. Also available on mobile devices.





Professional design, installation and service of renewable energy systems

October 15, 2012

City of Portland  
389 Congress Street  
Portland, ME 04101

RE: ReVision Energy Solar Installation at 231 York Street

Dear Code Enforcement,

ReVision Energy has been contracted to design and install a solar electric and solar hot water system at the above address in Portland. This letter is to confirm that all work will be performed by licensed and qualified installers, expert in the field and in compliance with both manufacturer's recommendations and all applicable local and state codes and standards. This also confirms that the roof structure can handle the weight of the panel load, in addition to snow load. The weight of the panels does not change the structural integrity of the building.

ReVision Energy employs licensed engineers, plumbers, and electricians and carries the solar industries highest certifications (NABCEP) in both solar thermal and photovoltaic installation. We're committed to high quality, code compliant work and look forward to working together with the city and the CEO to ensure that all your requirements and needs are met and that our customer ends up with a system that is beautiful, functional and safe.

Electrical and grounding:

All electrical work to be performed by a licensed ME electrician and will conform to NEC 2011 revision as well as NABCEP standards. Specifically, wiring and grounding of the photovoltaic system will be governed by manufacturer's recommendations and article 690. All installed metal components are grounded via the grounding electrode conductor.

If you have any questions or concerns, we'd like to address them as quickly and completely as possible. Please don't hesitate to call or e mail anytime.

Respectfully,

Fortunat Mueller, P.E.  
Co-owner  
ReVision Energy  
(207) 752-6358  
fortunat@revisionenergy.com

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**Bangor**  
207-570-4222

**Liberty**  
207-589-4171

**Portland**  
207-221-6342

**Portsmouth**  
603-486-7170

[www.revisionenergy.com](http://www.revisionenergy.com)



# PORTLAND MAINE

*Strengthening a Remarkable City, Building a Community for Life • [www.portlandmaine.gov](http://www.portlandmaine.gov)*

## Receipts Details:

**Tender Information:** Check , BusinessName: visa, Check Number: 11263

**Tender Amount:** 320.00

## Receipt Header:

**Cashier Id:** gguertin

**Receipt Date:** 10/15/2012

**Receipt Number:** 49251

## Receipt Details:

Reference ID:	8362	Fee Type:	BP-Constr
Receipt Number:	0	Payment Date:	
Transaction Amount:	320.00	Charge Amount:	320.00
Job ID: Job ID: 2012-10-5178-ALTCOMM - 16 solar panels on roof			
Additional Comments: 231 York St.			

**Thank You for your Payment!**

## Marge Schmuckal - Fwd: 231 York Street solar panels

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**From:** Jean Fraser  
**To:** Barhydt, Barbara; Schmuckal, Marge  
**Date:** 10/16/2012 5:31 PM  
**Subject:** Fwd: 231 York Street solar panels  
**Attachments:** southeast roof wide angle - 16 sunivas.jpg; southwest roof for SHW - 4 wagners.jpg

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What do you think????

>>> Jennifer Hatch <jen@revisionenergy.com> 10/16/2012 2:43 PM >>>  
Jean,

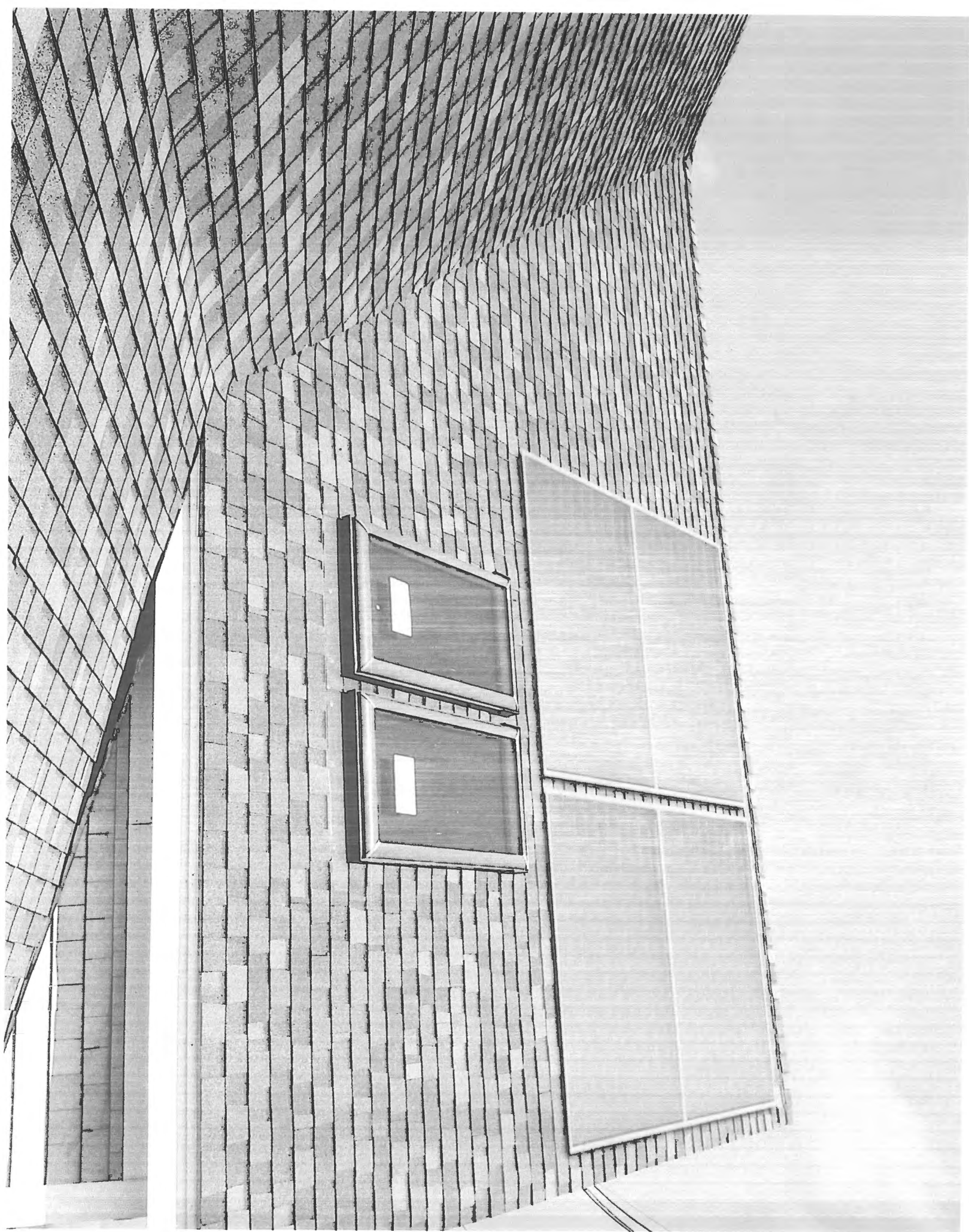
It was good speaking with you today. Please see drawing attached outlining where the panels will go. All panels will be flush mounted against the roof - no panels will stick out above the ridge line. As you can see the hot water panels and solar electric panels will be on separate roofs. Let me know if you have any questions!

Best,--

Jennifer Hatch  
ReVision Energy  
142 Presumpscot St  
Portland, ME 04103  
(207) 221-6342  
[www.revisionenergy.com](http://www.revisionenergy.com)

*The future depends on what we do in the present ~ Gandhi*



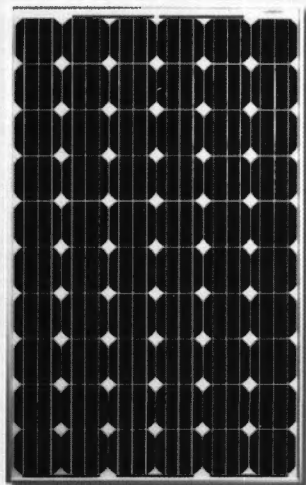






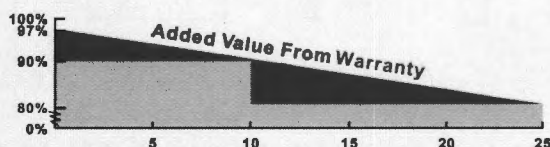
## CS6P

230/235/240/245/250M



### Key Features

- Industry first comprehensive warranty insurance by AM Best rated leading insurance companies in the world
- Industry leading plus only power tolerance: 0 ~ +5W
- Strong framed module, passing mechanical load test of 5400Pa to withstand heavier snow load
- The 1st manufacturer in the PV industry certified for ISO:TS16949 (The automotive quality management system) in module production since 2003
- ISO17025 qualified manufacturer owned testing lab, fully complying to IEC, TUV, UL testing standards
- **Backed By Our New 10/25 Linear Power Warranty**  
Plus our added 25 year insurance coverage



- 10 year product warranty on materials and workmanship
- 25 year linear power output warranty

### On-grid Module

CS6P is a robust solar module with 60 solar cells. These modules can be used for on-grid solar applications. Our meticulous design and production techniques ensure a high-yield, long-term performance for every module produced. Our rigorous quality control and in-house testing facilities guarantee Canadian Solar's modules meet the highest quality standards possible.

### Applications

- On-grid residential roof-tops
- On-grid commercial/industrial roof-tops
- Solar power stations
- Other on-grid applications

### Quality Certificates

- IEC 61215, IEC 61730, UL 1703, CEC Listed, MCS, CE
- ISO9001: 2008: Standards for quality management systems
- ISO/TS16949:2009: The automotive quality management system

### Environmental Certificates

- ISO14001:2004: Standards for Environmental management systems
- QC080000 HSPM: The Certification for Hazardous Substances Regulations
- Reach Compliance



## IRONRIDGE XR ROOF MOUNT PLATFORM

### KEY FEATURES

- ◆ Extruded aluminum components are lightweight for easy handling yet strong enough for most roof mount applications
- ◆ Choice of XRL (lightweight) and XRS (standard) rails
- ◆ Both XRL and XRS rails come with slots for attaching L-feet and top slots for attaching panel clamps
- ◆ XRS rails has slot for bottom mounting clamps
- ◆ Hidden internal splice bars are aesthetically pleasing
- ◆ Internal splices provide superior strength and flexibility with L-feet placement
- ◆ Adjustable L-feet have vertical extension slots for easy adjustability of up to 1-3/8"
- ◆ Standoffs provide increased airflow and ventilation and enable precise placement of flashings
- ◆ Standoffs come in four standard heights: 3", 4", 6", and 7"
- ◆ XR platform compatible with popular flashings including QuickMount and Oatey
- ◆ Panel clamps for both top and bottom mounting
- ◆ Panel clamps for most popular photovoltaic modules
- ◆ Mid-clamp design maximizes panel density
- ◆ Ground clips eliminate the need for copper wire between modules
- ◆ The XR Roof Mount components are covered with an industry-leading 10 year limited product warranty and a 5 year limited finish warranty
- ◆ All XR Roof Mount components are PE certified



The IronRidge XR platform is a reliable, comprehensive, and feature rich photovoltaic mounting solution. Anchored by the XRS (Standard) and XRL (Light) rails, the XR platform includes all of the components necessary for supporting virtually any commercial or residential roof mount installation, regardless of surface material or roof grade.

The XRS and XRL rails are manufactured from extruded aluminum to maximize spans while minimizing weight for improved handling. The graceful curves of the XRS rail will please even the most aesthetically demanding customers. Rails can be extended with the IronRidge patent-pending internal splice bars, providing a strong support connection and ultimate flexibility in footing attachment locations. Installers have a variety of options in attaching IronRidge rails to the roof, including adjustable L-feet, aluminum standoffs, and tilt legs for optimizing power. In addition, IronRidge accommodates modules from most major manufacturers. Top-down panel clamps securely grip the outside frame of the module, freeing the installer from the constraints of panel mounting holes. The XRS rail has an additional side slot to enable the option of bottom mounting. Lastly, grounding clips pierce the anodized rails, creating a ground path through the equipment and eliminating the need to run copper wire between every module.

IronRidge provides a complete technical support system that includes step-by-step installation guides, engineering certification documentation, easy-to-read span charts, and on-line configurator software.

See reverse for product specifications and ordering information. Please contact your local distributor for configuration assistance.

### Electrical Data

### Temperature Characteristics

### Performance at Low Irradiance

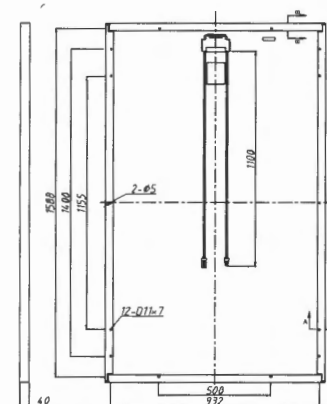
## Engineering Drawings

Under Normal Operating Cell Temperature, Irradiance of 800 W/m<sup>2</sup>, spectrum AM 1.5, ambient temperature 20°C, wind speed 1 m/s

### Mechanical Data

Figure 10 shows a 10x10 grid of square cells. The grid is composed of 10 columns and 10 rows of squares. The top and bottom edges of the grid are labeled with the number 10. The left and right edges are labeled with the number 10. The grid is divided into four quadrants by a vertical line and a horizontal line. The top-left quadrant is labeled 'a', the top-right quadrant is labeled 'b', the bottom-left quadrant is labeled 'c', and the bottom-right quadrant is labeled 'd'. The grid is also divided into four quadrants by a vertical line and a horizontal line. The top-left quadrant is labeled 'a', the top-right quadrant is labeled 'b', the bottom-left quadrant is labeled 'c', and the bottom-right quadrant is labeled 'd'.

### I-V Curves (CS6P-250M)



\*Specifications included in this datasheet are subject to change without prior notice.

## About Canadian Solar

Canadian Solar Inc. is one of the world's largest solar companies. As a leading vertically-integrated manufacturer of ingots, wafers, cells, solar modules and solar systems, Canadian Solar delivers solar power products of uncompromising quality to worldwide customers. Canadian Solar's world class team of professionals works closely with our customers to provide them with solutions for all their solar needs.

Canadian Solar was founded in Canada in 2001 and was successfully listed on NASDAQ Exchange (symbol: CSIQ) in November 2006. Canadian Solar has already expanded its module manufacturing capacity to 2.05GW and cell manufacturing capacity to 1.3GW in 2011.

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## SPECIFICATIONS

- ◆ XRL/XRS Rail – 6105-T5 extruded anodized aluminum
- ◆ XRL/XRS Splice Bars – 6105-T5 extruded aluminum
- ◆ Standoffs – 6105-T5 extruded aluminum
- ◆ L-feet: 6105-T5 extruded aluminum
- ◆ Clamps: 5052-H32 aluminum
- ◆ Hardware: 18-8 Stainless Steel

## XRS PROPERTIES

- ◆ Area = .807136 inches<sup>2</sup>
- ◆ Centroid relative to output coordinate system origin
  - ◆ X = 0.5556
  - ◆ Y = 1.4097
  - ◆ Z = 120.000
- ◆ Moments of Inertia of the area (at the centroid)
  - ◆ Lxx = 0.8430
  - ◆ Lxy = 0.1117
  - ◆ Lxz = 0.0000
  - ◆ Lyx = 0.1117
  - ◆ Lyy = 0.1822
  - ◆ Lyz = 0.0000
  - ◆ Lzx = 0.0000
  - ◆ Lzy = 0.0000
  - ◆ Lzz = 1.0252
- ◆ Polar Moment of Inertia
  - ◆ At Centroid = 1.0252<sup>^4</sup>
- ◆ Principal Moments of Inertia
  - ◆ Ix = 0.1638
  - ◆ Iy = 0.8614
- ◆ Principal-Axis Angles
  - ◆ Angle = 99.343 degrees
- ◆ Moments of Inertia (output)
  - ◆ LXX = 11625.205
  - ◆ LXY = 0.5204
  - ◆ LXZ = 53.8153
  - ◆ LYX = 0.5204
  - ◆ LYY = 11623.1909
  - ◆ LYZ = 136.5369
  - ◆ LZX = 53.8153
  - ◆ LZY = 136.5369
  - ◆ LZZ = 2.8784

## ORDERING INFORMATION

XR Rails		
Part Number	Description	Weight
51-7000-144a	XRS Standard Rail (1) – 12 feet	11.364 lbs
51-7000-168a	XRS Standard Rail (1) – 14 feet	13.258 lbs
51-7000-192a	XRS Standard Rail (1) – 16 feet	15.152 lbs
51-7000-216a	XRS Standard Rail (1) – 18 feet	17.046 lbs
51-6000-144a	XRL Light Rail (1) – 12 feet	6.288 lbs
51-6000-168a	XRL Light Rail (1) – 14 feet	7.336 lbs
51-6000-192a	XRL Light Rail (1) – 16 feet	8.384 lbs
51-6000-216a	XRL Light Rail (1) – 18 feet	9.432 lbs
29-7000-010	XRS Splice Kit (1)	0.442 lbs
29-7000-000	XRL Splice Kit (1)	0.151 lbs
Panel Clamps		
Part Number	Description	Weight
29-7000-xxx	End Clamps (4) – depends on panel	.251-.290 lbs
29-7000-10x	Mid Clamps (4) – depends on panel	.213-.251 lbs
29-7000-117	Under Clamps (4)	0.324 lbs
Footing Attachments & Flashings		
Part Number	Description	Weight
29-7000-017	L-foot Kit (4)	0.872 lbs
51-600x-500	3"-7" Standoffs – Specify L-feet or Tilt leg	.533-.710 lbs
31-1000-001	Oatey Galvanized Flashing 11830 (12)	8.750 lbs
31-1000-000	QuickMount QMSCA12 (12)	13.390 lbs
51-7200-0XX	Tilt Legs (7" – 40")	.0658 lbs/inch
51-7210-000	Tilt Leg Bracket	1.576 lbs
Grounding		
Part Number	Description	Weight
29-4000-001	WEEB DMC-Clip (100)	0.258 lbs
29-4000-002	WEEB Grounding Lug (100)	12.356 lbs
29-4000-003	WEEB Bonding Jumper (100)	17.614 lbs
29-4000-006	WEEB ACC-PV Wire Clip (100)	0.625 lbs

## L-FOOT DIMENSIONS

