



## PLANNING & DEVELOPMENT SERVICES

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### Solar PV Guidelines

- 1) Get your utility approvals in place from Alberta Utilities Commission and from Fortis. For the best and most current information go to <http://www.hme.ca/connecttothegrid/>. At this website you will find information on how to connect to the grid and a path to the documentation required for the utilities approvals.
- 2) Apply to the Red Deer County for your **Electrical permit**. The (Alberta) Permit Regulation requires an electrical permit for all Solar PV installations (connected to the grid or standalone).
- 3) **Building permit:** A building permit is required only if new elements are constructed to support the system. To confirm the loads involved are acceptable without structural changes, complete (and bring along when you apply for your electrical permit) a "Structural Review Checklist of PV Array Mounting System" (page 4).
- 4) Development permits are not required for residential Solar PV installations in Red Deer County.

A guide to the requirements for electrical permits for solar systems on all buildings in Red Deer County

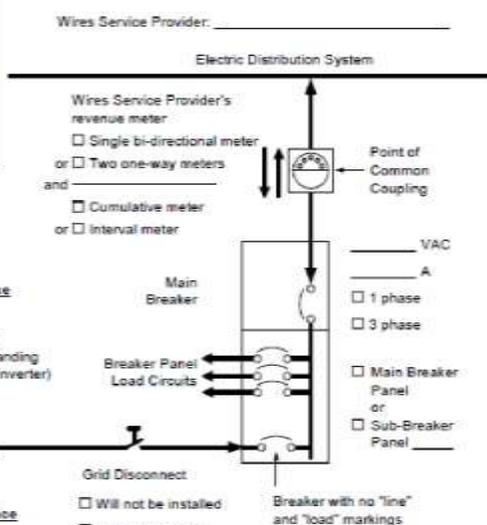
#### The electrical permit application must contain:

1. The permit application must name who is responsible for installing the electrical components of the system. Permits may only be issued to a homeowner (doing the work themselves on a house they own and occupy) or to an electrical contractor. All electrical contractors must have a Master's Certificate. The value of construction is to include all the components of the solar PV installation.
2. Submit a single-line diagram of the system. Canadian Electrical Code (CE Code) Rule 84- 030 requires a permanent single-line diagram and warning notice be posted at the Supply Authority disconnect. This diagram is to show the PV array configuration, the wiring system, overcurrent protection, the inverter and disconnect switches. It should have a reference to the disconnect locations. A sample single line diagram is attached (pg. 3).
3. Submit an equipment list with the manufacturer **and** model number of each of the major components. The following should be included:
  - PV modules
  - inverter(s)
  - combiner box
  - the PV module mounting system (the rack)
  - grounding/bonding type for the modules and rails (such as WEEB clips or lay-in lug).

The **Electrical inspection** is conducted when the system is installed. Ideally the inspector will have access to the roof top components. CE Code requires that all electrical systems, including solar PV systems, be in compliance with all relevant articles of the most recent CE Code. Section 84 deals with the installation of electric power production sources interconnected with a Supply Authority system. The electrical permit and inspection process is set up to monitor compliance with all of this.

Sample form for required single line diagram:

From How ell-Mayhew Engineering [www.hme.ca](http://www.hme.ca)

<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Wiring arrows indicate direction of electrical energy flow.</li> <li>2. Grid-connection safety requirements are given by the Canadian Electrical Code Section 84, and the Wires Service Provider.</li> <li>3. All components shall meet Canadian electrical product certification standards.</li> <li>4. All components shall contain nameplate labels indicating the acceptable Certifying Organization.</li> <li>5. An inverter with a Canadian Certification Mark thus meets the CSA's standard C22.2 No. 197.1 for utility grid-connection.</li> <li>6. Separate Grid Disconnect is optional and may or may not be required by the Wires Service Provider.</li> <li>7. If installed, Grid Disconnect shall comply with Canadian Electrical Code Rule 84-024 (2006).</li> <li>8. Generator Disconnect and Grid Disconnects may be integral to the inverter.</li> </ol>	<p>Wires Service Provider: _____</p> <p style="text-align: center;">Electric Distribution System</p> 								
<p><b>Mini Micro-Generation Source</b></p> <p><input type="checkbox"/> Solar PV DC  <input type="checkbox"/> Micro-wind DC or AC  <input type="checkbox"/> Stirling engine DC or AC  <input type="checkbox"/> Micro-hydro DC or AC  <input type="checkbox"/> Biomass DC or AC  <input type="checkbox"/> Fuel cell DC  <input type="checkbox"/> Other: _____</p>	<p><b>Type of Generator Interface</b></p> <p><input type="checkbox"/> DC to AC Inverter  <input type="checkbox"/> AC to DC to AC Inverter  <input type="checkbox"/> Non-Inverter with anti-islanding protection (equivalent to inverter)</p>								
<p>Brand: _____          Model: _____          Rated capacity: _____ kW          Certification Mark: _____          Location on site: _____</p>	<p>Brand: _____          Model: _____          Rated capacity: _____ kW<sub>AC</sub>          Certification Mark: _____          Location on site: _____</p>								
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">                 Site Name: _____             </td> <td style="width: 50%; padding: 5px;">                 Drawn by: _____             </td> </tr> <tr> <td colspan="2" style="text-align: center; padding: 5px;">                 Single Line Diagram for Grid-Dependent, Mini Micro-Generator                  Connected to the Wires Service Provider's Electrical Distribution System             </td> </tr> <tr> <td style="padding: 5px;">                 This single line diagram is intended for use in permitting and grid-connection approvals. It is not intended to be used for system design or installation.             </td> <td style="padding: 5px;">                 Drawing Date: _____                  Site Description: _____                  Site Location: _____             </td> </tr> <tr> <td style="padding: 5px;">                 DRAWING NO. _____ REV _____                  SCALE: NOT TO SCALE             </td> <td></td> </tr> </table>		Site Name: _____	Drawn by: _____	Single Line Diagram for Grid-Dependent, Mini Micro-Generator Connected to the Wires Service Provider's Electrical Distribution System		This single line diagram is intended for use in permitting and grid-connection approvals. It is not intended to be used for system design or installation.	Drawing Date: _____ Site Description: _____ Site Location: _____	DRAWING NO. _____ REV _____ SCALE: NOT TO SCALE	
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- You can also find online diagrams that you can fill out and print at:

<http://www.solarabcs.org/about/publications/reports/expedited-permit/forms/index.html>

<http://www.hme.ca/connecttothegrid/>

Section 64  
Renewable energy systems

**Table 64-1  
Summary of the requirements for different types of renewable energy systems**

Rule references									
Requirement	General	Inverters	Solar PV systems	Small wind systems	Large wind systems	Micro-hydro-power systems	Hydrokinetic power systems	Stationary fuel cell systems	Storage batteries
Marking	64-072	—	64-200	64-300	64-400	64-500	64-600	64-700	—
	64-074	—	64-212	—	—	—	—	—	—
Maximum voltage	—	—	64-202	64-302	—	—	—	—	—
Conductors	64-052	—	64-204	64-304	64-402	64-502	64-602	64-702	—
	—	—	64-206	—	—	—	—	—	—
Return/neutral conductor	64-054	64-108	—	—	—	—	—	—	—
Overcurrent Protection	64-058	—	64-214	64-308	64-404	64-506	64-606	64-704	64-802
Disconnecting means	64-060	—	—	64-310	64-406	64-508	64-610	64-706	64-806
Wiring methods	64-062	—	64-210	64-306	—	64-504	64-608	—	26-552 and 26-554
Grounding and bonding	64-064	—	64-222	64-312	64-408	64-512	64-612	64-708	—
	64-068	—	—	—	—	—	—	—	—
64-070	—	—	—	—	—	—	—	—	—
Interconnections	64-076	64-110	—	—	—	—	—	—	64-810
Stand-alone systems	64-078	64-102	—	—	—	64-510	64-604	—	—
Connections	—	64-106	64-220	—	—	—	—	—	—
	—	64-112	—	—	—	—	—	—	—
Mounting/location	—	64-104	64-208	—	—	—	—	64-710	26-544
	—	—	—	—	—	—	—	—	—

(Continued)

A guide to the requirements for building permits for solar systems on all buildings in Red Deer County.

This guideline provides assistance in determining when a building permit (structural) may be required for installing solar PV systems on the roofs of residential (Alberta Building Code Part 9) buildings in Red Deer County.

It is the responsibility of the owner to ensure the building is capable of withstanding the loads from the system being installed and the array will not be torn off in the wind. The solar PV array will add loads (such as from its weight and from wind) onto the building onto which it is installed. The building structure must have the ability to support those loads and/or reactions. In most cases these loads are relatively small.

In general the weight, footprint and height of a solar system determine the need for involving an engineer to design structural support elements. Engineers are to be involved where there is a need to reinforce the roof, the method of attaching the solar racking system onto the roof is by use of ballast (versus a direct connection) or the installation is on a flat roof where there is a major obstruction such as a parapet or wall around the edge. A building permit and inspection is required when reinforcement elements are required and constructed.

**If the installation of solar modules on a roof of a residential building falls within the following conditions, then the addition of the solar array should not require additional structural support. This applies to both flat roof and sloped roofs and roofs of rafter or truss construction. Permit applicants are to confirm loads by completing (and bring along when you apply for your electrical permit) a Structural Review Checklist attached on pg 5.**

1. The roof must have been designed in compliance with Part 9 of the Alberta Building Code. Modern structures are built with factors of safety large enough to account for the relatively small loads imposed by a PV array. For older buildings or those built with non-standard construction practices, the structural members would need evaluation to ensure structural integrity.
2. The solar array's distributed (dead) weight is less than 5 pounds per square foot (24.4 kg/m<sup>2</sup>) and the roofing is a single layer of lightweight material (such as asphalt shingles, cedar shakes, or metal).
3. The solar module's connections to the roof result in the array's weight being uniformly distributed. The maximum point load shall be less than 50 pounds (22.7 kg) per roof connection.
4. The solar array will be mounted close to the surface of the roof with a maximum height of 18" (46 cm) above the roof surface. Modules must be below or flush to the roof ridge on sloped roofs and they cannot extend beyond the roof edges (i.e. eaves) on all sides of the building. Solar modules must not be installed on the overhang area of the roof.
5. The mounting structure is an engineered product specifically designed to mount solar modules to roofs. Racks must be installed with full compliance to the installation instructions provided by the supplier of the mounting structure.



## Structural Review Checklist of PV Array Mounting System

**Is the array to be mounted on a defined, permitted roof structure? | Yes | No**

*If No due to non-compliant roof or for a ground mount structure, submit engineered worksheet.*

### **Roof Information:**

1. Is the roofing type lightweight (Yes = shingles, shakes, metal, lightweight masonry)

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*If No, provide engineered worksheet for roof structure (No = heavy masonry slate, etc...)*

2. Does the roof have a single roof covering? **| Yes | No**

*If No, provide engineered worksheet for roof structure*

3. Provide method and type of weatherproofing roof penetrations (e.g., flashing, caulk)

### **Mounting System Information:**

1. Is the mounting structure an engineered product designed to mount PV modules with no more than an 18" gap beneath the module frames? **| Yes | No**

*If No, provide details of structural attachment certified by a design professional.*

2. For the manufactured mounting systems, fill out information on the mounting system below:

- a. Total Weight of PV Modules and Rails \_\_\_\_\_ lbs.

- b. Total Number of Attachment Points \_\_\_\_\_.

- c. Weight per Attachment Point ( $a \div b$ ) \_\_\_\_\_ lbs (if greater than 50 lbs, provide engineering).

- d. Maximum Spacing Between Attachment Points on a Rail \_\_\_\_\_ inches (see product manual for maximum spacing allowed based on maximum design wind speed).

- e. Total Surface Area of PV Modules (square feet) \_\_\_\_\_ ft<sup>2</sup>.

- f. Distributed Weight of PV Module on Roof ( $a \div e$ ) \_\_\_\_\_ lbs/ft<sup>2</sup>.

*If distributed weight of the PV system is greater than 5 lbs/ft<sup>2</sup>, provide engineering.*