

CITY OF AIRDRIE

BUILDING INSPECTION DEPARTMENT

SOLAR PV GUIDELINES

May 14, 2019

This document is intended to be a guideline to permits required for Solar PV systems placed on houses, duplexes and townhouses. Other types of installations may be required to have involvement of a registered professional. Questions can be directed to the City of Airdrie Building Inspections Department at the following:

400 Main Street
Airdrie, AB T4B 3C3

Phone: 403-948-8832
E-mail: building.inspections@airdrie.ca

Regulatory Approval Steps:

- 1) Get your utility approvals in place from Alberta Utilities Commission and from Fortis. For an excellent source of information, go to <http://www.hme.ca/connecttothegrid>. At this web site, 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 City of Airdrie for your Electrical permit. The (Alberta) Permit Regulation requires an electrical permit for Solar PV installations. Details for electrical permit application and the information to be submitted with the application are attached (pg. 2).
- 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 submit with your electrical permit application a "Structural Review Checklist of PV Array Mounting System" (attached on pg. 5)
- 4) Development permits are not required for residential Solar PV installations in Airdrie. The Land Use Bylaw carries the following provisions in section 7.29:

Solar collectors are allowed in any district, and must meet the following standards and requirements. A solar collector: (1) Where mounted to a building or structure, shall be located on the roof of the building and may not extend beyond the outermost edges of the roof. (2) Shall be located and mounted to ensure that no glare is produced for neighbouring properties and streets. (3) Panels and equipment for Solar Collectors shall not extend more than 0.6 metres from the surface of the roof, shall be below or flush to the roof ridge (of sloped roofs) and shall not extend beyond the eave line on all sides of the building.

A Guide to the Requirements for Electrical Permits for Solar Systems on Residential Buildings in the City of Airdrie

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 and a City of Airdrie business licence. Note: most of a PV system installation requires installers to be certified electricians or registered apprentices working under the supervision of a certified electrician. For details see: https://tradesecrets.alberta.ca/sources/pdfs/occupation_page_supporting/photovoltaic_info_sheet.pdf
2. Submit a single-line diagram of the system. Canadian Electrical Code (CE Code) Rule 84-030 requires a permanent single-line diagram be posted at the Supply Authority disconnect. This diagram is to show the PV array configuration, the wiring methods, overcurrent protection, the inverter, rapid shutdown initiation device location and disconnect switches. A sample single line diagram is attached (pg. 3).
3. Submit the four main current and voltage ratings for the solar PV array as required by CE Code rule 64-200 - rated operating current and voltage; maximum photovoltaic source circuit voltage and rated short-circuit current. These values are all required for system design and for labeling. This information on the single-line diagram.
4. Submit an equipment list with the manufacturer **and** model number of each of the major components. The following should be included:
 - modules
 - racking system
 - inverter(s) (micro inverter or string inverter)
 - dc-dc optimizers
 - rapid shutdown system components

The Electrical inspection is conducted when the system is installed. Ideally the inspector will have access to the roof top components and this is best accomplished by calling the inspection the day of the installation. CE Code requires that all electrical systems, including solar PV systems, be in compliance with all relevant articles of the CE Code. Section 84 deals with utility interactive systems and the rules for installation of electric power production sources interconnected with a Supply Authority system. Section 64 deals specifically with renewable energy and solar photovoltaic systems. As well, other CE Code sections apply for conductors, overcurrent protection, bonding and grounding. All components must be approved for use in Canada. The electrical permit and inspection process is set up to monitor compliance with this.

Operating the new system -you can operate your system once you have received authorization from Fortis Alberta. Fortis may require a copy of your final electrical inspection report and copy of your application to your electrical Energy Retailer prior to installing a bi-directional cumulative meter.

Sample single line diagram:

From Howell-Mayhew Engineering www.hme.ca

Notes:

1. Wiring arrows indicate direction of electrical energy flow.
2. Grid-connection safety requirements are given by the Canadian Electrical Code Section 84, and the Wires Service Provider.
3. All components shall meet Canadian electrical product certification standards.
4. All components shall contain nameplate labels indicating the acceptable Certifying Organization.
5. An inverter with a Canadian Certification Mark thus meets the CSA's standard C22.2 No. 107.1 for utility grid-connection.
6. Separate Grid Disconnect is optional and may or may not be required by the Wires Service Provider.
7. If installed, Grid Disconnect shall comply with Canadian Electrical Code Rule 84-024 (2006).
8. Generator Disconnect and Grid Disconnects may be integral to the inverter.

Mini Micro-Generation Source

Solar PV DC

Micro-wind DC or AC

Stirling engine DC or AC

Micro-hydro DC or AC

Biomass DC or AC

Fuel cell DC

Other: _____

Mini Micro-Generator

Brand: _____

Model: _____

Rated capacity: _____ kW

Certification Mark: _____

Location on site: _____

Type of Generator Interface

DC to AC Inverter

AC to DC to AC Inverter

Non-Inverter with anti-islanding protection (equivalent to inverter)

Generator to Utility Interface

Brand: _____

Model: _____

Rated capacity: _____ kW_{AC}

Certification Mark: _____

Location on site: _____

Wires Service Provider: _____

Electric Distribution System

Wires Service Provider's revenue meter

Single bi-directional meter

or Two one-way meters

and _____

Cumulative meter

or Interval meter

Point of Common Coupling

_____ VAC

_____ A

1 phase

3 phase

Main Breaker Panel or Sub-Breaker Panel _____

Main Breaker

Breaker Panel Load Circuits

Grid Disconnect

Will not be installed

Will be installed

Location on site: _____

Breaker with no "line" and "load" markings

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 NO. _____ REV _____	Drawing Date: _____ Site Description: _____
SCALE: NOT TO SCALE	Site Location: _____

Note – 2018 CE Code 64-218 (5) also requires the location the device to initiate rapid shut down to be shown on the Single Line Diagram

A Guide to the Requirements for Building Permits for Solar Systems on Residential Buildings in the City of Airdrie

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

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, layout in relation to overhangs 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. 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 flat roof and sloped roofs and roofs of rafter or truss construction. Permit applicants are to confirm loads by completing (and submitting along with your electrical permit application) 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/m²) 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 on all sides of the building. **Solar modules must not be installed on any overhang area of the roof unless accompanied by a review by a structural engineer.**
5. PV racking systems are required to be approved. They can be certified by (1) a Certification Body accredited by the Standards Council of Canada **or** (2) Inspected by an Inspection Body under SPE 1000 to test for bonding/grounding accompanied with a separate engineering evaluation for structural capabilities.

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, provide engineering review.

Is any portion of the array on an overhang area of the roof? | Yes | No
If yes, provide engineering review

Roof Information:

1. Is the roofing type lightweight (Yes = shingles, shakes, metal, lightweight masonry) | Yes | No
If No, provide engineering review (No = heavy masonry, slate, etc...).

2. Does the roof have a single roof covering? | Yes | No
If No, provide engineering review

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 racking system, 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÷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) _____ ft²

f. Distributed Weight of PV Module on Roof (a÷e) _____ lbs/ft²

If distributed weight of the PV system is greater than 5 lbs/ft², provide engineering.