

CE CODE AND PHOTOVOLTAIC POWER SYSTEMS

1-DAY COURSE
\$399

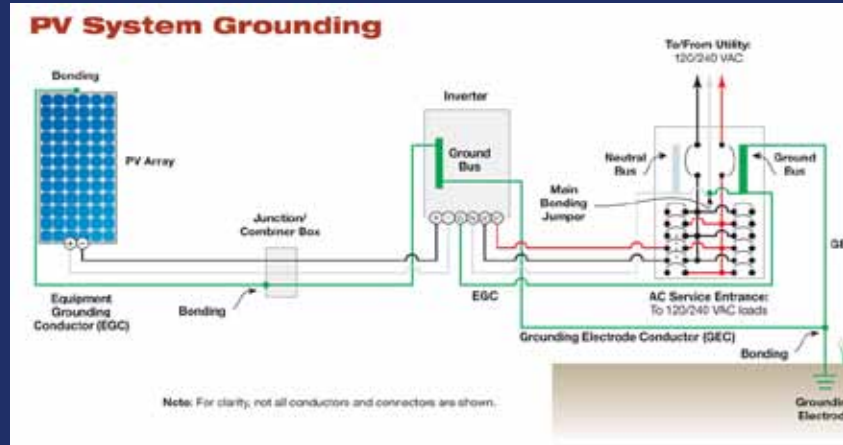
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CE CODE AND HAZARDOUS LOCATIONS EQUIPMENT

1-DAY COURSE
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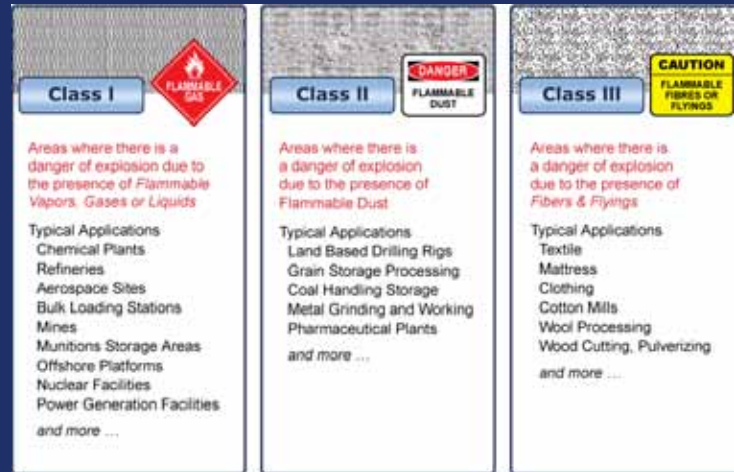
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COMBINED CE CODE AND PHOTOVOLTAIC POWER SYSTEMS/HAZARDOUS LOCATIONS EQUIPMENT TRAINING

2-DAY COURSE
\$699

February 5-6, 2019 | Winnipeg, MB

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WWW.ELECTRICITYFORUM.COM/ELECTRICAL-TRAINING/CE-CODE-PV-SYSTEMS-HAZLOC

Day One: CE Code for Photovoltaic Systems

This one day course is intended for those looking to gain CE Code knowledge on solar systems, from the photovoltaic array, through the inverter to usable power. Designed for engineers, electricians and inspectors looking to get into the quickly growing market of solar power, we will explore the major components involved and what the code requirements are.

Across Canada, building owners are adding solar panels to their roofs in order to save electricity and to reduce their utility bills. They are choosing to use their own solar energy first, and many buildings meet 20-50 per cent of their annual power needs from their rooftop system. Since prices for solar power in Canada have fallen dramatically over the past 5 years, solar power systems are now affordable.

These Canadian Solar Energy Programs make it easier for Canadians to integrate solar power systems into their buildings. Solar power systems last for decades, so building owners will continue to save money on their power bills for years to come.

The 2018 Canadian Electrical Code presents major changes for Photovoltaic (PV) Systems. Many Canadian provinces have already adopted the new code changes. The biggest change in the removal of Section 50 (solar PV section) and the addition of PV to section 64 (Renewable).

Some of the highlighted new or changed rules will be examined in this course.

Solar photovoltaic systems:

Rules 64-200 to 64-222 apply to solar photovoltaic systems and include requirements for:

Providing Marking, At The Disconnecting Means, Specifying The Rated Operating Current And Voltage
The Maximum Photovoltaic Source Circuit Voltage
The Rated Short-Circuit Current
The Location Of The Rapid Shutdown (At The Supply Authority Meter Location Or At The Consumer's Service Equipment Location)
Determining The Maximum Rated Open-Circuit Voltage And Voltage Ratings Of Cables, Disconnects, Overcurrent Protection And Other Equipment
Limiting Voltage Drop
Determining Ampere Rating
Use Of Photovoltaic Module Application Class A, B, Or C
Wiring Methods
Conductor Marking And Colour Coding
Determining Requirement And Rating Of Overcurrent Protection
Providing Arc-Fault Circuit Protection
Provision And Location Of A Rapid System Shutdown (Including Labelling As Noted Above)
Use And Rating Of Attachment Plugs And Similar Devices
Methods Of Bonding To Ground Non-Current Carrying Metal Parts Of Photovoltaic Modules
Markings and Warnings - Labelling your PV system properly is a good habit to get into. The new code has added some label requirements such as system specs on disconnects and rapid shut down devices. Also, any warning label now has to be red with white letters.

Ground Fault Protection - This mainly affects off-grid installations as all the grid-tie inverters already come equipped with ground fault detection. It is now a requirement for all grounded systems to have ground fault protection.

Combiner Box Disconnects - Combiner boxes now require a single disconnect to shut down the array under load. The difficulty is that the rule calls for the disconnects to be interlocking with the door. The interlocking requirement is currently not possible for

small grid-tie or off-grid installations.

Rapid Shut Down - This is the most controversial new rule. The concept is to have a switch that can shut off the PV array power at the array, so there are no live DC conductors running through the house to the inverter. This is intended to help protect fire fighters when they cut holes in the roof to vent/cool the house or building. The issues are that most fire fighters no longer vent from the roof, fire fighters are not informed on how PV rapid shut down works, fire fighters would have to blindly put faith in the functionality of the switch and the rule applies to all PV systems whether or not fire fighter service that area or not. All of these lead to adding points of failure to a PV system and increasing the probability of a fire starting in the first place.

PV Cable Colours - Traditionally PV cables have all been black in colour. The new code now requires that the positive conductor be coloured red and the negative black.

Rodent Guards - Where a system requires arc fault that is not module level, you now need to install a rodent guard to prevent rodents from chewing on the wires behind the array. This could be a screen protecting the array wires from squirrels and rats, or mechanical protection on all exposed wiring.

Course Outline

1) PV Panels

- a) Voltage
- b) Wiring methods
- c) Ampacity of conductors
- d) Attachment plugs
- e) Rodent Protection
- f) Bonding

2) Disconnect

- a) Array disconnect
- b) Combiner
- c) Rapid shutdown
- d) Inverter
- e) Marking

3) Interconnection

- a) Islanding
- b) Ampacity of Neutral
- c) Loss of phase
- d) Busbar ratings
- e) Back fed breakers
- f) Marking

4) Energy Storage

- a) Charge control
- b) Ventilation
- c) Voltage limitations
- d) Wiring methods
- e) Diversion load control

This one day course is ideal for the engineer looking to start or the electrician wanting to expand their knowledge in hazardous locations. We will explore all concepts related to above ground hazardous locations. If you engineer or maintain the electrics in the oil and gas field or grain and/or flour mills this course is for you. Join us as we take an in-depth look at Section 18 and all the components involved.

COURSE OUTLINE

CE Code and Hazardous Locations Systems

SESSION 1: Principles of Hazardous Locations

- a) History
- b) Definition
- c) Zones, Classifications/Divisions
- d) Gases and Vapours
- e) Dusts

SESSION 2: Applications

- a) Legal responsibility
- b) Applicable codes, available guides/handbooks
 - i) Canadian Electrical Code/national electric code
 - ii) American Petroleum Institute
 - iii) Energy Institute
 - iv) IEC
 - v) ANSI
 - vi) Standata
 - vii) Section 19

SESSION 3: Flameproof enclosures

- a) History
- b) Types of joints
- c) Windows in enclosures
- d) Special fasteners
- e) Breathers and drains
- f) Explosive fluid seals
- g) Testing of the enclosure

SESSION 4: Flameproof installations

- a) Conduit system
- b) Cable systems
- c) Flexible conduit
- d) Flexible cords and cables
- e) Factory sealed devices
- f) maintenance

SESSION 5: Dust-Ignition proof enclosures

- a) History
- b) Dual-rated enclosures and requirements
- c) Marking requirements
- d) Conduit systems
- e) Cable systems
- f) maintenance

SESSION 6: Intrinsic Safety

- a) History
- b) Testing devices for intrinsic safety
- c) Zener barriers
- d) The entity concept
- e) Control drawings
- f) Wiring methods
- g) Entity concept

SESSION 7: Purged and pressurized enclosures

- a) Principle of operations
- b) Pressuring by blower
- c) Compressed air systems
- d) Protective measures
- e) Pressurised rooms
- f) Static pressurization
- g) Analyzer houses
- h) Gas turbines

SESSION 8: Increased safety

- a) Background
- b) Principle of operations
- c) Special provisions
- d) Advantages
- e) maintenance

SESSION 9: Combustible gas detection

- a) History
- b) Principle of operation
- c) Testing procedures
- d) Electromagnetic stability
- e) Application
- f) Installation
- g) Calibration and maintenance



1 (855) 824-6131
(905) 686-1040



(905) 686-1078

**ON-LINE:**

www.electricityforum.com/electrical-training/ce-code-photovoltaic-systems

www.electricityforum.com/electrical-training/ce-code-hazardous-locations

www.electricityforum.com/electrical-training/ce-code-pv-systems-hazloc

**MAIL:**

The Electricity Forum
1885 Clements Rd., Unit 218
Pickering, ON L1W 3V4

ATTENDEE INFORMATION

To receive registration fee discounts, you must **REGISTER AND PREPAY** prior to the course date.

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The registration fee to attend the oneday Arc Flash and Shock Training course is \$399.00 + GST/HST. The fee includes Course presentation materials, CEU Credit, refreshments, Lunch is Included.

Register and prepay 14 days before forum date and receive an early bird discount of \$50.00

CANCELLATION AND REFUND POLICY

Registration fees are refundable only upon receipt of written notification 10 days prior to the conference date, less a 10 per cent service charge. Substitution of participants is permissible. The Electricity Forum reserves the right to cancel any conference it deems necessary and will, in such event, make a full refund of the registration fees.

REGISTER 3 DELEGATES AT FULL PRICE AND GET THE 4th REGISTRATION FREE!

**WHEN & WHERE****1-Day CE Code for Photovoltaic Systems Training Course**

www.electricityforum.com/electrical-training/ce-code-photovoltaic-systems

February 5, 2019 | Winnipeg, MB
Sandman Hotel & Suites
1750 Sargent Ave.
Tel: 204-775-7263

February 7, 2019 | Saskatoon, SK
Sandman Airport Hotel
310 Circle Drive
Tel: 306-477-4844

February 11, 2019 | Edmonton, AB
Sawridge Inn Edmonton South
4235 Gateway Blvd NW
Tel: 780-438-1222

February 13, 2019 | Richmond, BC
Sandman Signature Vancouver
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10251 ST. Edwards Drive
Richmond, BC
Tel: 604-278-9611

February 27, 2019 | Mississauga, ON
Hampton Inn and Suites
3279 Caroga Drive, Mississauga, ON
Tel: 905-671-4730

\$399**1-Day CE Code and Hazardous Locations Systems Training Course**

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\$399**Combined CE Code for Photovoltaic Systems & CE Code and Hazardous Locations Systems Training Course**

www.electricityforum.com/electrical-training/ce-code-pv-systems-hazloc

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