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Advisory Bulletin AB-2017-04 **Roof Mounted Photovoltaic Equipment**

WARNING: ALL SOLAR PANELS ARE LIVE AND POSE SIGNIFICANT SAFETY RISK.

With the recent movement towards renewable energy in Alberta, the installation of photovoltaic equipment on roofs has quickly emerged. The roof may not be a suitable location for large equipment installations compared to a ground installation, however the Government of Alberta is forging ahead. The Alberta Roofing Contractors Association is concerned about this trend as there are many safety and structural considerations with the installation of photovoltaic arrays on both low-slope and steep-slope roofs.

Safety

1. Unlike other rooftop equipment (i.e. radio antennas, cell phone antennas) solar panels cannot be shut off and are always producing electricity.
 - a. Moonlight and emergency lighting continue to energize solar panels.
 - b. Covering a panel with a tarp will not dissipate energy in the system.
2. The metal frame of the solar panel may be charged with electrical current and can result in shock and burns when touched.
3. Shutting off the AC/DC inverter only stops electricity from entering the building. It does not stop electrical energy from being created from the solar panels.
4. Any damage to exposed wires or conduit pose a significant electric shock to workers.
5. Conduit should be labeled and if there are no labels workers should assume the worst.
6. Any moisture from rain or snow can increase amperage up to **400% and would be a lethal.**
7. Use a non-conductive (NOT steel or aluminum) ladder if solar panels are on any portion of the roof.
8. A panel damaged by hail or rocks can result in all energy draining from the damaged point.
9. Check to ensure plumbing vents have not been altered, methane gas may build up under the panels and pose a significant fire risk.
10. Panels are normally wired in series and any damage to any panel or wires connecting panels can result in electricity escaping from the system.
11. Be aware that ballasted systems may cause excessive ponding and roof collapse should be considered prior to allowing workers on the roof.
12. Before beginning any work on a roof with solar panels the system operator should be contacted to verify that grounding wires are in good repair, panels are in good repair, and confirm the amount of electricity being created by the system.

Structural / Application Considerations

There are two ways photovoltaic equipment is being mounted;

1. Fastened to structural supports (sleepers) which have been professionally engineered to accept the associated loads.
2. Surface mounted on the roof membrane, ballasted to remain in place.

When fastened to an engineered structural support, the supports must allow for;

- Dead load of equipment
- Both wind uplift and lateral wind loads
- Snow load
- Proper penetrations for electrical services following ARCA standard guidelines

When surface mounted, in addition to previously listed considerations, the design must take into consideration;

- Point load or bearing support for system racking.
- Drainage of the roof system must not be impeded by the additional equipment.
- Type of ballast used to secure photovoltaic panels. The ARCA does not recommend sand bag ballast as they deteriorate over time, are a source of potential damage to the roof membrane and contribute to drainage concerns.
- Protection of roof membrane (as per ARCA Standards) from system supports.
- Compressive strength of roofing assembly components.
- Moisture drive into roof assembly beneath system supports.

Regardless of the mounting configuration, there are additional design considerations.

- The roof system must have an expected service life equal to or greater than the photovoltaic equipment.
- The system layout must not obstruct proper roof drainage.
- Existing equipment must not be modified or obstructed (i.e. plumbing vents, fall protection anchors).
- Excessive foot traffic / trade damage will possibly damage roof membrane.
- The impact of additional heat on the membrane.

All solar photovoltaic systems must be installed in accordance with **Section 64** of the Canadian Electrical Code 2015. This includes standards on marking, disconnecting, wiring and grounding.

Please contact the ARCA if you have any questions.