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SOLAR – PHOTOVOLTAIC (PV) SYSTEMS

- This handout is intended only as a guide. It shall not be considered a complete set of requirements.
- Materials and installation must comply with the current Minnesota State Building Code and the manufacturers' installation specifications for each product.
- A building permit is required for solar panel systems (also known as photovoltaic systems).
- **Check with the municipality office to determine if there are local ordinances regarding solar panels.**
- A separate electrical permit is required.

BUILDING Permit Submittal shall include:

- ☐ **Building Permit Application,** completed in its entirety, including signature and valuation.
- ☐ **Documentation**:
  - **Location and roof plans (if roof-mounted),** including information on spans and roof construction materials so loading, fire resistance and ridge setbacks can be verified.
  - **A site plan** (or **Certificate of Survey** if required by municipality) **(if ground-mounted),** drawn to scale and dimensioned, identifying system location and dimensions with measurements from the adjacent lot lines; as well as all lot lines, setbacks, easements, adjacent street names, all structures on the property, septic system location (if applicable), and all buried utilities. **Check with your municipality to determine setback requirements for the property.**
  - Detailed system diagram of all components, highlighting system grounding and bonding.
  - Basic line drawing that shows all the devices on the system including the solar module, DC disconnect, inverter, sub-panels, AC disconnect, main service meter, and wire sizes and connections. Specify manufacturer, model numbers, and ratings.
  - Specific locations and labels used for compliance with NEC 690 and UL 969.
  - Rack mounting details and calculations.
  - Battery storage location and venting (if applicable).
  - Label and listing specifications for the PV module, inverter, and rack. Panels shall be listed for compliance with UL 1703 and inverters shall be listed for compliance with UL 1741 with additional listing for grid connection (if applicable).
- ☐ Additional information may be required by the plan reviewer.

PERMIT CARD AND APPROVED PLANS (throughout the project) shall be:

POSTED prior to start of work - **VISIBLE** from street or driveway - **ACCESSIBLE** to the inspector

INSPECTION REQUIREMENTS:

Inspections **MUST** be scheduled during office hours **AT LEAST** one business day prior to inspection. If a specific date and time is required, additional notice may be needed. Failure to cancel a scheduled inspection may result in a reinspection fee.

- **Office Hours:** Monday - Friday • 8:00 a.m. - 4:30 p.m.
- **Phone:** (952) 442-7520 or (888) 446-1801

Inspections: (Refer to your permit card regarding project-specific inspections)

- **Footings (if ground-mounted):** After holes are dug, but PRIOR TO POURING CONCRETE; or during pile driving process (for pile-mounted systems).
- **Attachment:** After all hardware has been installed.
- **Final:** After project is complete and final electrical inspection has been approved.

NOTICE: Construction or work for which a permit is required shall be subject to inspection by the Building Official, and such **construction or work shall remain accessible and exposed for inspection purposes until approved.** It is the responsibility of the permit applicant to be in attendance on site and provide access to the Building Official for all required inspections. If work is concealed and/or work is not complete at time of inspection, an additional inspection is required and a **reinspection fee may apply.**

Note: The State of Minnesota requires all residential building contractors, remodelers, roofers, plumbers, and electricians to obtain a state license, unless they qualify for a specific exemption. Any person claiming an exemption must provide a copy of a Certificate of Exemption from the Department of Labor & Industry to the Municipality before a permit will be issued.

Note: To determine contractor requirements, or to check the licensing status of a contractor, please call the Minnesota Department of Labor & Industry at 651-284-5065 or toll free 1-800-342-5354.

Note: For specific code requirements, contact the Building Inspection Department at 952-442-7520 or 888-446-1801 or e-mail: infoMN@safebuilt.com.

PROJECT CHECKLIST:

The following is a guideline to assist in compliance with the requirements of the MN State Building Code.

☐ The home address must be visible from the street.

ROOFTOP APPLICATION – RESIDENTIAL:

☐ The solar photovoltaic panel system shall be designed for an ultimate wind speed of 115 mph and the component cladding loads found in Table R301.2 (2) with adjustments for height and exposure from Table R301.2(3).

☐ Rooftop systems shall support a roof snow load of 35 pounds per square foot and ground mount systems shall support a ground snow load of at least 50 psf as found in Table R301.2(1).

☐ The total dead load of modules, supports, mountings, raceways, and all other appurtenances must be accounted for in the proposed design in accordance with Section R324.4.1 of the current MRC.

☐ Roof and wall penetrations shall be flashed and sealed in accordance with Chapter 9 or the current MRC.

☐ Where mounted on or above the roof coverings, the photovoltaic panels and modules and supporting structure shall be constructed of noncombustible materials or fire-retardant treated wood equivalent to that required for the surrounding roof construction as found in Section R902 of the current MRC (if applicable).

☐ When the roof on which any array or modules are mounted is within 3' of a lot line, they shall be tested, listed and identified in accordance with UL 1703 and UL 2703 and be Class A, B or C.

☐ Rooftop installed photovoltaic systems that are adhered or attached to the roof covering or photovoltaic modules/shingles installed as roof coverings shall identify their fire classification.

☐ Photovoltaic shingles shall be attached in accordance with the manufacturer's installation instructions and Section R905.16 of the current MRC.

☐ All interior and exterior raceways, enclosures, and cable assemblies shall be marked at the following locations with labels indicating "WARNING: PHOTOVOLTAIC POWER SOURCE" in all-white, capital letters, a minimum of 3/8" tall, on a red background, and must be reflective and weather-resistant.
- ✓ Every 10'
- ✓ Within 1' of turns or bends
- ✓ Within 1' of penetrations through roofs/ceilings, walls, or other barriers.

☐ Circuit raceways shall be installed as close as possible to the roof's ridge, hip, or valley.

☐ Modules covering 33% or less of the roof's surface shall be installed at least 18" below the ridge. Modules covering greater than 33% of the roof's surface shall be installed at least 36" below the ridge.

☐ A minimum of two, 36" wide pathways shall be provided, on separate roof planes, from the lowest roof edge to the ridge of all buildings containing rooftop solar arrays. At least one of these pathways shall be provided on the driveway or street side of the roof.

☐ For each individual roof plane with a solar array, a minimum 36" pathway shall be provided from the lowest roof edge to ridge on the same roof plane as the array, on an adjacent roof plane, or straddling the same adjacent roof planes.

☐ Pathways shall be over areas capable of supporting firefighters and shall be located in areas with minimal obstructions such as vent pipes, conduit or other mechanical equipment.

☐ Panels shall not be placed below emergency escape and rescue openings unless a 36" clear pathway is provided for unimpeded egress.

ROOFTOP APPLICATION – NON-RESIDENTIAL:

Whenever solar arrays are installed the licensed design professional shall notify the Fire Code Official.

☐ Rooftop solar arrays installed on detached, non-habitable Group-U structures including parking shade structures, carports, solar trellises and similar structures shall comply with the Minnesota Fire Code, the Minnesota Electric Code and the manufacturer's instructions only. They are exempt from the Minnesota Building Code requirements listed below (MBC 1305.3111.3).

- ☐ Rooftop arrays shall be designed for all uniform and concentrated live loads, dead loads (including array and its components) and snow drift when applicable in accordance with Section 1607.13.5 of the current MBC.
- ☐ Rooftop arrays shall be designed for all applicable wind loads in accordance with Section 1609 of the current MBC.
- ☐ Arrays shall be listed and labeled for the fire classification required based on building construction type as found in Section 1505.1 and 1505.9 of the current MBC.
- ☐ Access landings shall be a minimum 6’ in all directions and free of obstructions. On roofs with a slope greater than 2:12 access landings shall be placed with direct access to the roof ridge. Each grouping of arrays shall have at least two access points spaced not closer than 1/3 the diagonal dimension of the array served.
- ☐ For each individual roof plane with a solar array, a minimum 36" pathway shall be provided from the lowest roof edge to ridge on the same roof plane as the array, on an adjacent roof plane, or straddling the same adjacent roof planes. At least one pathway shall be located on the street, drive or fire department access side of the building.
- ☐ Pathways shall be over areas capable of supporting firefighters and shall be located in areas with minimal obstructions such as vent pipes, conduit or other mechanical equipment.
- ☐ Panels shall not be placed below emergency escape and rescue openings in R-type occupancies unless a 36” clear pathway is provided for unimpeded egress.

The following requirements are for roofs with a slope of 2:12 or less:

- ☐ There shall be a minimum 6’ wide clear access perimeter around the edges of the roof.
- ☐ Interior pathways shall be provided at intervals of not greater than 150’. The pathway shall be over an area capable of supporting the live load of firefighters accessing the roof.
- ☐ The pathway shall be a straight line not less than 4’ clear to skylights, ventilation hatches, or standpipes.
- ☐ The pathway shall provide not less than 4’ clear around roof access hatch with at least one not less than 4’ clear pathway to parapet or roof edge.
- ☐ Arrays shall not be located below a required emergency escape and rescue opening unless a 4’ wide pathway is provided to the perimeter pathway to provide unimpeded egress.
- ☐ Arrays shall be no greater than 150’ by 150’ in distance in either axis in order to create opportunities for fire department smoke ventilation operations.
- ☐ Smoke ventilation options between array sections shall be one of the following:
  - ✓ A pathway 8’ or greater in width
  - ✓ A 4’ or greater in width pathway and bordering roof skylights or smoke and heat vents.
  - ✓ A 4’ or greater in width pathway and bordering 4’ by 8’ “venting cutouts” every 20’ on alternating sides of the pathway.

GROUND-MOUNTED PANELS AND MODULES

- ☐ BEFORE YOU DIG, contact Gopher State One Call to locate buried utilities: (651) 454-0002 or (800) 252-1166. www.gopherstateonecall.org.
- ☐ Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703.
- ☐ Photovoltaic panels and modules shall be installed in accordance with the manufacturer’s installation instructions.
- ☐ A clear, brush-free area of 10’ shall be required.
- ☐ Panels are subject to minimum fire separation distances.

RAPID SHUTDOWN TYPE SYSTEMS

☐ All rapid shutdown type systems shall be labeled in accordance with Section 3111.3.6.1 of the current MBC as one of the following:

1. For solar photovoltaic systems that shut down the array and the conductors leaving the array, a label shall be provided. The first two lines of the label shall be uppercase characters with a minimum height of 3/8-inch (10 mm) in black on a yellow background. The remaining characters shall be uppercase with a minimum height of 3/16-inch (5 mm) in black on a white background. The label shall be in accordance with Figure 3111.3.6.1(1) and state the following: **SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN. TURN RAPID SHUTDOWN SWITCH TO THE "OFF"POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZZARD IN ARRAY.**

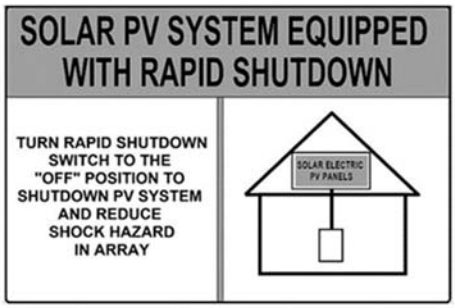

FIGURE 3111.3.6.1(1)
LABEL FOR SOLAR PV SYSTEMS THAT REDUCE SHOCK HAZARD WITHIN ARRAY AND SHUT DOWN CONDUCTORS LEAVING THE ARRAY

2. For photovoltaic systems that only shut down conductors leaving the array, a label shall be provided. The first two lines of the label shall be uppercase characters with a minimum height of 3/8-inch (10 mm) in white on a red background. The remaining characters shall be capitalized with a minimum height of 3/16-inch (5 mm) in black on a white background. The label shall be in accordance with Figure 3111.3.6.1(2) and state the following: **THIS SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN. TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUT DOWN CONDUCTORS OUTSIDE THE ARRAY. CONDUCTORS WITHIN ARRAY REMAIN ENERGIZED IN SUNLIGHT.**

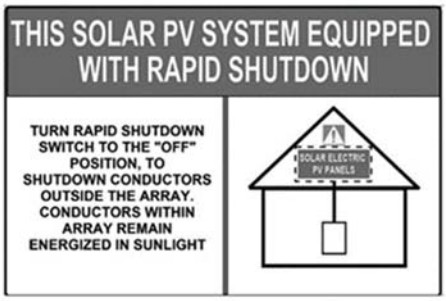

FIGURE 3111.3.6.1(2)
LABEL FOR SOLAR PV SYSTEMS THAT ONLY SHUT DOWN CONDUCTORS LEAVING THE ARRAY

☐ The labels in Section 3111.3.6.1 shall include a simple diagram of a building with a roof. Diagram sections in red signify sections of the solar photovoltaic system that are not shut down when the rapid shutdown switch is turned off.

☐ The rapid shutdown label in Section 3111.3.6.1 shall be located not greater than 3 feet (914 mm) from the service disconnecting means to which the photovoltaic systems are connected, and shall indicate the location of all identified rapid shutdown switches if not at the same location.

☐ Solar photovoltaic systems that contain rapid shutdown in accordance with Section 3111.3.6.1, items 1 and 2, or solar photovoltaic systems where only portions of the systems on the building contain rapid shutdown, shall provide a detailed plan view diagram of the roof showing each different photovoltaic system and a dotted line around areas that remain energized after the rapid shutdown switch is operated.

☐ A rapid shutdown switch shall have a label located not greater than 3 feet (914 mm) from the switch that states the following: **RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM.**

