PV SYSTEM LABELS, MARKINGS AND IDENTIFICATION

This table provides specifications for labels, markings and identification of PV systems and components as required by the 2014 National Electrical Code (NEC, NFPA 70).
Additional labeling may be required by other codes or at the discretion of local building or fire officials.
This information is intended as a guideline and can serve as a checklist for contractors and building officials to verify compliance.
Examples provide suggestions for ANSI-compliant NEC labels, although other label formats and colors may also be acceptable to the AHJ.
Directory requirements from different sections can often be consolidated into a single system directory installed at designated locations.

KEY:
First column is color-coded to distinguish the following:
General information and requirements for safety markings, labeling and equipment identification
Labels, markings and identification typically provided by product manufacturers
Labels, markings and identification to be provided by contractors/installers
Labels and markings to be provided by installers requiring system voltage and current specifications

PRODUCT SAFETY SIGNS AND LABELS - ANSI Z535.4 - 2011

	References	Requirement	
Product Safety Signs and Labels	ANSI Z535.4-2011 NEC 110.21(B)	Provides guidelines for suitable font sizes, words, colors, symbols, and location requirements for safety signs and labels. Other colors may be used for compliance with other standards (7.6.1, 3.2).	Referenced from NEC 110.21(B).
Signal Words	ANSI Z535.4 8.2.3	Signal word letters should be at least 50% greater than the message panel wording.	**Signal Word & Safety Alert Symbol**
DANGER		DANGER: Indicates a hazardous situation that, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations. DANGER signal word shall be in safety white letters on safety red background.	DANGER
WARNING		WARNING: Indicates a hazardous situation that, if not avoided, could result in death or serious injury. WARNING signal word shall be in safety black letters on safety orange background.	WARNING
CAUTION		CAUTION: Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury. CAUTION signal word shall be in safety black letters on safety yellow background.	CAUTION
NOTICE		*NOTICE: Indicates important information but not hazard-related. Safety alert symbol shall not be used with this signal word. NOTICE signal word shall be in italicized safety white letters on safety blue background.*	NOTICE
SAFETY INSTRUCTIONS		SAFETY INSTRUCTIONS: Provide specific safety procedures. Safety alert symbol shall not be used with this signal word. SAFETY INSTRUCTIONS signal word shall be in safety white letters on safety green background.	SAFETY INSTRUCTIONS
Message Panel	ANSI Z535.4 8.2.1	Lettering shall be of size that enables a person with normal or corrected vision to read the message panel at a safe viewing distance from the hazard. Determination of safe viewing distance shall take into consideration a reasonable hazard avoidance reaction time.	Message panel wording should have either: Safety black letters on safety white background Safety white letters on safety black background

2014 NATIONAL ELECTRICAL CODE - NFPA 70

Description	References	Location/Requirement	Comments
Field Applied Hazard Markings	110.21(B)	Caution, warning, or danger signs or labels shall: (1) adequately warn of the hazard using effective words and/or colors and/or symbols. (2) be permanently affixed to the equipment or wiring method and shall not be hand written. (3) be of sufficient durability to withstand the environment involved.	References ANSI Z535.4 (2011) in Informational Note.
Identification of Disconnecting Means	110.22(A)	Each disconnecting means shall be legibly marked to indicate its purpose unless located and arranged so the purpose is evident. The marking shall be of sufficient durability to withstand the environment involved.	See specific labeling requirements for PV system disconnecting means in NEC 690.13(B).
Means of Identifying Grounded Conductors	200.6(A), (B)	Grounded conductors sizes 6 AWG and smaller shall be identified by a continuous white or gray outer finish. For 6 AWG or smaller conductors, identification of the grounded conductor solely through the use of white or gray marking tape or other distinctive white or gray marking applied at the time of installation is not generally permitted. An exception is permitted for single-conductors size 6 AWG and smaller, sunlight-resistant and outdoor-rated used as a grounded conductor for PV array wiring. These conductors typically have black outer finish and are not commonly available in white or grey finish.	Normally current-carrying conductors (positive or negative) for ungrounded PV arrays should not have a white or gray outer finish. Most interactive PV inverters today are non-isolated (transformer less) and required to use ungrounded arrays.
Identification of Equipment Grounding Conductors	250.119	Equipment grounding conductors shall be either bare, or insulated with a green outer finish, or green with one or more yellow stripes. An insulated or covered EGC conductor 4 AWG and larger shall be permitted, at the time of installation, to be permanently identified as an equipment grounding conductor by either a) stripping the insulation or covering from the entire exposed length, b) coloring the insulation or covering green at the termination, or c) marking the insulation or covering with green tape or green adhesive labels at the termination.	Equipment grounding conductors 6 AWG and smaller must generally be bare, or have green insulation.
Conductor Identification	310.110	The Code requires ungrounded conductors to be clearly distinguishable from grounded and (equipment) grounding conductors.	Generally, this permits the ungrounded conductors to be any color except white, grey, green or green with yellow stripes.
Conductor Markings	310.120	All conductors and cables shall be marked to indicate the following information, using the applicable method described in 310.120(B):(1) The maximum rated voltage. (2) The proper type letter or letters for the type of wire or cable as specified elsewhere in this Code. (3) The manufacturer's name, trademark, or other distinctive marking by which the organization responsible for the product can be readily identified.	Conductor identification markings are typically provided by the manufacturer. An exception is permitted in 690.41(F) for single conductors sizes 16 AWG and 18 AWG rated for sunlight and moisture resistance, meeting ampacity requirements and used for module interconnections.
Equipment Markings	690.4(B)	Inverters, motor generators, photovoltaic modules, photovoltaic panels, ac photovoltaic modules, source-circuit combiners, and charge controllers intended for use in photovoltaic power systems shall be identified and listed for the application.	These markings are provided by manufacturers on product labels.
Identified Interactive Equipment	690.60	Only inverters and ac modules listed and identified as interactive shall be permitted in interactive systems.	These markings are provided by manufacturers on product labels.
Identification and Grouping	690.31(B)	Photovoltaic system conductors shall be identified and grouped by separate color coding, marking tape, tagging, or other approved means, unless the identification of conductors is evident by arrangement.	Identification shall be provided at all points of termination, connection, and splices.

SYSTEM & EQUIPMENT LABELS

Description	References	Location/Requirement	Label Examples
Ground-Fault Protection	690.5(C)	Warning label shall appear on a utility-interactive inverter or be applied by the installer near the ground-fault indicator at a visible location. When the PV system also has batteries, the same warning shall also be applied by the installer in a visible location at the batteries. The warning sign(s) or label(s) shall comply with 110.21(B).	WARNING: ELECTRIC SHOCK HAZARD. IF A GROUND FAULT IS INDICATED, NORMALLY GROUNDED CONDUCTORS MAY BE UNGROUNDED AND ENERGIZED.
PV Disconnecting Means	690.13(B) - 2014, 705.10, 110.21(A)	Each PV system disconnecting means shall be permanently marked to identify it as a PV system disconnect. This requirement applies to all PV system ac and dc disconnecting means. A system directory per 705.10 is also usually required if the PV system disconnecting means are not co-located with the service disconnecting means. This marking requirement was previously in 690.14(C)(2) - 2011 NEC. Labels should clearly indicate whether a dc or ac disconnecting means, and for multiple dc disconnecting means which parts or sections of the array it controls. Labels for disconnecting means are often combined with label requirements in 690.53 and 690.54.	PHOTOVOLTAIC SYSTEM DC DISCONNECT (Subarray #) PHOTOVOLTAIC SYSTEM AC DISCONNECT (Inverter #)
Disconnect Type: Interrupting Rating	690.17(E)	PV disconnecting means that may have energized line and load side terminals require labels to warn that all the terminals of the disconnecting means may be energized in the open position. This label requirement generally applies to all PV system disconnecting means.	WARNING: ELECTRIC SHOCK HAZARD. DO NOT TOUCH TERMINALS. TERMINALS ON BOTH THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION.
Direct-Current Photovoltaic Source and Direct-Current Output Circuits on or Inside a Building	690.31(G)(3)	DC wiring methods including: 1) Exposed raceways, cable trays, and other wiring methods; 2) Covers or enclosures of pull boxes and junction boxes; 3) Conduit bodies with unused openings. Spacing between labels or markings, or between a label and a marking, shall not be more than 3 m (10 ft). The labels shall be reflective, suitable for the environment, visible after installation, and all letters capitalized (3⁄8" min height) white lettering on a red background. PV system circuits embedded in roofing materials not covered by PV array shall be similarly marked.	WARNING: PHOTOVOLTAIC POWER SOURCE
Ungrounded Photovoltaic Power Systems	690.35(F)	At each junction box, combiner box, disconnect, and device where energized, ungrounded circuits may be exposed during service. Ungrounded systems require special where labels where energized ungrounded dc conductors can be accessed. Most listed residential PV inverters installed today use ungrounded PV arrays. These inverters must be listed and identified for use with ungrounded arrays.	WARNING: ELECTRIC SHOCK HAZARD. THE DC CONDUCTORS OF THIS PHOTOVOLTAIC SYSTEM ARE UNGROUNDED AND MAY BE ENERGIZED.
Direct-Current Photovoltaic Power Source	690.53	At the photovoltaic array dc disconnecting means. The rated values for the PV power source are calculated by adding voltage ratings of series-connected modules and adding current ratings of parallel-connected modules or PV source circuits. These marking are permanent system ratings and since they are not subject to change, should not be hand drawn (110.21(B)).	PHOTOVOLTAIC SYSTEM DC DISCONNECT Rated maximum power-point current: __ A Rated maximum power-point voltage: __ V Maximum system voltage: __ V Maximum circuit current: __ A Charge controller rated maximum output current: __ A
Interactive System Point of Interconnection	690.54	At the inverter ac disconnecting means. These values are based on the inverter(s) rated ac output voltage and maximum current, and shall be provided by the installer at the ac disconnecting means.	PHOTOVOLTAIC SYSTEM AC DISCONNECT Rated ac output current: __ A Nominal operating ac voltage: __ V
Identification of Power Sources: Facilities with Stand-Alone Systems.	690.56(A)	At the service disconnecting means. Any structure or building with a PV power system that is not connected to a utility service source and is a stand-alone system shall have a permanent plaque or directory installed on the exterior of the building or structure at a readily visible location acceptable to the AHJ. The plaque or directory shall indicate the location of system disconnecting means and that the structure contains a stand-alone electrical power system.	NOTICE Standalone PV system located on premises. PV system disconnecting means are located as shown on directory. (Directory)
Identification of Power Sources: Facilities with Utility Services and PV Systems.	690.56(B), 705.10	Buildings or structures with both utility service and a photovoltaic system shall have a permanent plaque or directory providing the location of the service disconnecting means and the photovoltaic system disconnecting means if the disconnecting means are not co-located.	NOTICE PV system located on premises. PV system and service disconnecting means are located as shown on directory. (Directory)
Directory	705.10	This section requires a system directory denoting the location of the service disconnecting means and all interconnected power sources on a premises, and shall be placed at all service equipment and electric power source locations. This directory is required whether the exceptions for 690.56(B) apply or not.	NOTICE Utility-Interactive PV system located on premises. PV system and service disconnecting means are located as shown on directory. (Directory)
Inverter Output Connection	705.12(D)(2)(3)(b)	Applied to the distribution equipment. If the supply breakers (utility + PV) exceed 100% or the busbar rating but are no more than 120% of the busbar rating, the location of the PV output breakers and utility and supply breakers shall be located at opposite ends of the busbar and the PV breakers shall be labeled in accordance with 705.12(D)(2)(3)(b). This warning is often required for load side interconnection.	WARNING: INVERTER OUTPUT CONNECTION DO NOT RELOCATE THIS OVERCURRENT DEVICE
Distribution Equipment Supplied by Multiple Sources	705.12(D)(3)	Equipment containing overcurrent devices in circuits supplying power to a busbar or conductor supplied from multiple sources shall be marked to indicate the presence of all sources.	NOTICE THIS EQUIPMENT IS SUPPLIED BY BOTH UTILITY SERVICE AND PV SYSTEM