

# Solar DC Electrical Safety

Guy's Construction  
123 Main Street, Anytown, CA 90210

---

Ontology-Backed Safety Document

Effective Date: June 08, 2026

**SAMPLE DOCUMENT - NOT FOR COMPLIANCE USE**

## JURISDICTION AND REGULATORY FRAMEWORK

### STATE-SPECIFIC: California has the following requirements:

- solar
- the unique hazard that solar panels remain energized during daylight
- heat illness prevention for all outdoor workers: shade at 80F, high-heat procedures at 95F, 1 quart/hour/employee water, bilingual written plan; rooftop radiant heat can exceed 150F

*Cal/OSHA Title 8 Section 3395*

- Desert Renewable Energy Conservation Plan covering 22.5 million acres in California desert; designates development focus areas and conservation lands for utility-scale solar/wind

*BLM / California DRECP*

- locks and/or tags to each energy isolating device in accordance with the HEC procedures
- all movements over the broken rail or pull apart and be prepared to stop the train if necessary
- before July 3, 2011
- no later than January 3, 2009
- before October 1, 2016
- inspection performed by a representative of the Division of Industrial Safety
- being contained in the same raceway, cable tray, cable, outlet box, junction box, or similar fitting as feeders or branch circuits of other systems
- installation and safety requirements
- Article 690
- renewal fee of \$25
- examination for licensure
- The identity of the procedure and machinery, equipment, or system that were audited
- on the same horizontal level as the base of the letters of the signal word
- Water that meets the standards for drinking purposes of the state or local authority having jurisdiction, or water that meets the quality standards prescribed by the U.S. Environmental Protection Agency's National Primary Water Regulations (40 CFR...
- before October 1, 2012
- physical or electrical contact with the electric power circuit
- electrocution or arc flash
- increased risk of arc flash or electrocution
- electrical shock or electrocution
- electrical shock or electrocution
- for six hours at 24 °C ±4 °C (75 °F ±7 °F) while subjected to a pressure differential of at least 88 kPa (13 psig)
- original tare weight in kilograms preceded by the letters "TW"
- a device or vehicle that uses a non-destructive testing technique to inspect the pipeline from the inside
- 125 mL (4.22 fluid ounces) net capacity each for liquids
- top of the pipe protrudes above the underwater natural bottom in waters less than 15 feet (4.6 meters) deep
- PV application

- listed for use in PV systems
- listed for PV application
- fully de-energized during daylight
- 80V within 30sec at array boundary
- third physician to conduct examinations, consultations, laboratory tests and discussions with prior physicians as necessary to resolve disagreement
- fiberboard box (4G) or fiber drum (1G) with plastic inner packaging not exceeding 5 kg (11 lbs) and maximum net mass not more than 25 kg (55 lbs)
- the overall status of implementation of the provisions of this Part relating to the identification, inventory, and removal of underwater obstructions
- a list of interested parties (those with interests in the leases and/or units from which production is to be commingled for which the applicant has no existing commingling authority)
- a diagrammatic sketch of the mechanical installation along with a detailed explanation of the flow, procedures and frequency of well tests, calibration/proving of metering devices and allocation formulas

Monday Safety — Sample Document

## FEDERAL OSHA REQUIREMENTS

- fully de-energized during daylight; panels produce DC power whenever light hits them, creating unique LOTO challenge

*NEC 690 / NFPA 70E / industry practice*

- installation and safety requirements
- interrupt current under load; disconnecting under load creates sustained DC arc; must de-energize string before disconnecting MC4s

*Industry practice / NEC 690*

- solar DC systems unique hazards: cannot be fully de-energized during daylight (photons = voltage); DC arc flash does not self-extinguish like AC; string voltages 600V+ (utility-scale 1,000V+); rapid shutdown per NEC 690.12 required but does NOT eliminate all hazard; battery energy storage adds...

*NEC 690 + NFPA 70E + 29 CFR 1926.405*

- earthwork/grading, pile driving, trenching for conduit in utility-scale solar; desert soils often Type C; PEL 50 ug/m3, action level 25 ug/m3

*29 CFR 1926.1153*

- means to disconnect all current-carrying conductors from all other conductors in a building or other structure
- being contained in the same raceway, cable tray, cable, outlet box, junction box, or similar fitting as feeders or branch circuits of other systems if conductors of the different systems are connected together
- being contained in the same raceway, cable tray, cable, outlet box, junction box, or similar fitting as feeders or branch circuits of other systems if conductors of the different systems are separated by a partition
- being contained in the same raceway, cable tray, cable, outlet box, junction box, or similar fitting as feeders or branch circuits of other systems
- fall protection per 1926 Subpart M (6-ft trigger on rooftop installations); electrical hazards: DC arrays are energized whenever exposed to light (cannot be de-energized by disconnect alone); arc flash risk from DC systems per NFPA 70E; roof structural load assessment; heat illness for outdoor...

*29 CFR 1926 Subpart M + Subpart K + NFPA 70E (2021 DC provisions)*

- unique to solar: (1) DC doesn't cross zero - arc sustains continuously until gap breaks; (2) NEC 690.12 rapid shutdown reduces module voltage to 80V within 30sec at array boundary but modules still produce ~30-40V individually in sunlight; (3) ground fault on ungrounded (floating) inverters creates...

*NEC 690 + NFPA 70E 2021 (DC provisions) + OSHA electrical safety standards*

- listed for PV application
- PV systems on non-enclosed detached structures (carports, ground-mount) from rapid shutdown requirements per 2023 NEC

*NEC 690.12 (2023)*

- outside array boundary: conductors to 30V or less within 30 seconds; inside array boundary: DC conductors to 80V or less within 30 seconds

*NEC 690.12*

## COMPANY PROCEDURES

Guy's Construction implements the following procedures for solar dc electrical safety:

- Guy's Construction shall: means to disconnect all current-carrying conductors from all other conductors in a building or other structure
- Guy's Construction shall: fall protection per 1926 Subpart M (6-ft trigger on rooftop installations); electrical hazards: DC arrays are energized whenever exposed to light (cannot be de-energized by disconnect alone); arc...

*29 CFR 1926 Subpart M + Subpart K + NFPA 70E (2021 DC provisions)*

- Guy's Construction shall: listed for PV application
- Guy's Construction shall: outside array boundary: conductors to 30V or less within 30 seconds; inside array boundary: DC conductors to 80V or less within 30 seconds

*NEC 690.12*

## TRAINING REQUIREMENTS

- All employees involved in this scope of work must receive initial training before beginning work
- Refresher training when procedures change or deficiencies are observed
- Training must be documented with date, topic, trainer, and attendees

## RECORDKEEPING

- Training records: duration of employment
- Inspection/monitoring records: project duration + 3 years
- Incident reports: 5 years

Monday Safety — Sample Document

## California STATE-SPECIFIC REQUIREMENTS (FULL)

- solar
- the unique hazard that solar panels remain energized during daylight
- heat illness prevention for all outdoor workers: shade at 80F, high-heat procedures at 95F, 1 quart/hour/employee water, bilingual written plan; rooftop radiant heat can exceed 150F

*Cal/OSHA Title 8 Section 3395*

- Desert Renewable Energy Conservation Plan covering 22.5 million acres in California desert; designates development focus areas and conservation lands for utility-scale solar/wind

*BLM / California DRECP*

- locks and/or tags to each energy isolating device in accordance with the HEC procedures
- all movements over the broken rail or pull apart and be prepared to stop the train if necessary
- before July 3, 2011
- no later than January 3, 2009
- before October 1, 2016
- inspection performed by a representative of the Division of Industrial Safety
- being contained in the same raceway, cable tray, cable, outlet box, junction box, or similar fitting as feeders or branch circuits of other systems
- installation and safety requirements
- Article 690
- renewal fee of \$25
- examination for licensure
- The identity of the procedure and machinery, equipment, or system that were audited
- on the same horizontal level as the base of the letters of the signal word
- Water that meets the standards for drinking purposes of the state or local authority having jurisdiction, or water that meets the quality standards prescribed by the U.S. Environmental Protection Agency's National Primary Water Regulations (40 CFR part 141)
- before October 1, 2012
- physical or electrical contact with the electric power circuit
- electrocution or arc flash
- increased risk of arc flash or electrocution
- electrical shock or electrocution
- electrical shock or electrocution
- for six hours at  $24\text{ }^{\circ}\text{C} \pm 4\text{ }^{\circ}\text{C}$  ( $75\text{ }^{\circ}\text{F} \pm 7\text{ }^{\circ}\text{F}$ ) while subjected to a pressure differential of at least 88 kPa (13 psig)
- original tare weight in kilograms preceded by the letters "TW"
- a device or vehicle that uses a non-destructive testing technique to inspect the pipeline from the inside
- 125 mL (4.22 fluid ounces) net capacity each for liquids
- top of the pipe protrudes above the underwater natural bottom in waters less than 15 feet (4.6 meters) deep
- PV application
- listed for use in PV systems

- listed for PV application
- fully de-energized during daylight
- 80V within 30sec at array boundary
- third physician to conduct examinations, consultations, laboratory tests and discussions with prior physicians as necessary to resolve disagreement
- fiberboard box (4G) or fiber drum (1G) with plastic inner packaging not exceeding 5 kg (11 lbs) and maximum net mass not more than 25 kg (55 lbs)
- the overall status of implementation of the provisions of this Part relating to the identification, inventory, and removal of underwater obstructions
- a list of interested parties (those with interests in the leases and/or units from which production is to be commingled for which the applicant has no existing commingling authority)
- a diagrammatic sketch of the mechanical installation along with a detailed explanation of the flow, procedures and frequency of well tests, calibration/proving of metering devices and allocation formulas

Monday Safety — Sample Document