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L3 Quiz Key: PV Roof Mounting Methods

- 1)** PV installers should maintain a distance of at least _____ from overhead power lines with voltages up to 50kV.
- a) 6 feet
 - b) 8 feet
 - c) 10 feet
 - d) The maximum length of the mounting rail being used

c) 10 feet

Explanation

PV installers must work at a safe distance from all power lines to avoid electrocution hazards. OSHA 1926.1408 Table A lists the minimum approach distance based on power line voltages. For voltages of 0 to 50 kV, which includes most service conductors encountered at a residential or commercial installation, the minimum distance is 10 feet. When uncertain of a power line's voltage, stay 20 feet away. See Table A for additional distance requirements, especially when working on commercial systems or in proximity to high voltage lines.

- 2)** Common preparation work during residential PV installations that can safely be performed on the ground includes (choose **three**):
- a) Drilling and/or cutting of aluminum mounting rails
 - b) Attaching ground lugs to aluminum mounting rails
 - c) Attach mounting brackets to structure
 - d) Pre-assembly of mounting hardware

a) Drilling and/or cutting of aluminum mounting rails, b) Attaching ground lugs to aluminum mounting rails, d) Pre-assembly of mounting hardware

Explanation

Ground preparation and planning is not only safer, but it also saves time. It is much easier to perform work on a level, non-elevated surface, preferably in the shade. Complete as much preparation work as possible before going on the roof- this can include studying plan sets and component instructions, completing drilling or cutting work, and pre-assembling hardware. Remember to find a safe place on the ground to avoid falling objects and weather exposure.

- 3)** True or false: Electrocution is the only real hazard when installing PV systems.

False

Explanation

Many hazards may exist on a PV installation; these are not limited to electrical hazards. Other hazards include environmental exposure, overexertion, slips, trips, and falls,

respiratory and noise hazards, and struck by / caught between hazards. Solar installers must be properly trained to identify and eliminate or control these hazards.

4) Heat illness is a very serious concern among PV employers and installers; choose **three** realistic methods of prevention from the list below:

- a) Properly train employees to prevent and recognize symptoms
- b) Require all installers to be NABCEP certified
- c) Provide crew with large water containers in accessible location
- d) Allow for frequent breaks in the shade
- e) Perform installations during the cooler nighttime hours

a) Properly train employees to prevent and recognize symptoms, c) Provide crew with large water containers in accessible location, d) Allow for frequent breaks in the shade

Explanation

Proper training to prevent and recognize heat illness is essential for solar installers, who are commonly exposed to high temperatures and direct sunlight. First Aid training will provide instruction on what to do if someone has a heat-related illness, and is highly recommended. Other prevention measures include staying properly hydrated and taking frequent breaks in the shade. It is never a good idea to work alone, no matter how simple or small a job. Buddy systems save lives!

5) Many residential PV installations – especially in the southwest and California - are on tile roofs. Choose **two** safety hazards – from the list below - that are commonly faced on tile-roof installations.

- a) Silica dust
- b) Fast moving saw or grinder blades
- c) Time-consuming work
- d) Smell

a) Silica dust, b) Fast moving saw or grinder blades

Explanation

Exposure to fine particles of silica from tile cutting has been shown to silicosis, a serious and sometimes fatal lung disease. Wet cutting is the most effective way for controlling silica dust. Fast moving saw or grinder blades also present a hazard; it is best to cut tiles on the ground (a stable, level surface) whenever possible. While tile cutting can sometimes be time-consuming work, this is not a safety hazard unless the solar installer starts rushes to complete the job.

6) When cutting or grinding concrete tiles during part of a PV installation, workers should wear

- a) Eye and ear protection.
- b) Gloves.
- c) A respirator.
- d) All of the above.

d) All of the above.

Explanation

Proper PPE, including eye and ear protection, gloves, and a respirator are critical in reducing the hazards of tile cutting and grinding.

- 7)** When working in an attic, PV installers may be exposed to which of the following hazards (choose **four**)?
- a) Violent dogs
 - b) Dust and particles
 - c) Protruding nails
 - d) Extreme heat
 - e) Wet slippery conditions
 - f) Fall hazards

b) Dust and particles, c) Protruding nails, d) Extreme heat, f) Fall hazards

Explanation

Accessing attics for structural information, upgrades, or conduit runs can present some serious hazard, including dust and particles, protruding nails, extreme heat, and falls between joists. It is critical to wear proper PPE, and limit work time in attics. Exposure to asbestos and certain molds will require additional PPE.

- 8)** What is the proper classification of hard hat used on a PV installation?
- a) Class G: General
 - b) Class E: Electrical
 - c) Class C: Conductive

b) Class E: Electrical

Explanation

Class E hard hats not only protect from high-voltage shocks and burns up to 20,000 volts, but also protect from impacts and penetration from falling objects. These hard hats are the best choice for a PV installation, where both electrical and falling object hazards are present.

- 9)** Which of the following methods which would protect workers from falling objects.
- a) Wear hardhats
 - b) Keep work areas clean and organized
 - c) Erect toe boards, screens, or guardrail systems
 - d) Create restricted access zones on the ground
 - e) All of the above

e) All of the above

Explanation

Minimizing the risk of falling objects involves safe work practices such as keeping work areas clean and organized, control methods such as restricted access zones, toe boards, screens, and guardrail systems, and proper PPE such as hardhats. Remember, PPE should be the last line of defense!

- 10)** OSHA 29 CFR 1926.21(b)(2) requires employers to instruct every employee on which two of the following:
- a) Recognition and avoidance of unsafe conditions.
 - b) How to complete scheduled work in the allotted time.
 - c) Applicable regulations to control or eliminate hazards.
 - d) Proper way to log their time for each specific task completed during a day's work.

a) Recognition and avoidance of unsafe conditions., c) Applicable regulations to control or eliminate hazards.

Explanation

It is the employer's responsibility to instruct each employee on recognition and avoidance of unsafe working conditions, and the applicable regulations and equipment to control or eliminate hazards. Training is to be led by a competent person, meaning one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

- 11)** Trip hazards are often present on the job site. Pick four common trip hazards found on roofs during PV installations from the list below:
- a) Unsecured DC homerun wiring
 - b) Loose tools
 - c) Lifelines
 - d) Hard hats
 - e) Co-workers

a) Unsecured DC homerun wiring, b) Loose tools, c) Lifelines, e) Co-workers

Explanation

Trip hazards include loose equipment and tools, lifelines, wires and extension cords, lifelines (remember round things roll!). It is essential to maintain a clean, organized work space and communicate with fellow workers!

- 12)** What are some ways to prevent overexertion on a PV installation?
- a) Only allow the strongest crew member to lift solar modules
 - b) Stretch before work
 - c) Stay hydrated and take frequent breaks
 - d) Use two people to lift solar modules and other heavy equipment

b) Stretch before work, c) Stay hydrated and take frequent breaks, d) Use two people to lift solar modules and other heavy equipment

Explanation

Installing a PV system is hard work, and every installer - regardless of age - is subject to injury from overexertion. Take measures to protect your body, including proper lifting techniques, stretching, frequent breaks, and hydration. Using lifting equipment such as module hoists and reach forklifts to bring modules to the roof can also significantly decrease the chances of injury.

13) True or false: Leaning, standing, or walking on PV modules is acceptable as long as the module glass doesn't break.

False

Explanation

Do not lean, stand, or walk on PV modules either during installation or maintenance work. Walking on modules presents a fall hazard, especially if they are wet or dusty, as well as a quality issue—concentrated pressure can create cell micro-cracks not visible to the eye. Walking or standing on modules may also violate PV manufacturer installation instructions.