



SOLAR PANEL CLEANING

GENERAL INDUSTRY SAFETY STANDARD

SOLAR SAFETY GUIDELINES



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Foreword

This guide has been developed by the International Window Cleaning Association (IWCA) because professional solar panel cleaning companies at commercial or residential sites face many industry recognized hazards. Additionally, current rooftop and site regulations are very broad based and generic.

As the premier Association for the Industry with regards to safety, training and advocacy, and due to emerging and evolving technologies over the last 10 years, the IWCA saw the need to further define and clarify accepted safe guidelines for the use in solar panel and surface cleaning.

The scope and purpose of this general industry safety standard is to provide improved safe practices and up to date recommendations to assist thousands of trained workers across the globe when performing solar panel and photovoltaic cell (PV) surface cleaning.

What is a solar panel?

A collection of photovoltaic cells designed to absorb the sun's rays as a source of energy for generating electricity or heating.

What is solar panel cleaning?

The process of removing foreign substances from the surface of a solar panel in order to maintain the efficiency of the panel's absorption of solar energy.

Types of Solar Panel Cleaning

- Residential
- Commercial
- Industrial
- Agricultural
- Utility
- Floating

Primary Safety Concerns for Solar Panel Cleaning

- Electrical shock.
- Falls from height.
- Varying site conditions.
- Environmental hazards.
- Respiratory hazards from bird droppings.

Solar Panels Then



Solar Panels Now



Solar Future

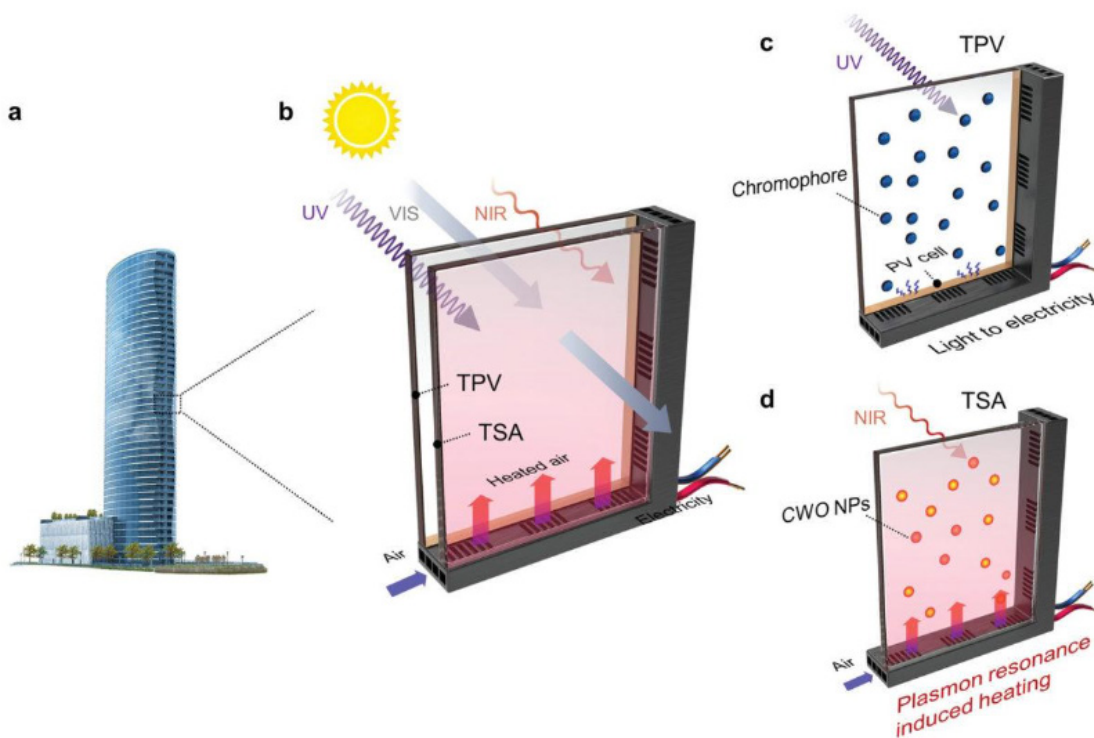


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1. PURPOSE

The purpose of this guide is to identify and provide accepted safe practices when cleaning solar panels on commercial and residential buildings as well as solar panel array sites that are either ground or roof mounted.

2. SCOPE

The scope of these guidelines is to provide criteria, techniques, and procedures to protect persons from recognized hazards associated with solar panel cleaning on commercial and residential buildings and sites.

These guidelines are intended for the protection of all affected parties when solar panel cleaning is being performed; including building owners or their managing agents, employers, operators, regulatory agencies and the general public.

The techniques or methods to perform any type of routine or restorative solar panel cleaning are not part of the scope of this guide.

3. GENERAL REQUIREMENTS

3.1 Job Hazard Analysis or Job Site Assessment

One of the most important steps to keeping workers safe on the job is to perform a site assessment before starting work at a site.

3.1.1 The site assessment should identify the safety and health hazards workers may encounter at a particular location and direct the worker on how to eliminate or mitigate those hazards.

3.1.2 Because commercial and residential buildings and sites are owned properties that hire outside contractors who perform both routine and non-routine cleaning, authorities having jurisdiction require the owners or their managing agents and the operators to share responsibilities with providing a safe place to work.

3.1.3 Extra care should be taken when cleaning solar panels on a commercial or residential building or site which has an installed array that has not been inspected, tested, certified and maintained in accordance with regulations from an enforcing authority.

3.1.4 When performing work for many hours at a commercial or residential building or site the employer shall implement means and methods to protect workers from hazards associated with long time periods of work, exposure to forecasted and/or unexpected wind and weather, ability to provide adequate protection of general public, and ability to perform prompt rescue. Rescue plans shall be in place and may be provided by a third party.

3.2 Workers Cleaning Solar Panels

These items identify the workplace hazards faced by operators that should be evaluated as part of the site assessment (JHA/JSA). These hazards are present at any and all buildings and sites where solar panel cleaning may take place:

- Falling and Falling Objects
- Geographic Location & Environment
- Roof Anchorage Rigging Points
- Electrical Hazards of Panels
- Electrical Lines and Radio Frequency Installations (RFI's)
- General Public
- Fire
- Respiratory
- Wildlife

3.3 Building Owners and Managing Agents

These items identify the workplace hazards faced by cleaning operators that are under the control of the building ownership. These hazards should be reviewed and the building owner or their managing agent shall provide the necessary documentation to ensure proper safety practices will be followed:

- Geographic Location & Environment
- Electrical Lines and RFI's
- General Public
- Rescue
- Fire Suppression

4. DOCUMENTATION REQUIREMENTS

4.1 Site-Specific Work Plans

The site owner or their managing agent and the cleaning operator each have the responsibility to contribute to and review the Site-Specific work plan.

4.2 Solar Cleaning Operator Work Plan Requirements

A written plan developed by the cleaning operator or qualified person shall be provided that will inform the building or site owner, or their operating agents, that will identify the following hazards and the means and methods to eliminate the hazards:

- 4.2.1 All fall hazard areas, fall protection system rigging and falling object hazard areas.
- 4.2.2 All fall protection line load path obstacles (vertical and horizontal).
- 4.2.3 Location of all electrical lines, connections, inverters and RFI's.
- 4.2.4 Location where falling object hazards may affect the general public.
- 4.2.5 Verification that all cleaning operators onsite have been trained and certified in accordance with the applicable sections of this guide.
- 4.2.6 Means and methods to be employed in the event a cleaning operator requires rescue.
- 4.2.7 Means and methods to be followed in the event of a natural disaster, emergency or fire.
- 4.2.8 Means and methods to control and avoid the effects of sustained wind speeds or sudden gusts.
- 4.2.9 If new hazards arise during the course of work, the work shall be stopped until appropriate protective measures have been identified, documented in the plan, and implemented.
- 4.2.10 An effective communication plan shall be established prior to beginning work and shall remain effective for all the time that work is actively taking place. Electronic means shall be utilized.

4.3 Building Owner/Manager Work Plan Requirements

The following items require written documentation verifying their condition or procedure to be followed to insure a safe work site. The documentation shall be included in the Site-Specific plan:

4.3.1 Identification of fall hazard zones on rooftop areas or other working surfaces where safety lines may be rigged and used.

4.3.2 Written documentation that fall protection line anchor rigging points have been inspected, maintained and certified.

4.3.3 Verification of electrical line location, connectors, inverters and safety requirements for working near RFI's.

4.3.4 Identification and protection of areas where general public may be exposed to falling object hazards.

4.3.5 Means and methods to be employed in the event an operator requires rescue or first aid.

4.3.6 Means and methods to be followed in the event of a natural disaster, emergency or fire.

4.3.7 The plan shall be readily available for use by the building or site owners or their operating agents, cleaning operators, enforcing authorities and emergency personnel.

4.4 Fall Protection System Anchorage Inspection

4.4.1 Before any fall protection system that utilizes safety lines, rope or direct attachment to an anchorage is used, be sure all anchor points are secure and able to support the necessary loads. If unsure of the verification process needed, consult with building owners and a qualified person.

4.4.2 The information must be based on physical inspection by the employer, operator and qualified person.

4.4.3 The employer must ensure that no employee uses any anchorage before the employer has verified all the above.

4.5 Operator Provided Equipment Inspection

4.5.1 All components of safety line and personal fall protection systems shall be inspected before and after each use.

4.5.2 Manufacturer guidelines shall be followed when determining the equipment's condition.

4.5.3 Any damaged or excessively worn components should be reported immediately and taken out of service until repairs or replacements are made.

4.5.4 Written or recorded inspection logs for all components of fall protection systems shall be maintained and provided upon request.

5. OPERATOR REQUIREMENTS

5.1 Duties of Cleaning Operator

5.1.1 The employer of cleaning operators is ultimately responsible for ensuring the proper use of the equipment, chemicals, and the training of the operators.

5.1.2 Employers shall develop and provide a safe cleaning operation to protect the safety and health of workers and the general public.

5.1.3 Regardless of what type of equipment and chemicals are used on the job, the employer must ensure that the equipment is properly inspected and maintained before it gets used. Chemicals and cleaning processes shall adhere to the manufacturer's instructions.

5.1.4 The employer must also ensure that employees are properly trained, evaluated and certified; and in a language or means and methods that they fully understand.

5.1.5 Proper resources shall be provided to employees for the development and safe operation of solar panel cleaning.

5.1.6 The employer shall act as manager or shall appoint a person to manage the solar cleaning program and activities within their organization.

5.2 Program Management

5.2.1 The employer shall ensure that the solar panel cleaning manager has a working knowledge of National Standards and Federal, State and Local regulations that apply to cleaning. This includes but is not limited to fall protection requirements, their systems and components and the use of chemicals in the workplace.

5.2.2 The solar panel cleaning manager shall be responsible for company-wide compliance with all standards and regulations.

5.3 Supervision

5.3.1 The employer shall appoint a Certified Solar Panel Cleaning Operator (CSPCO) to act as a supervisor at each worksite where cleaning is performed.

5.3.2 No solar panel cleaning operator shall be appointed as a supervisor unless they have been certified according to these guidelines.

5.3.3 Cleaning shall only be done when there is a minimum of one Certified Solar Panel Cleaning supervisor (CSPCS) and one certified Solar Panel cleaning operator onsite.

5.4 The Solar Cleaning Supervisor is responsible for ensuring:

5.4.1 The Site-Specific Work Plan has been implemented and reviewed by all operators onsite.

5.4.2 The supervisor shall record verification which includes the following:

5.4.3 That all hazards noted in the Site-Specific Work Plan have been identified, addressed and corrected prior to the start of operation.

5.4.4 That all solar panel cleaning operators are directed to adhere to the Site-Specific Work Plan and are to identify and inform the supervisor of any hazards which may exist outside of the Site-Specific Work Plan.

5.4.5 That all solar cleaning operators have been properly trained and are capable of performing the required operations.

5.4.6 That there is open communication to the building or site owner, manager, or their designated representative at all times when solar panel cleaning is being performed.

5.4.7 That all anchorage points used for fall protection have been identified and inspected prior to use in accordance with the Building Owner/Manager Requirements of the Site-Specific Work Plan.

5.4.8 That all rigging of fall protection systems is done according to the Site-Specific Work Plan.

5.4.9 That all solar panel cleaning equipment provided by the employer for the worksite has been inspected and verified in safe working condition.

5.4.10 That all solar panel cleaning operators secure their tools and equipment to prevent them from falling while working at height.

5.4.11 That all work areas are properly barricaded, and warning signage exists to protect the general public.

5.4.12 That prompt rescue and first aid of any operator can be performed and means of acquiring emergency services have been identified. It is suggested that at minimum, one team member on-site be trained in CPR and first aid.

5.4.13 That any on the job accidents have been reported to them.

5.4.14 All electrical hazard PPE is inspected, in good repair and always used when cleaning solar panels.

5.5 The Solar Panel Cleaning Operator is responsible for ensuring:

5.5.1 Completion and proficiency with the solar panel cleaning safety training program provided by the employer.

5.5.2 Full understanding and working knowledge of the Site-Specific Work Plan.

5.5.3 Verification their equipment bought onsite has been inspected and is in safe working condition prior to use.

5.5.4 That all tools and equipment are secured from falling while working at height.

5.5.5 That they perform their work within their level of training, skills, qualifications and experience.

5.5.6 That they are ready and able to perform a prompt self, partner rescue or first aid if required.

5.5.7 That they inform the solar panel cleaning supervisor if any task is beyond their training, skills, qualifications and experience prior to the start of operations.

5.5.8 That they inform their supervisor of any on the job accidents.

5.5.9 That they are properly wearing electrical hazard PPE.

6. TRAINING and CERTIFICATION

6.1 Solar Panel Cleaning Operator - Is a solar cleaning operator who has been trained and has the requisite skills and knowledge to demonstrate proficiency while under supervision when operating a solar cleaning job.

6.1.1 Training shall be documented and verified and shall include but not be limited to an understanding and working knowledge of the following:

6.1.2 Safety standards and Federal, State and Local regulations which apply to the use of equipment, chemicals and cleaning procedures.

6.1.3 Verification of documentation of fall protection anchorage inspection, testing and certification.

6.1.4 Contents of a Job Hazard Analysis.

6.1.5 Contents and requirements of a Site-Specific Work Plan.

6.1.6 Proper rigging practices which may include correct knot usage, use of multiple anchors, and the limitations imposed by catenary loads when multiple anchors are used.

6.1.7 Inspecting and maintaining cleaning and safety equipment and the proper storage and use of chemicals used in the cleaning process.

6.1.8 Fall protection and falling object protection systems.

6.1.9 Vertical lifeline suspension trauma, and how to effect strain relief.

6.1.10 Proper electrical shock hazards of panels, connectors and damaged lines.

6.1.11 Limitations on the use of electrical PPE and cleaning equipment.

6.1.12 Proper inspection, care and use of the following cleaning components:

- a. Electrical rated gloves and boots
- b. Safety rope
- c. Reflective vest or clothing

- d. Protective and insulated headgear (if applicable)
- e. Poles, rotating brushes, robots or other cleaning devices
- f. Carabiners
- g. Respiratory protection
- h. Tool & equipment lanyards
- i. Full body arc resistant harnesses
- j. Fall protection lanyards
- k. Fall protection rope grabs/rope stops
- l. Falling and falling object warning systems
- m. Chemicals

6.2 Solar Cleaning Operator Supervisor - Is a solar panel cleaning operator who has verifiable documentation that they have been trained, evaluated and certified as a person capable of identifying existing and predictable hazards at the worksite or working conditions which are hazardous, or dangerous and that they have the knowledge, skill and experience to take prompt corrective measures to eliminate them.

6.2.1 A Certified Solar Panel Cleaning Operator Training Program shall include at a minimum, assurance the operator receives and maintains a full working knowledge and understanding of:

6.2.2 Safety standards and Federal, State and Local regulations which apply to rooftop access and solar panel cleaning.

6.2.3 Safety standards and Federal, State and Local regulations which apply to the use of equipment, chemicals and cleaning procedures.

6.2.4 Verification of documentation of fall protection anchorage inspection, testing and certification.

6.2.5 Contents of a Job Hazard Analysis.

6.2.6 Contents and requirements of a Site-Specific Work Plan.

6.2.7 Proper rigging practices which may include includes correct knot usage, use of multiple anchors, and the limitations imposed by catenary loads when multiple anchors are used.

6.2.8 Performing a self or partner rescue.

6.2.9 Inspecting and maintaining PPE, safety and cleaning equipment and proper storage and use of chemicals used in the cleaning process.

6.2.10 Fall protection and falling object protection systems.

6.2.11 Vertical lifeline suspension trauma, strain relief, self and partner rescue techniques.

6.2.12 Proper safety rope, full body harness use and fall protection rigging theory and technique.

6.2.13 Proper electrical shock hazards of panels, connectors, and damaged lines.

6.2.14 Limitations on the use of electrical PPE and cleaning equipment.

6.2.15 Proper inspection, care, and use of the following components:

- a. Electrical rated gloves and boots
- b. Back up or safety rope
- c. Reflective vest or clothing
- d. Protective head gear (if applicable)
- e. Poles, rotating brushes, robots or other cleaning devices
- f. Carabiners
- g. Respiratory protection
- h. Tool & equipment lanyards
- i. Full body arc resistant harnesses
- j. Fall protection lanyards
- k. Fall protection rope grabs/rope stops
- l. Falling and falling object warning systems
- m. Chemicals

6.2.14 That they have verified 100 sites logged in hands on solar panel cleaning and in accordance with the above requirements.

7. EVALUATION

7.1 In order to become Certified, a Solar Panel Cleaning operator is required to successfully complete the IWCA Solar Panel Safety Training Course and exam and shall also be evaluated by an IWCA Approved Evaluator or Certified Instructor. The evaluation incorporates the use of a checklist and testing system to verify they have retained the requisite knowledge, understanding and physical skill necessary to use and perform the job safely according to these guidelines.

7.1.1 Additionally, they shall be required to have logged a minimum of 75 hours and 50 solar panel sites worked on before taking the exam and getting evaluated.

7.1.2 The IWCA Solar Panel Safety Certification requires re-certification via the IWCA Solar Panel Cleaning Safety Training program test along with an employer provided “hands on” evaluation by an IWCA Approved Evaluator or Certified Instructor.

7.1.3 Re-certification and evaluation by an IWCA Approved Evaluator or Certified Instructor is required every 2 years.

8. SOLAR PANEL CLEANING SYSTEM COMPONENTS

8.1 All components of the solar panel cleaning system shall be used according to the manufacturer’s instructions, design limitations and requirements for inspection, maintenance, and repairs.

8.1.1 No component shall be used beyond manufacturers recommendations and limitations.

8.2 Solar Panel Site Hazards

8.2.1 Weather hazards such as rain, storms, lightning, excessive heat and cold.

8.2.2 Animals common to the region and area that can be dangerous or cause distraction. Including but not limited to birds, snakes, wild animals and pets.

8.2.3 Gasses from fuel powered equipment must be considered and placed away from operators and equipment where inhalation or heat from exhaust may be a safety hazard.

8.2.4 Terrain, both on roofs and ground must be evaluated for potential fall issues, holes or voids, slippery surfaces or areas where equipment or plant growth block views of potential hazards.

8.3 Solar Panel Electrical Hazards

8.3.1 Visually Inspect panels, mounts, connections and wires for possible shock or arc risk as far as possible. Physical testing may not be possible in many applications.

8.3.2 Inspect panels for breaks, cracks, water intrusion or damage and mark for not to be cleaned or contacted.

8.3.3 Identify DC connectors for loose connections, damage or water intrusion.

8.3.4 Identify wires or cables with damage, missing sheath or other breaks.

8.3.5 Ensure all equipment and PPE are electrically rated and protected to a minimum of 1500V DC.

8.3.5 Overhead lines and residential weather heads should be identified and MADs established.

8.4 Solar Panel Site Slip, Trip and Fall Hazards

8.4.1 Residential and commercial roof evaluations must be done before accessing.

8.4.2 Residential and commercial roofs should be evaluated for pitch, damage, defect, biologic growth and composition material. All rooftop access should follow recommended safe practices for roof access and standards and be done according to those standards. Cleaning panels without accessing the roof is the safest method.

8.4.3 Identify and mark skylights, light access panels with less strength.

8.4.4 Never walk on areas blocked from sight. Never walk backwards on any rooftop.

8.5 Falls from Height

8.5.1 Be aware of changes in elevation of walking or working surfaces that have an unprotected edge and are higher than four feet above the next lower level. An unprotected edge is one that is not protected by a guardrail or structural component that is at least 42 inches in height.

8.5.2 The employer must ensure that each employee on a walking-working surface with an unprotected side or edge that is 4 feet (1.2 m) or more above a lower level is protected from falling by one or more of the following:

(A) Guardrail systems; (B) Safety net systems; or (C) Personal fall protection systems, such as personal fall arrest, travel restraint, or positioning systems.

(ii) When the employer can demonstrate that it is not feasible or creates a greater hazard to use guardrail, safety net, or personal fall protection systems on residential roofs, alternate means such as a MEWP, scaffolding or other type of ground-based access equipment.

8.6 Mobile Elevating Work Platforms/Manlifts/Bucket Trucks

8.6.1 A Mobile Elevating Work Platform (MEWP) shall be inspected before being used. All components and functions shall be in proper working order. Any damaged or overly worn or non-functioning operations shall be reported, and the MEWP shall not be used until repaired.

8.6.2 Certification of training may be required.

8.6.3 The rated load for the lift should not be exceeded.

8.6.4 The lift should not be used unless the appropriate outriggers and intermediate stabilizers are in place.

8.6.5 The lift should be leveled before using. If working on a sloped surface the wheels must be turned on a right angle towards the slope.

8.6.6 Proper insulated fall protection equipment shall be used when working from an MEWP.

8.6.7 Makeshift devices or ladders should not be used to gain more height out of the basket.

8.6.8 Keep all parts of the MEWP a safe minimum approach distance (MAD) from electrical lines or devices. Voltage coming into the building determines MAD.

8.6.9 Use danger signs and barricades to warn the public and keep them away from the operation of a MEWP.

8.6.10 STOP using a MEWP if wind speeds, or other weather conditions may create a hazard to you or the public.

8.7 Tower/Rolling Scaffold

8.7.1 A tower or rolling scaffold shall be inspected before being used. All components shall be in proper working order. Any damaged or overly worn components shall be removed from service.

8.7.2 Proper fall protection equipment shall be used when erecting, dismantling and working from a tower or rolling scaffold.

8.7.3 Scaffolding should not be erected on an unstable surface to gain more height.

8.7.4 The height of the scaffold should not exceed 4 times the minimum base width. If the height must be raised, the scaffolding should be tied into the workface at 25-foot intervals. The tie-ins should start at the point where the height exceeds 4 times the minimum base width.

8.7.5 Scaffolding towers shall be erected under the direct supervision of a qualified person and shall be inspected by a competent person before being used.

8.7.6 Scaffolding should not be moved while a worker is on it. The force to move the scaffold should be applied as close to the bottom as possible.

8.7.7 Makeshift devices or ladders should not be used to gain more height out of the scaffold.

8.7.8 Keep all parts of the tower or rolling scaffold a safe minimum approach distance from electrical lines or devices. Voltage determines MAD.

8.7.9 Use danger signs and barricades to warn the public about the hazard of falling equipment. STOP using a tower or rolling scaffold if windy.

8.8 Head Protection

8.8.1 Safety helmets shall be used where falling object hazards exist and where there may be a possibility of head injuries. Helmets shall comply with ANSI Z89.1-2014 - be insulated from electrical shock and be equipped with a chin strap or other restraining device to prevent it from coming off the worker's head.

8.9 Fall Protection

8.9.1 The personal fall arrest system and its components (lanyards, carabiners, deceleration devices, harnesses) shall comply with all standards given by the area regulating body.

8.10 Full Body Harness

8.10.1 Full Body Harnesses used in fall protection systems shall be certified and compliant with all standards given by the area regulating body.

8.10.2 Harness should be arc and shock resistant.

8.11 Lanyards

8.11.1 The length of a lanyard used for a personal fall arrest system shall not exceed 3.2 feet (1m) US and 2m UK in length when attached to the dorsal point (upper back) of the full body harness.

8.11.2 The lanyard may be attached to the sternal position (mid-front) only when the free fall distance is limited to 2 feet (0.6m) or less.

8.11.3 While components should be electrically rated, care must be taken with components such as ropes, that can become wet and electrically energized.

8.12 Personal Protective Equipment

In addition to the equipment defined in Section 8.8 to 8.11, workers in the solar panel cleaning industry shall wear personal protective equipment (PPE) to minimize exposure to serious workplace injuries and illnesses. All PPE should be safely designed and constructed and should be maintained in a clean and reliable fashion. It should fit comfortably, encouraging worker use. When engineering, work practice, and administrative controls are not feasible or do not provide sufficient protection, employers must provide PPE to their workers and ensure its proper use.

Employers are also required to train each worker as follows:

- When PPE is necessary
- What kind of PPE is necessary
- How to properly put PPE on, adjust, wear and take it off
- The limitations of the PPE
- Proper care, maintenance, useful life, and disposal of the PPE
- Employers must ensure that workers who use personal fall protection and work in other high hazard situations are trained about fall and equipment hazards, including fall protection systems.

Workers are required to:

- Properly wear PPE
- Attend training sessions on PPE
- Care for, clean, and maintain PPE
- Inform a supervisor of the need to repair or replace PPE

8.13.1 All personal protective equipment (PPE) shall be properly fitted to the worker prior to use.

8.13.2 Electrical Hazard PPE recommendations: Gloves, rubber Boots, helmet, insulated base pole section. Threshold Rating 1,500V DC minimum.

8.13.3 Chemical Use: Gloves (rubber or neoprene), glasses or goggles, or respirators may need to be worn when using chemicals. (Refer to manufacturer's recommendations on the label and the information contained in the SDS to determine appropriate PPE.)

8.13.4 Ladder Use: Work boots. Ladders used for solar panel cleaning should be electrically insulated.

8.13.5 Construction Cleaning: Helmets, work boots, safety glasses, high visibility clothing, and hearing protection.

9. EQUIPMENT USE

9.1 Site Preparation

9.1.1 Prior to mobilizing and operation of solar panel cleaning, all required documentation shall have been acquired and the Site-Specific Work Plan shall be reviewed by the solar panel cleaning Supervisor to the Operator(s) and all identified protocols for worker safety and safety of the general public shall be implemented and verified.

9.2 Roof Edge

9.2.1 If the roof edge is unprotected, the fall hazard zones shall be identified, established and maintained.

9.2.2 No worker shall be allowed in the fall hazard zones without the appropriate fall protection.

9.3 Chemical Use/Hazard Communication

Before using any chemical for solar panel cleaning and stain removal, you must understand the following:

9.3.1 The solar panel manufacturer's instructions.

9.3.2 The type of foreign material or residue to be removed.

9.3.3 The reaction the chemical will have on the material/residue.

9.3.4 The composition of the surface that the material/residue is to be removed from.

9.3.5 The effect the chemical may have on the person using it.

9.4 Respiratory Protection

9.4.1 Bird droppings present respiratory hazards. Proper respiratory protection should be used when cleaning where bird droppings are present.

9.4.2 Respirator should be used based on appropriate protection needs.

9.4.3 Respirators may be used, however fit testing and respirator training must be performed prior to use.

Training Requirement Prerequisites

United States:

IWCA OSHA 1910

Recommended additional training:

MEWP Theory and Hands On ANSI A92.24