**Solar Electric Technician Training**

**Module 2: Occupational health and safety**

**OSHA guideline for tools**

1. **What are the Hazards of Hand Tools?**

Hand tools are tools that are powered manually. Hand tools include anything from axes to wrenches. The greatest hazards posed by hand tools result from misuse and improper maintenance.

Some examples include the following:

* If a chisel is used as a screwdriver, the tip of the chisel may break and fly off, hitting the user or other employees.
* If a wooden handle on a tool, such as a hammer or an axe, is loose, splintered, or cracked, the head of the tool may fly off and strike the user or other employees.
* If the jaws of a wrench are sprung, the wrench might slip.
* If impact tools such as chisels, wedges, or drift pins have mushroomed heads, the heads might shatter on impact, sending sharp fragments flying toward the user or other employees.

The employer is responsible for the safe condition of tools and equipment used by employees. Employers shall not issue or permit the use of unsafe hand tools. Employees should be trained in the proper use and handling of tools and equipment.

Employees, when using saw blades, knives, or other tools, should direct the tools away from aisle areas and away from other employees working in close proximity. Knives and scissors must be sharp; dull tools can cause more hazards than sharp ones. Cracked saw blades must be removed from service.

Wrenches must not be used when jaws are sprung to the point that slippage occurs. Impact tools such as drift pins, wedges, and chisels must be kept free of mushroomed heads.The wooden handles of tools must not be splintered.

Iron or steel hand tools may produce sparks that can be an ignition source around flammable substance. Where this hazard exists,

spark-resistant tools made of non-ferrous materials should be used where flammable gases, highly volatile liquids, and other explosive substances are stored or used.

1. **What are the Hazards of Power Tools?**

Appropriate personal protective equipment such as safety goggles and gloves must be worn to protect against hazards that may be encountered while using hand tools.

Workplace floors shall be kept as clean and dry as possible to prevent accidental slips with or around dangerous hand tools.

Power tools must be fitted with guards and safety switches; they are extremely hazardous when used improperly. The types of power tools are determined by their power source: electric, pneumatic, liquid fuel, hydraulic, and powder-actuated.

To prevent hazards associated with the use of power tools, workers should observe the following general precautions:

* Never carry a tool by the cord or hose.
* Never yank the cord or the hose to disconnect it from the receptacle.
* Keep cords and hoses away from heat, oil, and sharp edges.
* Disconnect tools when not using them, before servicing and cleaning them, and when changing accessories such as blades, bits, and cutters.
* Keep all people not in valved with the work at a safe distance from the work area.
* Secure work with clamps or a vise, freeing both hands to operate the tool.
* Avoid accidental starting. Do not hold fingers on the switch button while carrying a plugged-in tool.
* Maintain tools with care; keep them sharp and clean for best performance.
* Follow instructions in the user's manual for lubricating and changing accessories.
* Be sure to keep good footing and maintain good balance when operating power tools.
* Wear proper apparel for the task. Loose clothing, ties, or jewelry can become caught in moving parts.
* Remove all damaged portable electric tools from use and tag them: "Do Not Use."

1. **Electric Tools**

Employees using electric tools must be aware of several dangers. Among the most serious hazards are electrical burns and shocks.

Electrical shocks, which can lead to injuries such as heart failure and bums, are among the major hazards associated with electric powered tools. Under certain conditions, even a small amount of electric current can result in fibrillation of the heart and death. An electric shock also can cause the user to f all off a ladder or other elevated work surface and be injured due to the fall.

To protect the user from shock and b urns, electric tools must have a three-wire cord with a ground and be plugged into a grounded receptacle, be double insulated, or be powered by a low voltage isolation transformer. Three-wire cords contain two current carrying conductors and a grounding conductor. Any time an adapter is used to accommodate a two-hole receptacle, the adapter wire must be attached to a known ground. The third prong must never be removed from the plug.

Double-insulated tools are available that provide protection against electrical shock without third-wire grounding. On double insulated tools, an internal layer of protective insulation completely isolates the external housing of the tool.

The following general practices should be folio wed when using electric tools:

* Operate electric tools within their design limitations.
* Use gloves and appropriate safety footwear when using electric tools.
* Store electric tools in a dry place when not in use.
* Do not use electric tools in damp or wet locations unless they are approved for that purpose.
* Keep work areas well lighted when operating electric tools.
* Ensure that cords from electric tools do not present a tripping hazard.
* In the construction industry, employees who use electric tools must be protected by ground-fault circuit interrupters or an assured equipment-grounding conductor program.