

A SAFE OPERATION

SAFETY TIPS FOR WORKING ON AND AROUND ELECTRIC POWER GENERATION EQUIPMENT

Electric Power Parts & Service

BUILT FOR IT.



1. PERFORM A JOBSITE HAZARD ASSESSMENT

Jobsite hazard assessments help minimize or eliminate safety and health hazards by removing the hazard when possible, and making employees aware of the potential risks identified around the work area. These assessments should be completed prior to starting a job, should be kept well documented and retained. Identifying hazards before any work is done on the jobsite makes it possible to control and mitigate the impact the hazards could have on the employees.

CHECKLISTS

CHECK YOUR PERSONAL SAFETY AND THAT OF OTHER EMPLOYEES:	CHECK YOUR WORK AREA:
<ul style="list-style-type: none">• Are you mentally and physically prepared to safely complete the work or are you fatigued such that your injury risk level is elevated?• Is there any moisture on your shoes and/or clothes?• Are you wearing the proper Personal Protective Equipment (PPE)?<ul style="list-style-type: none">Head protectionEye protectionHearing protectionFace shieldsGlovesSteel toe or metatarsal boots	<ul style="list-style-type: none">• What is in it?• What is above and around you?• How hot or cold is it?• Is it humid?• Is it a combustible atmosphere (i.e, dust from coal/grain/sugar or hydrogen from leaky batteries)?• What would happen if you created an arc or spark in your immediate work area?• Are overhead conductors exposed and ground surfaces exposed around you?

2. REVIEW YOUR WORK PROCEDURES

Work procedures are very important on any jobsite because they have been created to help identify the best way of performing a job task for each employee. Organizing these work procedures helps eliminate wasteful processes and improve consistency, which can contribute to the reduction of jobsite hazards. Review all procedures before beginning assigned tasks to determine:

- Are you qualified to perform the work?
- Have you been trained on the jobsite Lockout/Tagout (LOTO) policy and emergency procedures?
- Do you have the correct PPE for the job you are performing and is it in proper working condition?
- Do you have all of the necessary tooling and testing equipment? Is it in proper working condition and within its calibration period?

3. UNDERSTAND THE JOB SPECIFIC PROJECT WORK PLAN

Project planning cannot be ignored just because you are in a hurry to get the job completed. In fact, creating and properly using a project plan for a jobsite adds so much value that you will recognize a savings in time, money and other resources. Once the project plan has been created, you will need to list all employees working on the project and describe the roles and responsibilities of each, along with the number of people needed to perform a certain job function. The project plan should be made available to everyone on the jobsite. Understanding each team member's assignment and their location on the work site or the distribution system in which they will be working is imperative.

4. HAVE A COMMUNICATION PLAN

Develop a communication plan, identify roles and responsibilities of all employees and discuss it with your immediate team. One qualified person should be assigned a lead role and be responsible for ensuring everyone on the jobsite understands the communication plan. He or she should also ensure that the product and systems are safe prior to commencing additional work and before re-start. Always ensure the entire team understands the system shutdown and re-start procedures. Clear communication is key to safety on the jobsite. When working around power generation packages, each individual must understand their own roles and responsibilities along with those of everyone around them. This enables all employees to be aware of their surroundings and how each activity can impact the others.

5. COMMUNICATE YOUR EMERGENCY ACTION PLAN

Once you have created an Emergency Action Plan (EAP), you must take several steps to ensure the safety of your employees in the event of an emergency. The plan should list the responsible, trained people who are assigned to help ensure the plan is successful. An EAP becomes a safety and health risk when the documentation is not kept up-to-date or if employees do not receive proper training for what to do in the event of an emergency. Educate all employees annually on the types of emergencies that could occur at their specific site location, including:

- Roles and responsibilities
- Threats, hazards and protective actions
- Notification, warning and communication procedures
- Means for locating family members in an emergency
- Emergency response procedures
- Evacuation, shelter and accountability procedures
- Location and use of common emergency equipment
- Emergency shutdown procedures

Once the employees have received the appropriate training, the employer should conduct regular drills as a reminder and post the EAP in an area that can always be accessed by any employee.

IMPORTANT – Generators and Distribution Systems

Rated ABOVE 600 Volts: Prior to working around exposed bus bars and load cable terminations, ensure all stored energy has been discharged from the generator windings, bus bars and cables. Medium and high voltage windings and cables store electrical energy that could cause death or personal injury. Wear proper PPE and use properly rated tooling and equipment to discharge the windings, bus bars and cables.

6. ISOLATE ENERGY SOURCES

Remove all energy sources before working on power generation equipment. Secure all generators in a safe, de-energized, zero-stored-energy state. While placing the controller and the battery disconnect switch in the “OFF” position and depressing the emergency stop push buttons are good actions to take, they do not satisfy the requirements for ensuring the generator set is in a zero-stored-energy state. The “OFF” and “EMERGENCY STOP” push button control schemes employed by more modern controllers often provide a command signal to onboard electronics. Do not rely on software and microprocessors to be safety devices. Similarly, do not trust that a switch is open while in the “OFF” position. Always test and try operating the product prior to servicing as another method of ensuring the product is in a zero-stored-energy state.

- All AC and DC circuits entering and leaving the product shall be opened and secured with the appropriate LOTO device, thus electrically isolating the equipment to be serviced.
- Engine generator set packages shall have the battery cables removed from the batteries at the battery ends, and the battery cable ends shall be secured with the appropriate LOTO device.
- Gas and diesel fuel lines and air start lines shall be valved off or closed, and the valves shall be secured with the appropriate LOTO device.
- Any fuel or air between the valve and the engine shall be drained or vented.
- Remember to remove power from all attachments such as battery chargers, jacket water heaters and generator space heaters.
- Verify there is no stray voltage anywhere on the package and that all voltage sources are properly secured in the “OFF” or “OPEN” position with the appropriate LOTO device.
- Open the product’s output circuit breaker and secure it with the appropriate LOTO device to prevent an external source from energizing the product or starting a generator set package’s engine.

7. ENSURE PROPER GROUNDING

Grounding must occur to help prevent an injury while operating an electrical product. Ensure the product is always properly grounded and the conductive surfaces surrounding the work are also bonded to the product’s grounding system. Determine if there could be any differences in the electrical potential between the conductive surfaces. Even the smallest potential difference could cause current to flow through your body if you touch both simultaneously, resulting in electrical shock or electrocution.

8. CREATE A SAFE WORK ENVIRONMENT

With multiple jobs going on at a jobsite, it is important to be aware of the other job tasks and associated processes that are being performed near or around you. All employees should be trained and regularly communicated to on safety programs throughout the work areas. Encouraging a jobsite to have safety committees, safety goals and regular inspections, to name a few, will help create accountability and enforce compliance on the jobsite. Always be on the lookout for areas which could create a health and safety hazard and immediately report any suspicious findings to management so corrective action can take place.

- Are other trades working overhead?
- What potentially dangerous work environment changes are others making that could jeopardize your safety?
- What work environment changes are you making that could jeopardize the safety of others?

9. EXTENSION CORDS AND POWER TOOL SAFETY

Ensure all extension cords and power tools are properly grounded and are ground fault protected, regardless if they are being used indoors or outdoors.

- Prior to each use, inspect extension cords and power tools for damage. Pay special attention to the insulation systems. Significant cuts or tears in the insulation cannot be repaired with electrical tape.
- Ground pins shall be intact.
- Test extension cords to ensure the ground pin and ground receptacle are electrically continuous from one cord end to the other.
- Test power tools to ensure exposed metal frames and tool bodies are electrically continuous to the power cord ground pin.
- If the cords or cord ends are damaged, a qualified individual should repair or replace them.
- Cords should never be knotted or otherwise stressed.
- Cords should not be suspended overhead or used as ropes to lift, pull or secure objects.
- Cord plugs and receptacles should be tightly coupled and never resting in or around water or flammable fluids.
- Extension cords (and other temporary wiring methods) used at jobsites shall be ground fault protected to reduce hazardous leakage current.
- If ground fault protection cannot be confirmed, use portable ground fault protection devices to supply extension cords (and other temporary wiring).
- Extension cords shall not create a trip hazard and shall be kept out of the way of vehicular traffic.

10. ESTABLISH A SAFETY TRAINING CULTURE

Prepare a safety manual or safety sheet for the specific conditions found on your jobsite. Ensure equipment and materials are being used for their intended purpose. When appropriate, make sure all instructions are translated and clearly understood by all workers. Always review the manufacturer's Operation & Maintenance Manual before putting an engine to work.

To create a safe work zone, it is important all employees understand the common communication practices used on the jobsite. Train employees on jobsite communication including:

- Keeping track of others in the work zone and letting them know where you are at all times.
- Establishing eye contact before entering a work zone.
- Creating two-way communications before entering a work zone.
- Informing coworkers when leaving a work zone.

Obtain Cardio-Pulmonary Resuscitation (CPR), Automatic External Defibrillator (AED) training and emergency first aid training. If it is not applicable for you to be trained in these areas, make sure you know who is qualified to perform these tasks on your jobsite.

The equipment training and safety teams at Caterpillar have spent decades working with customers around the world, across a wide spectrum of equipment applications and jobsite conditions. The key lesson learned is, when it comes to jobsite safety, no amount of equipment technology or advanced machine design can replace caution and good safety practices.

The primary contributors to safe jobsites are awareness, proper training and attention to detail on the part of business owners and their employees. Safety must be a priority and an ongoing part of your company culture. We hope this information is helpful as you strive to profitably grow your business.

We also invite you to view and utilize additional safety training resources by visiting SAFETY.CAT.COM[™].

This information is not intended to be a comprehensive analysis of all hazards related to Cat[®] products or to your specific application and does not supersede any state, federal or local statutes or regulations. More complete information regarding Cat products is provided in the Operation & Maintenance Manual (OMM) for specific models. Caterpillar recommends you and your employees read and understand the OMM before operating or working on any machine.

