



## SAFETY LETTER

To: APS Electric Service Applicants and/or Applicants' Representatives planning a construction project

Re: Reminder of public safety issues and minimum approach distance requirements when working near overhead or underground power lines

Dear Applicant:

We appreciate the opportunity to assist you with your construction project, and would like to take this occasion to provide you with important information about safety regulations which apply to all work performed near overhead or underground power lines.

Prior to start of construction, you should be familiar with several clearance requirements regarding work performed near overhead and underground power lines. These include, but are not limited to, (i) Arizona law regarding high voltage overhead power lines and safety restrictions, (ii) Arizona law requiring underground facilities safe excavation practices, (iii) The National Electrical Safety Code, and (iv) regulations promulgated by the Occupational Safety and Health Administration (OSHA).

By taking a few moments now to review these safety requirements, you should be better able to complete your project in a safe and timely manner and reduce the possibility of accidents. Your compliance with these requirements in cooperation with APS will not only help you maintain project safety, but reduce the expense of project delays and damage claims.

### Overhead Power Lines:

Arizona law regarding "High Voltage Power Lines and Safety Restrictions" (A.R.S. §40-360.41 through 45) requires that a minimum clearance of ten (10) feet be maintained between an energized power line of up to 50 kV and a piece of mechanical equipment, its load and any attachments such as "tag lines." Energized power lines with higher voltages require even greater distances. New OSHA regulations regarding the use of cranes may require even greater clearance distances.

In fact, the Arizona law states that, "A person or business entity shall not...operate any mechanical equipment or hoisting equipment or any load of such equipment, **any part of which is CAPABLE OF vertical, lateral or swinging motion closer to any high voltage overhead lines than** the minimum clearance distance, "unless prior arrangements have been made with the utility company to make sure that the work can be performed safely." [emphasis added]

This means that before doing any work near overhead power lines: (1) you must consult with APS regarding the specific work you have planned near overhead power lines, and the specific date you plan to do the work; (2) you must make specific arrangements with APS so that the work can be done safely; and (3) you must contact [PublicSafety@aps.com](mailto:PublicSafety@aps.com) or call 602 250 3418 to arrange a site meeting if a multistory project is planned to be constructed closer than fifteen (15) feet of overhead power lines.

If you anticipate your project "work" will require activity closer to overhead power lines than these minimum standards allow, you must call APS at:

Residential – (602) 371-7171 or 1 (800) 253-9405  
Business – (602) 371-6767 or 1 (800) 253-9407

and ask for an APS Representative to meet with you at the construction site to address your construction plans so that appropriate safety precautions can be made. **No work can be done until safe work arrangements have been made with APS.** Failure to comply with this statute may not only be hazardous to your employees, but could result in damage claims against you. Violations of this statute could also subject you to a five thousand dollar (\$5,000) fine from the State as well as applicable fines from OSHA.

The National Electrical Safety Code "NESC" specifies clearances that must be maintained between power lines and buildings, signs and other structures. These clearances vary with the voltage of the line, activity expected near the line and the structure that may be near the line. If you construct buildings, signs or other structures nearer to existing power lines than the NESC authorizes, such construction activity may not only be hazardous to your employees (and a violation of OSHA and Arizona safety laws), but it may also subject you to the cost of correcting NESC code violations.

### **Underground Power Lines:**

Arizona law regarding "Underground Facilities" (A.R.S. §40-360.21 through 32) requires that you arrange for locating the position of underground facilities before beginning any excavation, and that you take necessary measures (including only hand digging within two feet of underground facilities) to ensure that the facilities are not cut or damaged. Failure to do so may not only be hazardous to your employees, but could result in damage claims against you. Violation of this statute may also subject you to a five thousand dollar (\$5,000.00) fine from the state. You may make arrangements for locating underground power lines free of charge by calling the Arizona Blue Stake Center at least two (2) full working days excluding holidays prior to performing any excavation. Please use one of the following available numbers - (602) 263-1100 in the greater Phoenix area or 1-800-782-5348 outside Maricopa County, or you can also use the nationally recognized three (3) digit number 811 to contact the Arizona Blue Stake Center, Monday through Friday excluding holidays from 6:00 a.m. through 5:00 p.m.

Please remember these safety standards and requirements along with applicable city ordinances when planning and constructing your project. For a more complete statement of the law, refer to the attached brochure and the referenced statutes. If your specific needs require assistance from APS, please call the number listed above. Thank you for your interest in safety.

Sincerely,

Your APS Representative



**Applicant Safety Acknowledgement Form  
(to acknowledge receipt of Safety Letter and Safety Brochure)**

(APS’s Safety Letter and associated Safety Brochure have been provided to you to ensure a safe work environment during your construction project. If you have any questions related to safe working distance requirements for workers, tools, materials, and or equipment working near APS overhead power lines, please contact [PublicSafety@aps.com](mailto:PublicSafety@aps.com) or (602)250-3418.)

This is to acknowledge that I have received from the APS Representative a copy of APS’ Safety Letter and associated Safety Brochure which outline my responsibilities before and during any excavation, and inform me of minimum approach distances that must be maintained, when working near overhead power lines.

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Project Identifying Information

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Project Address

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Printed Name (Applicant or Applicant’s Representative)

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Company Name (if applicable)

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Signature (Applicant or Applicant’s Representative)

Date of Acknowledgement: \_\_\_\_/\_\_\_\_/\_\_\_\_

# APS Public Safety Brochure

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# Electrical Safety Awareness



# Introduction to Electrical Safety

Electricity safely powers our modern society and our daily lives. But it is easy to take electricity for granted. If not treated with caution and respect, electricity can cause severe injury and even death.

Each year people are needlessly injured or killed when they make accidental contact with electricity at home, on the job, or outdoors. These tragic accidents are often the result of a failure to identify potential electrical hazards or simply being inattentive when around electrical equipment. Even momentary attention lapses may have fatal results.

This brochure is intended for use as a guide to help you identify and avoid potentially hazardous conditions when working with or near electricity at home, in the workplace or outdoors.

# Electrical Facts and Safety Tips

- Electricity travels at the speed of light, 186,000 miles per second.
- Electricity is the only commodity that is consumed the instant it is manufactured.
- Electricity cannot be stored in significant quantities given today's storage technologies.
- Electricity seeks ALL paths to ground. Never put yourself in a position to become part of the path to ground by touching (or stepping on) energized wires with your hands or clothing, or indirectly using tools, materials, or equipment.
- Treat all wires with respect and caution, regardless of size. Always assume a downed wire is energized. Call 911 and APS if you see a downed power line or exposed electrical equipment.
- Never enter an electric substation. If you see suspicious activity inside or near a substation, call 911 immediately.
- Do not use water on an electrical fire. Call 911. If possible, and if safe to do so, unplug the device that is on fire or turn the power off at the main breaker switch in the service entrance breaker panel. Evacuate to a safe area outside and away from the fire.
- If your vehicle comes to rest touching a downed power line, stay inside the vehicle, remain calm, and call 911 and APS. Warn others to stay away from the vehicle and wait for rescue workers to arrive. Ensure the area has been made safe by the utility company prior to exiting the vehicle. If you must get out of the vehicle due to a life threatening situation, jump out of the vehicle without touching both the vehicle and the ground at the same time. Shuffle away in very small steps, or hop away with both feet together, until you are at least 50 feet away from the danger area. Once you have evacuated the vehicle, DO NOT return or touch the vehicle until the utility makes the area safe.

# Contractor Safety Introduction to Electrical Safety

For contractors, working with electricity is a daily routine. But injuries and fatalities can occur even to the most experienced contractors when proper precaution is not taken. Even momentary lapses in attention can result in casualties. Here are some facts and tips for preventing potential accidents when working with power.

## Electrical Safety at Work

**Electrical safety goes hand in hand with proper job planning. As a part of your evaluation of the work to be performed be sure to:**

- 1** Analyze the job, looking for locations where you cannot work safely (by maintaining the required minimum approach distance) around overhead or underground utilities, using your equipment and work methods.
- 2** Determine whether your crews can maintain the necessary separation between cranes and derricks, personnel, materials and other equipment. If not, contact the APS Public Safety Department.
- 3** Plan ahead. It is often possible to temporarily re-route electrical lines. However, it could take from two days (for minor adjustments) to many weeks (for a major relocation). You will be charged for the cost of the work, and APS will provide cost estimates.
- 4** Never assume that an overhead power line is insulated. Most are NOT insulated.
- 5** Remember, you are required by law to contact the Arizona Blue Stake center at least two working days prior to the start of any digging.

## Excavation and Boring

- 1** Follow state law and call the Arizona Blue Stake center at least two working days before you dig.

- 2 If your job is not marked (the underground facilities located and marked by the facility owner or operator), do not dig.
- 3 Excavate in a careful, prudent manner, and manually expose with hand tools the exact location of the underground facilities once within 24 inches of the location marks.
- 4 Immediately notify the facility owner of any obvious damage. Do NOT attempt any inspection, repair or manipulation of the electric cable(s) you believe may have been damaged. Let the utility make that determination for you.
- 5 Do not assume that when you have uncovered one cable you have uncovered all of them.
- 6 Do not assume that all facilities are at a specific and consistent depth, and that the grade has not changed since installation.
- 7 Do not assume a cable is abandoned and not energized.
- 8 Do not concentrate your efforts solely on digging activities and risk forgetting that overhead power lines may be in the area that require separation at the minimum approach distances contained in Table B.
- 9 Do not assume a false sense of security simply because previous contacts with electrical utilities did not result in injury.
- 10 Do not assume that you know where underground utilities are located because you worked in the area before.
- 11 Do not assume there are no underground utilities simply because the work area is largely remote.
- 12 Use manual digging methods when digging closer than two feet of any electric utility pad-mounted equipment or power pole.

# Overhead Power Line Safety

## Overhead Separation Distances

The safe working distances, also known as minimum approach distances, for overhead electrical lines and equipment are somewhat complex. Please refer to the regulating authority if you have any questions or confusion. Of course,

you may also contact the APS Public Safety Department at (602) 250-3418 or contact [publicsafety@apsc.com](mailto:publicsafety@apsc.com) for clarification.

Generally, the type of work being performed dictates the rules governing the safe distance to an overhead power line or electrical equipment. The two specific types are: 1) work involving non-qualified electrical workers, people, materials and non-crane equipment; and 2) Work involving cranes and derricks.

## **Construction Industry and Heavy/Aerial Equipment Operation**

- 1 Ensure that the structure to be constructed meets the National Electric Safety Code clearance requirements pertaining to overhead lines.
- 2 If ladders, scaffolds or hydraulic lifts are to be utilized, ensure that the minimum separation of people, materials and equipment specified in Table B is maintained.
- 3 If cranes or derricks are used, ensure that the minimum separation as required by OSHA is maintained.
- 4 All equipment should have the buckets/forks lowered while in transit rather than risk snagging an overhead line.
- 5 Scaffolding should be dismantled prior to relocation to prevent contact with overhead lines.
- 6 Workers should avoid positioning themselves or hand-held objects too close to overhead lines.
- 7 Never place construction materials or spoils near power poles or underneath overhead power lines.
- 8 Ensure that dump trucks, graders, earth-moving and other mechanical equipment lower their buckets or hydraulic beds prior to transit to avoid contact with overhead lines.
- 9 Ensure that the electrical system is not compromised. Work in compliance with OSHA working clearances and underground facilities laws.
- 10 Ensure that APS is notified well in advance of any planned blasting operations near electrical facilities by calling the APS Public Safety Department.

# Minimum Approach Distances for Non-Qualified Electrical Workers, People, Materials, and Non-Crane and Derrick Equipment:

The following minimum clearance separation must be maintained between all lift equipment excluding cranes or derricks, non-qualified electrical workers, people, materials that are in close proximity to energized electrical circuits:

**TABLE B**

Minimum Clearance Between Energized Line/Equipment and People, Materials and Non-Crane Equipment	
Energized Line Voltage	Minimum Approach Distance
Up to 50,000 volts	10 feet
Over 50,000 volts up to 69,000 volts	11 feet
Over 69,000 volts up to 115,000 volts	13 feet
Over 115,000 volts up to 161,000 volts	14 feet
Over 161,000 volts up to 230,000 volts	16 feet
Over 230,000 volts up to 345,000 volts	20 feet
Over 345,000 volts up to 500,000 volts	25 feet

## Requirements for Operating Cranes and Derricks Near Power Lines

Brief Overview (see detailed requirements in OSHA regulations)

**When operating cranes and derricks, it is the employer's responsibility to:**

- 1 Identify the work area.
- 2 Determine if any part of the equipment, load line or load, if operated up to the equipment's maximum working radius, COULD pass within 20 feet of the power line (if the line is less than 350,000 volts) or within 50 feet of the power line (if the line is more than 350,000 volts).
- 3 If any part of the equipment COULD pass within the required minimum distance, then you must either:
  - a Confirm with the utility company that the power line has been de-energized and visually confirm the line has been grounded at the worksite; or

- b ENSURE that NO PART of the equipment, load line or load approaches closer than the required minimum distance, by implementing the required encroachment prevention provisions.

**Required Minimum Approach Distance for Cranes and Derricks**

- 1 20 feet for lines up to 350,000 volts and 50 feet for lines over 350,000 volts; or
- 2 If the specific voltage is clarified with the utility company, then the required minimum approach distances are:

**TABLE A**

Power Line Voltage	Minimum Approach Distance of Crane or Derrick, Load, and Load Line
Up to 50,000 volts 10 feet	10 feet
Over 50,000 volts up to 200,000 volts 15 feet	15 feet
Over 200,000 volts up to 350,000 volts 20 feet	20 feet
Over 350,000 volts up to 500,000 volts 25 feet	25 feet

**Required Encroachment Prevention Provisions for Cranes and Derricks**

- 1 The employer must:
  - a Conduct a planning meeting with the operator and the other workers who will be in the area of the equipment or load to review the location of the power line(s) and the steps that will be implemented to prevent encroachment.
  - b Ensure tag lines are non-conductive.
  - c Erect and maintain an elevated warning line, barricade, or line of signs, in view of the operator at the required minimum approach distance (see detailed OSHA regulations).
  - d Implement at least one of the following:
    - A proximity alarm set to give the operator sufficient warning to prevent encroachment.
    - A dedicated spotter who is in continuous contact with the operator (see detailed requirements in OSHA regulation).
    - A device that automatically warns the operator when to stop movement (see detailed requirements in OSHA regulation).

- A device that automatically limits range of movement, set to prevent encroachment.
- An insulating link/device (see detailed requirements in OSHA regulation).

Presume that Power Lines are Energized (Cranes and Derricks): The employer must assume that all power lines are energized unless the utility company confirms that the power line has been and continues to be de-energized and visibly grounded at the worksite.

**Required Training (Cranes and Derricks):**

The employer must train each operator and crew member assigned to work with the equipment (see detailed requirements in OSHA regulation).

**Minimum Approach Distances for People, Materials, and Non-Crane Equipment:**

The following minimum clearance separation must be maintained between all lift equipment, people and materials that are in close proximity to energized electrical circuits:

**TABLE B**

Minimum Clearance Between Energized Line/Equipment and People, Materials and Non-Crane Equipment	
Energized Line Voltage	Minimum Approach Distance
Up to 50,000 volts	10 feet
Over 50,000 volts up to 69,000 volts	11 feet
Over 69,000 volts up to 115,000 volts	13 feet
Over 115,000 volts up to 161,000 volts	14 feet
Over 161,000 volts up to 230,000 volts	16 feet
Over 230,000 volts up to 345,000 volts	20 feet
Over 345,000 volts up to 500,000 volts	25 feet

**Excavation and Arizona Blue Stake Laws**

Arizona Blue Stake laws require all entities to notify the Arizona Blue Stake center two working days prior to opening an excavation or otherwise digging so that all underground public utilities can be properly located and marked. Do not wait until work is underway. Call well in advance to obtain the information you need to do the job safely.

Never dig closer than two feet from pad-mounted utility equipment or power poles. Doing so will endanger your life.

Dig carefully by hand in the area immediately surrounding buried cables. Some cables may be located in conduit, and some may simply be directly buried. Arizona Blue Stake laws require that the exact location of buried facilities must be exposed with hand tools in a careful and prudent manner when the excavation is less than or equal to 24 inches from a marked underground facility and the uncovered facility must be supported and protected prior to and during excavation.

Do not touch conductors and never use conduit or exposed cables as a step or as a means of crossing a trench.

Do not leave cables exposed. Protect others do not leave any unsafe conditions unguarded or properly protected during all excavation work practices.

If the underground cable is cut, nicked or strained in any way, call APS immediately. Damage is not always obvious and repairs may sometimes be made to avoid the cost of removing and replacing damaged equipment.

*NOTE: The overhead and underground separation from power lines requirements are law. Additionally, it's the law to call Arizona Blue Stake two days before you dig! Arizona Revised Statutes allow the Arizona Corporation Commission to assess civil penalties up to \$5,000 per violation to persons or businesses that do not comply. Additionally, criminal damages can be pursued by APS for illegally tampering with or damaging its property or facilities.*

*NOTE: The sources for the regulatory requirements listed above may be found in Federal and State OSHA standards and Arizona Revised Statutes.*

## House Movers

- 1 Prior to moving a building or structure, call APS to ensure the power source to it has been de-energized.
- 2 Arizona state law requires all entities to refrain from encroaching on the minimum approach distances specified within Table B.
- 3 Planning ahead is a must. If your project cannot be completed without encroaching upon the minimum approach distances in Table B, contact

the APS Public Safety department to review and discuss how the project can be completed safely. An initial survey of the proposed route by APS personnel will be free of charge and an estimate of any additional work can be provided.

- 4 In some instances, APS may be able to make temporary adjustments to overhead line locations. The cost of these adjustments will be passed along to you should you decide to proceed.

## **Lift Rental Companies**

- 1 Mobile lifts (man lifts, scissor lifts, etc.) are capable of extending into and/or reaching overhead power lines and, therefore, become a path to ground for electricity.
- 2 It is important, prior to raising or extending the boom or device, that the operator LOOK UP and ensure that no overhead power line exists.
- 3 It is important that proper separation between the mobile lift and overhead power lines be maintained and that operators do not encroach upon the minimum approach distances for people, materials and equipment as outlined in Table B.
- 4 If the work to be performed cannot be safely completed due to the need to bring people, materials or equipment closer than prescribed in Table B, contact the APS Public Safety department to investigate alternative approaches. In no situation should you operate the equipment closer than allowed by Table B.

## **Sign Installation and Maintenance**

- 1 The primary electrical hazards involved with sign installation and maintenance is exposure to overhead and underground electric conductors and equipment.
- 2 Before the installation of a new sign, or maintenance of an existing sign, ensure that you maintain the necessary minimum approach distances as specified by OSHA for crane and derrick work, and as specified in Table B for people, materials and non-crane equipment.

- 3 Before digging for new foundations or to set a pole, ensure that you call the Arizona Blue Stake center at least two working days before the work begins.
- 4 Ensure that the electrical supply to your sign, if equipped, is provided by a licensed electrical contractor.
- 5 If you cannot maintain the proper minimum approach distances or the separation of structures from energized lines, contact the APS Public Safety Department.

## **Farming**

- 1 Take every precaution to avoid damaging overhead power lines and poles during the operation of farm equipment.
- 2 Farm equipment and machinery used in cultivating fields should be no more than 14 feet in height to safely clear overhead power lines.
- 3 When installing an irrigation system, pipes should be moved in a horizontal manner when near overhead lines to avoid accidental contact.
- 4 Keep ladders away from all overhead electrical equipment.

## **Tree and Vegetation Work**

- 1 If any portion of a tree is within the distances specified in Table B, contact the APS Forestry Department for assistance prior to beginning work.
- 2 Non-“Qualified Line Clearance Tree Workers” (as defined in OSHA) must not perform tree work near or around (within the distances specified in Table B) energized overhead power lines. Only Qualified Line Clearance Tree Workers are allowed to do the work.
- 3 All ladders and lift equipment must be positioned in a manner that will maintain the minimum approach distances specified in Table B.
- 4 If an electrical service wire passes through a tree or vegetation that is to be worked, contact the APS Public Safety Department prior to working to avoid serious injury or fatality.
- 5 If broken or fallen trees or limbs are contacting overhead electrical facilities, contact the APS Public Safety Department.

- 6 Consult with the APS Forestry Department prior to planting palms or trees around overhead or underground electrical equipment. Remember to notify Arizona Blue Stake at least two working days prior to digging.

# First Responders Introduction to Electrical Safety

As a first responder, “safety first” is a way of life. Our goal is to ensure that with these facts and tips, you are equipped to handle electricity with an equal level of expertise and caution.

## How Electrical Hazards Can Be Foreseen and Avoided

Electricity always seeks ALL paths to ground. It will use any conductor—metal objects, wet wood, water, or your body. If you touch an energized bare wire or faulty appliance while you are grounded, electricity will instantly pass through you to the ground causing a harmful, possibly fatal, shock.

The amount of electricity used by one 7.5 watt Christmas tree bulb can kill you if it passes through your chest. Even if not fatal, electrical shock can easily cause serious burns, falls, cuts or internal bleeding.

Overhead power lines are typically NOT insulated and are located high off the ground for safety reasons. Substations and transformers contain energized parts that are very dangerous to touch. Underground power lines, while well insulated, can be easily damaged by a shovel or pick and create a shock or flash hazard.

Birds can sit on a power line and not get shocked because they are not touching the ground or any other grounded object. But if you or the metal ladder or antenna you’re holding touches the same line, you’ll become electricity’s instant path to ground and risk a potentially fatal injury.

# Safety First for First Responders

**When responding to damaged power poles or downed power lines first responders must:**

- 1 Call the utility immediately and give an accurate location with pole or equipment number if available.
- 2 Keep spectators well clear of the area. If possible, secure the area around a damaged pole or downed power line 50 feet in all directions.
- 3 Do not spray water on wires or energized electrical equipment.
- 4 If a downed power line or equipment is touching other potentially conductive objects (fence, shed, automobile, etc.) consider them to be energized as well.
- 5 Do NOT attempt to move any downed power lines. Wait for utility personnel to safely correct the situation.
- 6 Gloves, footwear, clothing and equipment (pike poles, etc.) will NOT eliminate your risk of electric shock and injury.

**Responding to downed power equipment in contact with a vehicle or equipment:**

- 1 DO NOT approach or touch the vehicle or piece of equipment if downed wires or electrical equipment are in contact with it. Consider the downed wires or equipment and the vehicle or equipment as energized.
- 2 Visually check the occupant(s) from a safe distance and have them remain in the vehicle or on the equipment unless it is a life-threatening situation.
- 3 If the occupant(s) must leave the vehicle or equipment, instruct them to open the door but NOT step out. They must jump free of the vehicle or equipment without touching the vehicle or equipment and the ground at the same time.
- 4 Instruct them to shuffle step or hop (with both feet together) away from the area at least 50 feet. Have them stop and determine if they can feel any tingling sensation in their feet or legs, which is a sign that gradient voltage is present. If so, instruct them to shuffle step or hop another 50 feet away and repeat until there is no tingling sensation.

### **Responding to substation emergencies:**

- 1 Contact the utility company, provide an accurate location and ask for a “troubleman response.”
- 2 Do not enter a substation unless escorted by an electric utility worker. There are many hazards associated with substations, including the danger of arcing, explosions, toxic smoke and oxygen deficiencies.
- 3 Protect secondary exposures beyond the substation perimeter. Never spray water on metal enclosed switchgear.
- 4 Secure the area, keeping the public as far back as practical.
- 5 NEVER park vehicles under power lines or close to electrical hazards.

### **Responding to transformer, switching cabinet, underground vault or manhole fires:**

- 1 Call the electric utility, provide an accurate location and ask for a “troubleman response” immediately.
- 2 Keep the area clear of bystanders and first responders. There is a possibility of electrical explosion.
- 3 Never enter a vault or manhole containing electrical circuits or equipment until the utility company confirms the space has been de-energized.
- 4 Always wait for the electric utility personnel.
- 5 Do not spray water on electrical fires until utility personnel inform you that the equipment is de-energized.

### **Responding to Structural Fires:**

- 1 Call the electric utility immediately giving good location information.
- 2 To secure the electric power of a structure, use the fuse box or breaker panel. If available, turn the sub-breakers off first, followed by the main breaker. Commercial structures may not provide access to sub-breakers. In this case, turn off the main breakers.
- 3 If the structure is equipped with a solar photovoltaic (PV) system, and it is daylight, the PV panels will continue to convert sunlight to electricity. The solar industry recommends applying opaque tarps over all PV panels to reduce or limit exposure to solar electrical issues. Open the Utility Safety

Disconnect Switch to isolate the PV system and prevent back-feed into the building's service entrance section. But remember, the PV system will continue to be energized unless the sun is prevented from reaching the PV panels themselves. Associated PV system wiring, inverter, sub-meters, etc. will remain energized.

- 4 NEVER remove the structure's electric meter. Removing the meter can result in an electrical flash or explosion with the possibility of injury.
- 5 NEVER cut or remove the service lines. Wait for the electric utility personnel to arrive and safely de-energize the grid supply to the structure for you.

## Residential Introduction to Electrical Safety

Electricity keeps our houses running, but it is easily taken for granted. If not treated with caution and respect, electricity can cause severe injuries that can result in casualties. Keep your home a safe haven by learning these simple, yet powerful ways to prevent power-related accidents at home.

## Here are Some Ways to Maintain Electrical Safety at Home

Each year in the United States, electricity-related accidents in the home cause approximately:

- 300 fatal electrocutions
- 12,000 shock and burn injuries
- 150,000 fires

## Learn How to Anticipate and Prevent Electrical Hazards

Electricity always seeks ALL paths to ground. It will use any conductor—metal objects, wet wood, water, or your body. If you touch an energized bare wire or faulty appliance while you are grounded, electricity will instantly pass through you to the ground causing a harmful, possibly fatal, shock.

The amount of electricity used by one 7.5 watt Christmas tree bulb can kill you if it passes through your chest. Even if not fatal, electrical shock can easily cause serious burns, falls, cuts or internal bleeding.

Overhead power lines are typically NOT insulated and are located high off the ground for safety reasons. Substations and transformers contain energized parts that are very dangerous to touch. Underground power lines, while well insulated, can be easily damaged by a shovel or pick and create a shock or flash hazard.

Birds can sit on a power line and not get shocked because they are not touching the ground or any other grounded object. But if you or the metal ladder or antenna you're holding touches the same line, you'll become electricity's instant path to ground and risk a potentially fatal injury.

## Understanding More About Your Home's Electric Service

The utility's power supply grid connects to your home through the service entrance—your circuit breaker box or fuse box. Inside the box, your service panel contains fuses or circuit breakers which stop power to specific circuits in case of a short circuit or overload.

If there is a short circuit or overload in your home and a circuit breaker or a fuse trips, you should:

- Unplug appliances on that circuit.
- Switch off power at the main switch.
- Replace the fuse that has a broken metal strip with a new fuse of the same rating.

- If you have circuit breakers, locate the one that is tripped and switch it to the “off” position, then to the “on” position.
- Try to determine the cause of the problem.
- Restore power.

Never put a penny or metal foil in a fuse box to replace a fuse—you could start a fire. Most service panels have a “master” or “main” switch. Use it to cut all power when changing a fuse (or in the case of a fire) to prevent electrical shock. If you don’t have a main switch, turn off all circuit breakers. **DO NOT** tamper with your electric meter. Doing so will risk shock, explosion and fire.

## Is Your Home Wiring Adequate?

- 1 Do fuses or circuit breakers trip often?
- 2 Do toasters or irons not get as hot as they should?
- 3 Does your TV picture shrink or flicker when large appliances go on?
- 4 Do you use extension cords because there aren’t enough outlets?

If you answered “yes” to any of these, check with a qualified electrical contractor about updating your home’s wiring.

## Learn about Grounding and GFCIs

When using a plug or extension cord equipped with three prongs, the third prong connects inside the outlet to a ground wire, which in turn connects with a water pipe or ground rod located near the electrical service panel. As a result, any short circuit in the tool or device attached to the plug should cause electricity to flow directly to the ground rather than through you.

Ground Fault Circuit Interrupters (GFCI) are found in some outlets and electrical service panels. They monitor the flow of electricity to and from appliances. If there’s an imbalance in that flow, electricity may be able to travel to ground through you, and the GFCI will quickly cut power to prevent this from happening. GFCIs:

- 1 Are required in newer homes in “wet” areas such as in bathrooms, garages, near kitchen sinks and outdoors
- 2 Are required on some basement outlets

- 3 Can be added as temporary plug-in GFCI adapters
- 4 Can be added by an electrician as replacement outlets

If your outlets don't have GFCI test and reset buttons, check your electric service panel—you may have some ground fault protected circuit breakers.

GFCIs should be tested periodically (monthly). Simply plug in an electrical appliance (fan, hair dryer, etc.), turn it on and depress the “test” button located on the outlet. The appliance should immediately turn off. To reset the GFCI for that location, turn off and unplug the electrical appliance, and then depress the “reset” button.

## Here Are Some Tips for Keeping DIY Projects Electrically Safe

Do-It-Yourself Hazards:

It is important to watch out for nearby power lines any time you:

- Use a ladder
- Work on a roof
- Prune trees
- Carry long tools or pipes
- Clean a pool
- Dig in the yard
- Install or remove an antenna

Overhead and underground power lines may be present, and proper preparation is important before you begin your project. Be sure to call the Arizona Blue Stake center @ 811 at least two working days prior to any digging activity.

Remember a few rules:

- 1 Electricity and water don't mix. Keep appliances, even those that are turned off but plugged in, away from bathtubs, sinks, puddles and wet hands. They can shock and injure or kill you.
- 2 Do not yank electric cords out of an outlet by their cord—use the plug head.

- 3 Never carry a power tool or appliance by its power cord. They are not designed to withstand repeated bending.
- 4 Do not run electrical cords under rugs or furniture. They can be damaged or overheat and start a fire.
- 5 Carry ladders and antennas (and other long conductive objects) horizontally and always LOOK UP before raising them to ensure that there are no overhead power lines. Overhead power lines are typically not insulated. Touching a ladder or antenna to an energized power line will result in completing a path to ground and cause serious injury or death.
- 6 Survey your roofline for overhead power lines PRIOR to working on your roof. Again, do not come within the distances referenced in Table B to overhead power lines. Also, remember that most overhead power lines are not insulated.

## **Stay Protected During Natural Disasters**

Natural disasters are not uncommon in Arizona, Summer monsoons, flash flooding and winter storms can play havoc with the APS electric transmission and distribution system.

### **1 Flooding:**

Stay away from the flooded area, especially in locations where the APS system is located underground. Water and electricity do not mix. Portions of the APS system may energize automatically, even when flooded. Stay away from overhead power lines when in watercraft. The height of the flooded area may raise you to an unsafe level beneath power lines.

### **2 Snow and Ice Storms:**

Snow and ice accumulations on overhead power lines can cause the lines to fail and fall to the ground. Do not park or camp under overhead power lines. Understand that in areas of the state that are prone to severe winter weather, having alternate means of warming your residence, food and water is important because APS cannot guarantee service at 100% levels. While we take pride in the reliability of our system, all mechanical systems break from time to time, and snow and mud can prevent us from quickly reestablishing service, especially in remote areas. Always assume that downed power lines are energized and remain a safe distance away (50+ feet).

### 3 Summer Storms/Monsoons:

Strong storms can result in damage to structures, including the APS overhead transmission and distribution system. Stay a safe distance from APS structures and power poles following a significant storm in areas where other obvious structural damage is evident. Always assume that downed power lines are energized and remain a safe distance away (50+ feet).

## Have Fun Safely with Recreational Activities: Flying, Sailing, Ballooning, Hang Gliding, etc.

Recreational enthusiasts have suffered serious injuries when they or their equipment came too close to overhead power lines.

Pilots, for example, must ensure that they look for overhead power lines when flying near ground level because they can be difficult to see in certain lighting conditions. Sailboat masts can be tall, and can contact overhead power lines (yes, they exist over waterways in some locations). Acting as “pilot in command” carries certain obligations, including safely operating the craft at all times.

## Solar Safety

As Solar Photovoltaic Systems become more common, it is important to better understand how they work. [Learn more about the safety tips involved with this next innovation today to ensure a safer tomorrow.](#)

### SEE MORE

- APS recommends against climbing on, walking on, or cleaning roof mounted solar panels, as serious slipping/tripping hazards exist. Contact your solar system provider to have your system maintained or you panels cleaned.
- Do not tamper with any wiring from the solar panels back to the APS Service Entrance Section. If you suspect an issue contact your solar system provider, and/or APS.

- In the event an electrical fire originating at the solar panels occurs, contact 911 immediately. Do not attempt to put out the fire with water, this could result in serious injury or death.
- Ensure that APS and First Responders have 24/7 access to the Utility Disconnect Switch.
- The Utility Disconnect Switch with the switch handle opened, will prevent the solar system from back-feeding APS equipment.
- The Utility Disconnect Switch cover shall be locked with an APS padlock at all times, do not remove the APS lock for any reason. If you or your solar system provider requires maintenance in which the Utility Disconnect Switch door needs to be unlocked, contact APS.
- Opening the Utility Disconnect Switch will not stop the solar panels from generating electricity. Solar panels generate electricity when the sun is shining, even during overcast days.
- The required Utility Disconnect Switch is not a dead front, when the switch door is open electrical shock hazards exist.
- Solar panels, when on fire, pose serious health risks from the toxic fumes released, stay upwind of the smoke whenever possible.
- Do not paint over any of the required APS equipment labeling, these labels aid APS and First Responders in isolating the solar system should an issue or emergency occur.
- If a battery backup system is installed, ensure all devices (Utility Disconnect Switch, inverter, battery disconnect, and AC critical load disconnect) have 24/7 access.
- Battery banks installed as part of a backup system can present toxic inhalation and explosive hazards when on fire, do not attempt to extinguish a battery fire with water.

## Generator Safety

If you're planning on using a generator, here are some safety precautions to keep in mind.

- Make sure to read the operating manual carefully.

- Keep the generator outside in a well-ventilated area so the exhaust doesn't come into your facility.
- Plug items that you want powered by the generator directly into the outlets on the generator.
- If you use extension cords make sure they are adequately sized.
- Turn off all equipment before starting the portable generator, then turn on the items one at a time.
- If a generator is connected to your buildings wiring system, back-feed can occur. This can pose a potentially fatal shock hazard to anyone working on APS' electrical system. Also, when APS has restored power, your generator is likely to be severely damaged or destroyed.
- If it is absolutely necessary to connect the generator to your buildings wiring system, ensure that a "break-before-make" transfer switch is installed. This switch will connect the wiring system to either the generator or the APS system, but never at the same time.
- A transfer switch should only be installed by a licensed electrician, and requires an electrical permit and electrical inspection.
- If you install a generating source to power your buildings wiring system and do not also install a transfer switch, APS has specific interconnection requirements that you must follow. Please call (602) 371-6959 or your local APS office for details.

## Kid Safety and Education

# Introduction to Electrical Safety

Electricity safely powers our video games, tablets and televisions, but if you're not careful, it can also cause injuries and be unsafe. Being cautious around electricity is not only important for you, but for your kids as well, so please take a moment to review these safety tips.

## Here are some tips for when your children are around electricity

- 1 Learn what “Danger High Voltage” signs look like, and stay away from power lines, substations and pad-mounted electrical equipment.
- 2 Don’t climb trees near power lines, tree branches can conduct electricity.
- 3 Treat all wires with respect and caution, regardless of size. Always assume any wire is energized.
- 4 Call 911 if you see a downed power line or exposed electrical equipment. Keep yourself safe by staying 100 feet away.

### Learn how to “play it safe” with outdoor toys

- 1 Electricity can travel down the strings of kites or balloons that touch or become entangled in power lines.
- 2 Use these types of toys in open areas safely away from overhead power lines.
- 3 Keep metallic balloons indoors, as they are highly conductive, dispose of properly in the trash; do not release balloons near overhead power lines.
- 4 If a toy gets into a power line or substation, tell an adult to call APS and to never try to retrieve it.

# Contacts

## **APS Public Safety Department**

(602) 250-3418

## **APS Customer Service Department**

(602) 371-7171 (metro Phoenix)

(800) 253-9405 (outside metro Phoenix)

[aps.com](http://aps.com)

## **Arizona Blue Stake Center**

Call the nationally recognized 3 digit one call number: 811

(602) 263-1100 (Maricopa County)

(800) 782-5348 (outside Maricopa County)

[azbsinc.com](http://azbsinc.com)

## **Arizona Department of Occupational Safety and Health**

(602) 542-5795 (Phoenix)

(520) 628-5478 (Tucson)

[http://www.ica.state.az.us/ADOSH/ADOSH\\_main.aspx](http://www.ica.state.az.us/ADOSH/ADOSH_main.aspx)