PCA TOOLBOX SAFETY TALKS

PLUMBING CONTRACTORS OF AMERICA

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PCA

PCA Toolbox Safety Talks

INTRODUCTION

The ***PCA Toolbox Safety Talks*** publication provides short duration safety and health training for plumbers. The 52 individual talks help the trainees learn to identify the most common hazards in plumbing. The talks also teach them how to protect themselves from the hazards.

PCA recommends that each contractor establish a weekly, short-duration (5 to 10 minute) safety and health training session for their plumbers. The process of weekly safety and health training shows employees that job site safety and health is important to their employer.

After finishing a training session, each trainee and the trainer should sign and date the completed talk. In addition, the form on the last page of the book can be used by the trainer to document employee training.

Remember that adults learn by repetition. Therefore, it is beneficial to repeat the same talks several times over the course of time. Since the talks are based on the most common hazards in plumbing, focusing on them will help you prevent the most common job site injuries and illnesses in Plumbing.

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Instructions for the Toolbox Safety Talk Presenter

Preparation:

1. Select the most appropriate talk for the week by looking through the Table of Contents on the back of the front cover.
2. Mark the talk that you choose with a pencil on the Table of Contents to remind you later which talks have already been used.
3. Photocopy the talk (one for each participant).

Presentation:

1. Answer any questions from the previous week's talk that you could not answer at the time of the talk. Then give a copy of the new talk to each participant.
2. Tell the participants to ask questions any time during the talk.
3. Read the talk slowly and clearly.
4. Relate any experiences you have had that deal with the topic of the talk.
5. Ask the participants to share their experiences with the group, but give them no more than one minute each to do so.
6. Ask whether there are any questions.
7. Ask the participants to sign the talk in the space at the bottom right hand corner.
8. Tell them to record any comments they have on the back of the talk.
9. Collect the signed talks and dismiss the group.

Follow Up:

1. Before filing the signed talks, be sure to read the comments on the back and respond accordingly.
2. Remember to get the answers to any questions you could not answer previously. Start the next week's talk by answering those questions.

PCA Toolbox Safety Talks

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SUPERVISOR NAME: _____

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Falls from Portable Straight Ladders

#1

On November 11, 1999 a 28-year old plumber was using a portable, straight ladder to access the upper portion of a wall. He began drilling a five-inch hole in the concrete wall. Somehow, he lost his balance and fell backwards off the ladder. His head slammed into the concrete floor 10 feet below and he died from the injuries.

- Falls from ladders are the leading cause of injury among plumbers.
- Reaching out from ladders and carrying tools, equipment and materials by hand are the leading causes of falls from ladders. Keep your hands free to climb and pull other items up by rope after you are safely off the ladder.
- Ladders are classified by the weight they are designed to safely support. Make sure your ladder is designed to hold your weight plus the weight of your tool belt. Look for the ladder rating on the side rails of the ladder.
  - —Type IA - ladders are rated up to 300 pounds.
  - —Type I - ladders are rated up to 250 pounds.
  - —Type II - ladders are rated up to 225 pounds.
  - —Type III - ladders are rated up to 200 pounds.
- Inspect the ladder each time before you use it. If there is any damage to the ladder, such as cracked, broken or missing rungs, cracked side rails, missing feet or any other damage, remove it from service.
- Set the ladder at the proper pitch. For each four feet of height the ladder should be one foot out from vertical. For example, a ladder accessing a 24-foot high landing from a level surface should be pitched out six feet from vertical.
- Set the ladder up on a level, non-slippery surface and secure it in place by bracing it at the bottom and/or tying it at the top.
- Make sure the ladder you choose extends at least three feet above the roof, deck, platform or landing area.
- Make sure there is no mud or grease on the rungs or on your shoes or boots.

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Falls from Stepladders

#2

On August 12, 1999 a 65-year old plumber was applying flux to a pipe while standing 6 feet off the ground on a stepladder. He fell off the ladder and landed on a gas cylinder. The valve on the cylinder punctured his chest cavity. He died shortly after arriving at the hospital.

- Falls from ladders are the leading cause of injury among plumbers. Stepladders are involved in a large percentage of these falls.
- Inspect your stepladder before you use it. If there is any damage to the ladder such as cracks, missing rungs, missing rivets, bending, warping, etc. take it out of service immediately.
- Check each step for ice, mud, snow, grease, oil or anything else that could cause a slip. If one of these slip hazards is present, clean the ladder off thoroughly before using it.
- Check the bottom of your work shoes or boots before using the ladder. There may be mud or grease on them as well.
- Never use a stepladder as a straight ladder. They are designed to support your weight only in a fully open position.
- Never use the top platform or the first rung from the top as steps.
- Don't use the supports on the back of the ladder as steps. They are not made to support your weight.
- Never use stepladders as scaffold or platform supports. They are not made to support or balance the weight that would be placed upon them.
- Make sure the ground is level under all four feet and that the ladder is locked in the fully open position before starting to climb.

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Falls from Scaffolds

#3

All falls from scaffolds can be prevented no matter what type of scaffold you are using, as long as you remember and follow a few basic safety concepts while working with scaffolds.

- Inspect the scaffolds before you start to work on them. If any scaffold parts look worn or damaged take them out of service and replace them immediately.
- Make sure the access ladders and guardrails are secured in place.
- Be sure all work areas are fully planked.
- If the scaffold does not look level and plumb, stay off it and report to your supervisor.
- When working 10 feet or more above a lower level, use a guardrail system for fall protection.
- When access ladders are not a permanent part of the scaffold, make sure portable access ladders extend at least three feet above the platform and secure them to prevent them from slipping.
- Make sure portable access ladders are set up on a level and solid base.
- Eliminate trip hazards by keeping scaffold work platforms clear of debris and unnecessary materials, tools and equipment.
- Watch carefully for slip hazards (such as mud, grease, oil, ice, snow, etc.) and remove all slip hazards immediately.
- Pay special attention to potential slip hazards on platforms, walkways and the bottoms of your work shoes or boots.
- Avoid carrying tools, materials and equipment by hand when climbing aboard the scaffold.
- After you are safely on the work platform, pull the items you need up by rope and bucket or have someone hand them to you if possible.

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Falls from Mobile Scaffolds

#4

In many situations mobile scaffolds are the most convenient way to reach overhead plumbing work. These scaffolds are safe when they are used properly. However, improper use of mobile scaffolds can be extremely hazardous. Be sure to follow these safety tips when working on mobile scaffolds.

- Inspect all of the parts carefully as you erect the scaffold. Take all defective parts out of service immediately and replace them with appropriate parts that are manufactured specifically for the scaffold you are erecting.
- Erect the scaffold only on a firm, level surface. Use pigtails, toggle pins or nuts and bolts to connect scaffold pieces. Never use wire, welding rods or any other substitutes.
- Remember to lock the casters before installing cross braces at the base.
- Be sure to install horizontal cross braces at the base of the scaffold and at every 20 feet in height.
- Never exceed the maximum height requirement for mobile scaffolds. In most states the maximum height of a mobile scaffold cannot exceed (4 × [the minimum base dimension]). For example a mobile scaffold that has base dimensions of 4 feet by 5 feet cannot exceed 16 feet in height. 4 feet is the minimum base dimension (4 × 4 = 16). Be sure that the scaffold is level and plumb and that the working surface is fully planked.
- Use guardrails for fall protection. When guardrails cannot be used, use a personal fall arrest system or a positioning device system for protection from falls. Use the scaffold only on firm level surfaces.
- Access the platform only by way of the access ladder. If the scaffold does not have a built-in access ladder, properly secure an access ladder to the scaffold. Never step up on the mid-rail or lean out over the top-rail on a scaffold.
- Avoid riding on the scaffold when it is being moved from one location to another.
- When working on the scaffold watch carefully for and avoid sources of electricity and overhead obstructions like sprinklers or ducts. Wear your hard hat.

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Falls from Aerial Lifts

#5

Aerial lifts are devices used to elevate workers and materials to work areas not accessible from ground level. They include extendable boom platforms, aerial ladders, articulating boom platforms, vertical towers or any combination of these. These devices can easily be used safely. However, plumbers are injured each year in falls from aerial lifts.

- To protect yourself from falling off an aerial lift, get the proper training before you operate or work on the lift. Secure the safety rails in place before beginning work.
- To keep the lift from falling over, use it only on stable, level ground. Keep the platform as low as possible. Set the brakes and use the outrigger before starting work.
- Make sure that the opening to the platform has a swinging gate or chain to keep workers from stepping, backing or falling through it. As soon as you reach the platform, secure the gate or chain in the closed position.
- Keep your feet firmly on the platform floor. Avoid sitting or climbing on the edges or other areas of the lift.
- Wear a full body harness and lanyard and attach it to the boom or basket. Do not attach the lanyard to any adjacent structures or objects.
- When there is another worker on the platform with you, communicate clearly with each other before you change positions on the platform and before the platform is moved. Let the other worker know where you are and what you are going to do.
- Be careful climbing on and off the platform. Falls from short distances injure plumbers every year, too.
- Whenever possible keep the platform free from scrap materials, tools, cords and other trip hazards.
- Also, be sure that the platform is free from slip hazards such as mud, ice, grease and oil.

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Falls through Roof Openings

#6

Each time you prepare to work on a roof, remember that plumbers frequently fall through roof openings and that the resulting injuries are usually very serious.

- When working on roofs with holes large enough for a person to fall through such as sky lights or HVAC unit holes use hole covers, guardrails or personal fall arrest systems to prevent falls.
- When using hole covers, make them with materials that are strong enough to support at least twice the load that could be placed on them.
- Secure all floor covers in place so they can't be easily removed or unintentionally knocked out of place. For example, a thick, strong plywood cover could be placed over a hole and nailed securely in place.
- Label the covers boldly with the words "hole" or "cover."
- If it is a large hole, such as a hole for a rooftop HVAC unit, protect the hole with guardrails and toeboards.
- If guardrails are used, build them to withstand 200 pounds of force in any outward or downward direction applied within 2 inches of the top edge at any point.
- If covers or guardrails are not available, use a personal fall arrest system for fall protection. The system includes an anchorage, connectors, body harness and lanyard or lanyard deceleration device.
- Holes in roofs that are not big enough to fall through, such as holes cut for pipe vents can still be hazardous. A worker could easily trip in the hole and fall over the edge or into an object. Be sure to cover even the smaller holes.

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Falls from Edges

#7

On June 6, 1999 a 28-year old plumber was installing pipefittings in a new building. He opened and stepped through what looked like a closet door. The door led to an open elevator shaft and the plumber fell more than 12 feet to the concrete floor below. He died from the impact of the fall.

- An edge is any elevated surface where the end of the surface leads to a drop off to a lower elevation. For example, when a floor is being installed, where the floor stops is considered an edge until the floor installation has been completed. When working on edges, protect yourself from falls by using guardrails, personal fall arrest systems or safety nets.
- When guardrails are used, build them to withstand 200 pounds of force in any outward or downward direction applied within 2 inches of the top edge at any point.
- When personal fall arrest systems are used, be sure the system will arrest a fall before there is contact with a surface or structure below.
- Full body harnesses and double locking snap hooks provide the best protection on personal fall arrest systems.
- When nets are used, make sure they are high enough to prevent a falling worker from contacting the surface or any objects below. Keep the nets clear of construction debris at all times.
- Remember to extend nets outward from the outermost projection of the work surface as follows:
  - —for work performed up to 5 feet above the surface of the net, it should extend out 8 feet;
  - —for work performed from 5 to 10 feet above the surface of the net, it should extend out 10 feet; and
  - —for work performed over 10 feet above the surface of the net, it should extend out 13 feet.

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Falls from Scissors Lifts

#8

On August 4, 1999 a 49-year old plumber was using a scissors lift to install new pipe in an old movie theater. While he was driving the self-propelled lift, which was extended to its maximum height of twenty feet, he drove over a four-inch ledge causing the lift to overturn. The plumber died from the impact of the fall.

- Before operating a scissors lift, inspect the entire area in which the lift will be used. If you find potential hazards such as drop offs, floor holes, bumps or debris in the path of travel, take the time to remove or otherwise protect yourself from the hazards.
- Also, inspect the area overhead for obstructions such as sprinkler equipment and ceiling beams and electrical hazards such as live wires and light fixtures.
- Plan ahead on how to carefully work around the obstructions.
- If you have been assigned to work near electrical hazards, have the source of electricity de-energized. If this can't be done, stay well away from the electrical hazards until insulated barriers can be used to prevent contact with the hazards.
- Inspect the lift itself before starting it. Look for hydraulic system leaks and check all of the fluid levels, especially the hydraulic fluid.
- Inspect the tires for wear. Remember that the stability of the lift depends on the tires. Take your time and do a thorough inspection. Also check all controls, safety devices and warning placards or control markings.
- After starting the lift, perform a functional test by testing all the controls and safety devices. If the inspection or the functional test reveals even the slightest defect, take the lift out of service immediately and report to your supervisor.
- Make sure you have received training on the same brand and model lift that you will be using for work.

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Falls through Floor Holes

#9

Floor holes are prevalent on most construction sites. There have to be holes for stairways, elevators, pipes, ductwork, etc. Unfortunately, these holes can be extremely hazardous to plumbers and other workers when fall prevention or protection practices have not been implemented. Plumbers are killed every year in the United States from falls through floor holes.

- Each day before you start work, check to see whether there are any floor holes in your work area and in the areas that you must pass through.
- When you find a floor hole that is large enough for a person to fall through check to see whether guardrails or floor covers have been installed to prevent falls from occurring.
- Guardrails should have 42-inch high top rails, midrails, and toeboards and be able to withstand at least 200 pounds of force applied within 2 inches of the top edge in any downward or outward direction.
- Hole covers must be secured in place and be marked with the words "hole" or "cover" to provide warning of the hazard.
- If the floor hole doesn't have guardrails or hole covers in place, avoid the area and tell your supervisor immediately.
- If you are in a situation where you must work near a floor hole without the benefit of guardrails or hole covers, use a personal fall arrest system or positioning device system for fall protection.
- Holes that are too small for a person to fall through should still be covered to prevent tripping. The hole covers for smaller holes should also be secured in place and marked with the words "hole or "cover."

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Falls from Working Surfaces

#10

Not all falls occur from elevations. Plumbers are injured every year by falls from the same level on which they are working. Slipping or tripping on a substance or an item in the general work area are typically the causes of these falls. The ensuing injuries are usually due to forceful contact with equipment, tools or materials during the fall. Most of these falls are due to poor housekeeping on the job site.

- Make sure that your work boots are in good shape, fit properly and have soles that provide adequate traction.
- Make sure that grease spills and other slippery substances are cleaned up immediately with an absorbent material.
- Keep electrical cords out of walkways whenever possible. When doing so is impossible reduce the tripping hazard by securing the cord to one side of the walkway. Where the cord crosses a walkway use duct tape to secure it down to the surface.
- As you work, continuously pick up and discard all pieces of scrap pipe and other materials that are lying on the ground in walking and working areas.
- Store ladders in an upright position by leaning them up against a wall or vertical support member.
- Keep job site material storage areas organized. Pipe should be stored up off the floor on racks.
- Keep smaller hand tools off the floor by placing them back in your tool belt immediately after use.
- Move larger hand tools and power tools from the walking area as soon as you are finished using them. Don't leave them on the floor in any walking or working areas.
- Keep hangers, fittings, fixtures and other materials in buckets or other containers. Keep the containers out of walking areas and up against a wall in working areas.
- Make sure that welding and cutting hoses and welding leads don't present a tripping hazard. Keep them out of walkways whenever possible. Coil and remove them from working areas as soon as you are finished with them. Keep cylinders secured in an upright position.
- Make sure that even the small trip hazard floor holes are covered. The covers should be secured in place and marked with the works "hole" or "cover."

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Hazards from Electric Arc Welding

#11

The biggest hazard in arc welding is not from heat, sparks, fumes or intense infrared radiation, but from electrical current (electrocution).

- On most manual arc welding operations, the electric current ranges from 10 amps to 600 amps. Remember that it only takes 70 to 100 milliamps to kill most people and 70 milliamps are only a small part of one single amp.
- The trick is to keep yourself from becoming the easiest path to ground.
- Inspect the stinger leads for damage. There can be no damage in the first 10 feet of active stinger lead. Minimal lead damage elsewhere can be repaired with vulcanizing or heat shrinking kits.
- Always keep yourself insulated from the electrode and electrode holder, especially if you are wet from sweat or some other source. Use well insulated electrode holders and welding cables.
- Keep your clothes and hands as dry as possible. Use insulation between your body and the ground such as a welding mat, where possible. Cover or otherwise arrange the cables to prevent falling sparks from burning through the insulation.
- Avoid changing electrodes with bare hands or wet gloves.
- Ground the welding unit according to the National Fire Protection Association's National Electrical Code (NFPA 70).

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Ground Faults

#12

On August 2, 1999 a 62-year old plumber was working on a water pump at the bottom of a wet well. The circuits at the breaker box were improperly labeled and the plumber failed to test the pump for live current. The pump was not connected to a Ground-fault Circuit Interrupter and the plumber was electrocuted.

- Ground-fault Circuit Interrupters (GFCIs) can protect plumbers from many electrical hazards.
- If a plumber is standing on a wet or damp floor using a power tool with a damaged cord and comes into contact with the hot or neutral wire, he or she will become the easiest path to ground. The current will flow through the worker to ground.
- GFCI prevents some electrocutions by detecting a difference in the amount of current flowing between the source of electricity and the tool. If there is even a slight difference, it automatically shuts off the circuit.
- When a difference in current of 5 milliamps is detected, the GFCI trips the circuit in as little as 1/40th of a second.
- Most power tool receptacles are designed to trip at around 15 amps. But death from electrical shock can occur for most people at between 70 to 100 milliamps.
- Inspect GFCI-protected circuits regularly because, like any mechanical device, they could fail.
- Also, use GFCIs in conjunction with an assured equipment grounding conductor program because GFCIs won't detect line-to-line faults.
- In one case, a worker was electrocuted while using a power tool. The investigation showed that a drywall nail had been driven into a non-metallic cable, nicking the hot and ground wires. The ground wire became energized and the worker was electrocuted when he touched the metal casing of the power tool he had plugged into the outlet. GFCI was in use at the time; however, GFCI does not protect against line-to-line faults.

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Contact with Live Wires

#13

Electrical accidents are a leading cause of fatalities in plumbing. Train yourself to think constantly about electrical hazards while you are working.

- Typical overhead distribution lines carry 7,200 volts per line. Major transition lines carry 500,000 volts. Lines from a power pole to a residence carry 110 volts each. Even one residential line carries much more electrical current than is needed to kill a person.
- Electricity always takes the easiest path to ground so you must keep yourself from becoming that path.
- If you have to work where pipes, ladders or any other conductive material could contact a power line, cut off the power or have it cut off, if at all possible. Make sure that access to the power switch is locked out so it can't be inadvertently turned on while you are working.
- If power can't be cut off, the power company can put insulators over power lines where there could be an exposure.
- Remember that the weather insulation on power lines is not designed to insulate you from electrical current. Avoid all contact with power lines.
- Remind everyone working around you about the electrical hazards. A coworker could unintentionally charge the work area around you and expose you to the current.
- Assume that all wires are live wires and treat them accordingly.

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No Grounding

#14

On March 27, 1997 a 48-year old plumber was replacing water pipes in an existing apartment building. He was using a trouble light as an extension cord. He placed the trouble light on an aluminum ladder. The metal-shielded, defective trouble light energized the ladder. The plumber was electrocuted when he rested his head on a copper water pipe while simultaneously touching the ladder. The investigation showed that the ground prong had been removed from the trouble light plug.

- Electrocutions are a leading cause of fatalities in our industry. Many of them occur because electric power tools and equipment are not properly grounded.
- Electricity always attempts to travel to ground, takes the path of least resistance and travels at the speed of light (186,000 miles per second).
- When working with electric power tools and equipment, you can ensure that the current has a safe, easy, path to ground. If you don't, the easiest path to ground may be through your body, causing severe injuries or death.
- Inspect the plug each time you prepare to use a tool or piece of equipment. If the tool or equipment has a two-prong plug, it is probably double insulated. Look for writing on the equipment that tells you it is double insulated. If there is no writing, look for the square inside the square symbol. Either of these techniques assures the user that the tool is double insulated. If you are not sure, don't use the tool. Report to your supervisor immediately.
- If the tool or equipment has a three-prong plug and one of the prongs has been removed, do not use it. Take it out of service immediately and ensure that it stays out of service until the plug is replaced by someone qualified to do it properly.
- Keep a circuit tester with you and check each receptacle that you plan to use to be sure they are properly grounded. Testers are easy to use. If a circuit tester indicates that the receptacle is not grounded, do not use it. Report it to your supervisor immediately.
- When using a portable generator, ground it properly before you start work.
- Always use Ground Fault Circuit Interrupters (GFCIs) for added protection against ground faults, especially in wet or damp environments.

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Conductive Ladders

#15

Out of 50 construction-related electrocutions reported to OSHA in 1996, 8 of them were the result of workers contacting overhead power lines with metal ladders.

- Metal ladders are excellent conductors of electricity.
- If you are touching an energized metal ladder, your body may become the easiest path to ground and cause electric current to flow through your body to ground.
- Use non-conductive ladders whenever possible where the potential for contact with live wires or other sources of electricity exists.
- Non-conductive ladders are made out of fiberglass or plastic.
- Non-conductive ladders are recommended for use around electrical hazards.
- Wooden ladders are also non-conductive, as long as they are not wet.
- Wet, wooden ladders are conductive and can be just as deadly as metal ladders if they are placed in contact with a source of electricity.

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Damaged Power Tools and Equipment

#16

On August 20, 1998 a 39-year old plumber was using an electric drill to power a metal snake through a clogged pipe. The drill was not insulated and the cord was damaged. The drill became energized and the plumber became the easiest path to ground. He was electrocuted.

- Each year in the United States there are more than 20,000 electrical accidents and 700 deaths related to electricity. Many of them occur as work-related deaths in plumbing.
- A significant number of those plumbing fatalities are due to working with damaged electrical tools and equipment.
- Electrical tools can be extremely hazardous if they are damaged enough to cause the user to contact exposed live wires.
- Inspect each tool carefully before you use it. If there are cracks, cuts or abrasions on the cord, take the tool out of service until it can repaired by a person qualified to do so properly. Don't try to fix it yourself.
- If the casing of a tool is broken or cracked anywhere, discard the tool in such a way that it won't be used by others.
- Check the plug carefully, too. If the plug is the three-prong type and a prong is missing, take the tool out of service until the plug is properly replaced.
- Before using the tool, check the area carefully for objects with sharp edges and other areas where the cord could be pinched, scraped or cut. Avoid these areas whenever possible. If you can't avoid them, take whatever measures are necessary to protect the cord.
- Store electric power tools in a waterproof toolbox when they are not in use. Remember that the cords and other parts of tools become weather beaten if not stored properly and insulation can rot away, exposing the wires.
- Avoid using all electrical powered tools in wet or damp locations without ground fault circuit interrupters. Never allow a power tool cord or extension cord to lie in a puddle of water.

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Improper Handling of Materials

#17

Improper manual handling of materials is a leading cause of nonfatal injuries in plumbing. Plumbers can eliminate these injuries by remembering and following a few simple safety concepts.

- Before moving materials, check to see whether there is material handling equipment available. If so, don't move the materials by hand. Use the equipment instead.
- If materials must be moved by hand, make an assessment as to how heavy and bulky they are. If you can't handle them easily by yourself, get help from one or more coworkers.
- When lifting materials, always use proper lifting techniques. Keep the object as close to your body as possible. Keep the natural curves in your back by keeping your butt down and your head up. Lift with your legs and avoid twisting your back while you lift and carry the materials.
- Be aware of situations where your hands could get pinched or crushed between materials such as rolling pipe.
- Be aware of sharp edges. Protect your hands by wearing leather gloves.
- Watch carefully for hazards that could make you slip, trip, or fall while moving materials. Remove the hazards or carefully go around them.
- If you are moving materials overhead, such as stacked tubing, always wear your hard hat.
- Wear steel toed boots or shoes if heavy materials could roll or be dropped onto your feet.

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Improper Lifting Techniques

#18

Most back injuries that occur while performing plumbing work are from improper lifting techniques. By following a few simple steps, you can protect yourself from back injuries.

- Many back injuries can be prevented by stretching the back muscles before you begin work. This is particularly true if you have to lift heavy objects during the day. Remember to re-stretch following lunch or long break periods. Suggested stretching exercises follow.
- **Stretching upper back**—Stand erect with your hands in front of your thighs and palms facing your body. Lift your hands toward your chin while exhaling. Keep elbows pointed out. Hold the position for a moment and slowly lower your hands. Do 2 sets of 12 with a minute rest between sets.
- **Stretching middle back**—Stand erect and raise your shoulders toward your ears. Hold the position for a moment and slowly lower your shoulders. Do 2 sets of 12 with a minute rest between sets.
- **Stretching lower back**—Get on your hands and knees and allow your back to sag. Arch your back upward like a cat and bend your head forward. Hold the position for a moment and slowly return to the starting position. Do 2 sets of 20 with a minute rest between sets.
- Before moving any materials or equipment, assess their weight as best you can. If there is any question in your mind about your ability to easily move them, don't go it alone. Get help from a coworker.
- When preparing to lift an object, whether you are by yourself or getting help from a coworker, follow these steps:
  —get a firm grip on the object;
  —get your body as close to the object as possible;
  —keep the natural curves in your back by keeping your butt down and head up; and
  —lift with your legs.
- Once you have the object up in the air be sure not to twist your back. Move your whole body and keep the natural curves in your back.

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PCA Toolbox Safety Talks

Flammable and Combustible Liquids

#19

Plumbers often have to work around flammable and combustible liquids. Flammable liquids can easily ignite at temperatures below 100 degrees Fahrenheit. Combustible liquids won't easily ignite until temperatures get to 100 degrees Fahrenheit or higher.

- Flammable and combustible liquids used in plumbing can be very hazardous, especially since there are so many potential sources of ignition such as electrical sparks, flames from acetylene cutting torches, propane torches, brazing operations, cigarettes, etc.
- Common flammable and combustible liquids used in plumbing include petroleum products, benzene and other cleaning solvents.
- Whenever possible, substitute non-flammable/combustible liquids for flammable or combustible liquids that do the same job. Eliminating the hazard is the best option.
- When you can't substitute, keep the quantities of flammable/combustible liquids as small as possible. Keep only the amount you will use right away.
- Keep these liquids in containers designed specifically for their use. Metal safety cans with self-closing lids and flash arrestors that are UL approved are a good choice.
- Every container should be properly and clearly labeled so workers won't unintentionally use the wrong liquid. For example, don't use a container labeled for gasoline to store a cleaning solvent. Doing so could lead to a hazardous situation.
- Be constantly aware of the location of these liquids in relation to sources of ignition. Keep them well away from ignition sources even though they are in approved containers.
- Static electricity can be a source of ignition. When transferring one of these liquids from a drum to a smaller container protect yourself from this ignition source by grounding the drum first. Then bond the drum and container by attaching a conductive wire from the drum to the container.

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PCA Toolbox Safety Talks

Flammable and Explosive Gases

#20

Flammable and explosive gases are prevalent in plumbing work. Gases burn at different rates of speed depending upon the type of gas and several environmental factors. When flammable gases burn at accelerated rates of speed, explosions occur.

- The most common fuel gases used in our business are propane, butane and acetylene.
- Because there are so many potential sources of ignition in our work, it is vital to keep fuel gases from being released into the air.
- Uncontrolled burning gases are serious hazards, as are gases that become explosive.
- An explosion is nothing more than rapidly accelerated combustion. Oxygen added to burning gases rapidly accelerates the rate of combustion and can lead to an explosion.
- Think about how the burning of acetylene intensifies when oxygen is added to the gas. If the right amount of oxygen mixes with a flammable fuel gas and the mixture is ignited, an explosion will occur.
- Even though oxygen by itself is not flammable, it should be treated like other fuel gases. Avoid releasing it into the air around you.
- Be especially careful to keep oxygen from coming into contact with oil, grease or other petroleum-based substances.
- Fuel gases and oxygen must be stored properly. For example, propane should not be stored inside a building. Ask your supervisor about proper storage.

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PCA Toolbox Safety Talks

Explosions

#21

Exposure to explosives in plumbing is minimal, but we do have exposure to a number of flammable substances including gasoline, benzene, cleaning solvents, propane, butane and acetylene. When vapors from any of these substances get mixed with the right amount of oxygen and an ignition source, an explosion will occur.

- Plumbers are sometimes killed by explosions. However, explosions can easily be prevented by keeping ignition sources away from explosive substances.
- Remember that oxygen, by itself, is not flammable or combustible but it does rapidly accelerate the rate of combustion. Keep oxygen from releasing into the air around you by keeping oxygen cylinder valves tightly closed when not in use.
- In confined spaces, the release of flammable liquid vapors or gases and the right amount of normal breathing air can be hazardous. If the mixture is just right and there is an ignition source, an explosion will occur.
- Keep all flammable substances away from ignition sources and sources of oxygen. And keep only small quantities of flammable liquids on hand. Store them in approved containers.
- Keep oxygen and acetylene cylinders separate when they are not being used. Store them at least 20 feet apart or keep a 5-foot high, 1/2-hour rated, noncombustible barrier between them.
- Make sure the valves on fuel gas cylinders are closed tightly when you finish working with them. Also, inspect the valves and pressure gauges for leaks before and after you use the cylinders. If you find a leak, warn others to keep ignition sources away from the cylinder and report the problem to your supervisor immediately.
- Remove gauges and hoses when work is completed.
- Replace the valve protection caps on gas cylinders as soon as you are finished using them for the day or if you must transport them to another location.

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PCA Toolbox Safety Talks

Carbon Monoxide

#22

On May 9, 1999 a 27-year old plumber was sitting in a pickup truck inside his company's garage with the motor running. Ventilation inside the garage was inadequate because the garage door had not been opened. The plumber was overcome by carbon monoxide and died from asphyxiation.

- Carbon monoxide (abbreviated CO) is a colorless, odorless, tasteless gas. It is produced by any process where fossil fuels such as gasoline, diesel fuel, propane and home heating oil are burned.
- If you ever feel dizzy, nauseous, or get a headache while working near a source of CO, assume that there is a CO problem and get to fresh air immediately. Alert everyone else who could be exposed to stay out of the area. Shut off the source of CO only if you can do so without being exposed. Otherwise call the local fire department for help. Firefighters will enter the area with self-contained breathing apparatus.
- If you are working where carbon monoxide is being produced, make sure the area you are working in has good ventilation. For example, if you are in a poorly ventilated space and plan to use a propane torch, install a temporary ventilation system before you light the torch.
- Also, when you are working in trenches or excavations, remember that CO is only slightly lighter than air. If there is equipment operating close by, like a backhoe or a loader and conditions are right, the CO may accumulate in the trench or excavation and you may be overcome by the gas.
- Be sure that all vehicles in your work area have well maintained exhaust systems.
- Be especially alert when working on a job site where other trades are present. They may not be aware of CO hazards and you may be exposed.
- If a coworker is overcome by CO, move the coworker to fresh air away from the CO source. If you know how to administer mouth-to-mouth resuscitation and CPR, do so if needed. Call Emergency Medical Services for help.

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PCA Toolbox Safety Talks

Contact with Acids

#23

When you work around acids, be aware of the potential hazards and protect yourself from the hazards.

- Acids are chemical compounds. The acids you are most likely to encounter on your job sites are:
  - —Electrolyte Corrosive (battery acid)
  - —Sulfuric Acid
  - —Muriatic and Hydrochloric Acid
  - —Nitric Acid
  - —Perchloric Acid
  - —Hydrofluoric Acid
- The major hazards associated with acids are burns to the skin and eyes, lung damage, other respiratory system problems and fire. Prevent dangerous reactions by avoiding adding water to an acid. Always read the warning labels on acid containers.
- Check the Material Safety Data Sheet (MSDS) for the acid to which you may be exposed. Check specifically for the types of hazards that may be present. Find out about the appropriate types of personal protective equipment needed and what to do if you or a coworker come into contact with an acid.
- Make sure the area you will be working in has adequate ventilation.
- Personal protective equipment is always required for work with acids. At a minimum, wear splash-proof goggles and gloves designed specifically for use with acids.
- If acid gets into your eyes or those of a coworker, flush the eyes immediately with water and get emergency medical assistance promptly. Acid on the skin should be washed off immediately with water, as well.
- Respiratory protection may also be required, depending on the type of acid and the amount of ventilation in the work area.
- You may want to use a face shield and an impermeable apron or bib. If you get acid on your clothes, immediately remove them and rinse the exposed area thoroughly with water.
- If an acid fire occurs, immediately evacuate and call the fire department.

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PCA Toolbox Safety Talks

Asbestos

#24

Asbestos is a widely used, mineral-based material that is resistant to heat and chemical corrosion. Prior to 1980, it was used in the production of building materials such as pipe wrap, boiler wrap, ceiling tiles, floor tiles, insulation and wall board. Asbestos can be harmful to plumbers if it is inhaled or swallowed.

- Asbestos fibers are lightweight and become airborne with the slightest movement of the air around them. The fibers are harmful while airborne because they are too small to see and are easily inhaled and swallowed.
- Plumbers may be exposed to airborne asbestos fibers when working in older buildings where pipe wrap, boiler wrap and other building materials become friable. This means that the materials are so worn that they easily crumble, sending the lightweight fibers into the air.
- Workers who are exposed to asbestos can suffer adverse health effects such as the lung disease called asbestosis or cancer of the lungs, esophagus, stomach, colon and rectum. It may take 15 to 40 years following the exposure before symptoms appear.
- Smokers are 90 times more likely to get lung cancer than non-smokers with the same exposure to asbestos.
- While performing plumbing work in existing buildings, beware of construction materials that may contain asbestos.
- If there are friable building materials in your work area and you believe they could contain asbestos, stop working in the area until a qualified person can determine whether there is exposure to airborne asbestos fibers. If there is no exposure, it is safe to resume work as usual.
- If there is exposure to asbestos in your work area you may be required to use respiratory protection. If so, your employer will see to it that you get the proper training and equipment to do your work safely.

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PCA Toolbox Safety Talks

Heat Stroke

#25

- Plumbers are often exposed to extreme heat. Working in confined spaces, hot buildings or on roofs in the hot sun can be very hazardous.
- The worst potential hazard is heat stroke which is a life threatening condition. Heat stroke occurs when the body loses its ability to sweat (the first sign of heat stroke is failure of the body to sweat). The body must sweat to keep its temperature within the normal range.
- When heat stroke occurs, the body temperature can get so high that brain damage and death can occur fairly quickly.
- Symptoms of heat stroke include hot, red skin, very small pupils and very high body temperature.
- To protect yourself from this hazard, take frequent breaks in a cool shady place.
- Drink plenty of water each time you break.
- Choose lightweight clothing with breathable fabric if your type of work allows it. Avoid dark clothing, which absorbs heat.
- If you are wearing heavy protective clothing to complete a task, do the work early in the morning or later in the afternoon to avoid mid-day heat.
- If you see any coworker exhibit heat stroke symptoms, send someone to call for Emergency Medical Services. Place the worker on his or her back in a shady place and apply cool water or cool wet towels. Prop the worker's feet up 8 to 10 inches above the ground to treat for shock.

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PCA Toolbox Safety Talks

Heat Exhaustion and Heat Cramps

#26

Plumbers are frequently exposed to hot environments while working. Although they are not initially life threatening, they can lead to more serious problems.

- Symptoms of heat exhaustion include pale and moist skin, heavy sweating, dilated pupils, headache, nausea, dizziness and vomiting.
- When you are working hard in a hot environment and your body is working properly, you are sweating heavily to cool your body. The loss of fluid in your body causes blood flow to slow, which could result in a form of shock.
- Protect yourself from heat exhaustion by keeping fluids in your body. Drink water frequently throughout the day. Take breaks to cool down and replace body fluids.
- If a coworker shows any symptoms of heat exhaustion, get the victim to a cool place and call for Emergency Medical Services. Treat for shock by placing the victim on his or her back and prop the victim's feet up 8 to 10 inches above the ground.
- Cool the victim by loosening his/her clothing, fanning and placing cold packs on top of the clothes. If the person is fully conscious and can safely drink, give the victim 1/2 glass of water every 15 minutes.

Heat cramps are muscle spasms from heavy exertion. The cramps are usually in the stomach or legs.

- Protect yourself from heat cramps by keeping plenty of fluid in your body. Drink water frequently throughout your workday.
- If you or a coworker show signs of heat cramps, get to a cool place. Drink 1/2 glass of salt water every 15 minutes for an hour. The recommended mixture is 1/4 teaspoon of salt mixed with one quart of water.

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PCA Toolbox Safety Talks

Hypothermia and Frostbite

#27

As plumbers we are often exposed to cold conditions, especially during the winter months. There are two potential hazards associated with cold conditions. They are hypothermia and frostbite.

- The environment does not have to be extremely cold for workers to suffer from hypothermia. Hypothermia results from the loss of body heat. It can occur even when the temperature is well above freezing. Symptoms of hypothermia include shivering, apathy, loss of consciousness, decreased pulse rate and decreased breathing rate. Death can occur, as well. Protect yourself from hypothermia by dressing properly. Whenever you will be exposed to cold for any period of time, wear warm clothes and pay attention to your body.
- Remember that most body heat escapes from the head, underarms and groin area. Block the heat from escaping in these areas and dress in layers so you can remove some clothes when you get hot and put them back on when you start to get cold. If you start to shiver uncontrollably, get out of the cold. Warm back up and then return to work. Eating nourishing food will help keep your body warm, too.
- Avoid getting wet, especially when dressed in cotton clothing. Wool provides much better insulation even when it's wet.
- If a coworker shows signs of hypothermia, immediately call for emergency medical services. Get the victim out of the cold and warm his or her body quickly. Don't give a victim food, drink or tobacco products.

Frostbite occurs in freezing weather. Frostbite results from ice crystals forming in body tissue, usually on the ears, nose, cheeks, chin, fingers or toes. The symptoms of frostbite are slightly flushed skin (first sign), white or grayish yellow skin and, finally, bluish gray skin. Pain is usually felt at first, but may go away.

- To protect yourself from frostbite, keep your ears, nose, cheeks, chin, fingers and toes covered with warm clothing when exposed to freezing temperatures. Anytime a body part gets so cold that it starts to hurt, get out of the cold. Get warm and then go back to work.
- If you or a coworker show signs of frostbite, get to a warm place. Place the frozen body part in warm water (not hot). Call a health care provider.

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PCA Toolbox Safety Talks

Hazardous Substances

#28

Plumbers are exposed to chemical substances on a daily basis. The chemicals are needed for us to successfully complete our work and they are safe to use when used properly. However, if they are not used properly, they can become extremely hazardous and result in the permanent loss of health and possibly death.

- If you are working around any chemical substances in the form of gases, mists, vapors, fumes, particles, liquids, solids or any other form, you have the right to know what hazards are associated with those substances.
- Check the label on the substance you are concerned about. If there is not enough information on the label, check the Material Safety Data Sheet (MSDS) to find out what the hazards are and how you can protect yourself from the hazards.
- The three primary ways workers get hazardous substances into their bodies are by inhaling them, swallowing them or absorbing them through their skin.
- You need to know how the substances can enter your body to know how to protect Yourself.
- If a substance presents an inhalation hazard, you may need special ventilation or may need to wear a respirator.
- If a substance can be swallowed, you will need to keep food and drinks away from the work area and wash yourself thoroughly before eating or drinking.
- If a substance can be absorbed through the skin, you will have to keep the substance off your skin by wearing protective clothing and gloves.
- The label and MSDS will give you all of this information. Follow their instructions carefully and you should have adequate protection.
- If you are not sure about any substance, check with your supervisor.

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PCA Toolbox Safety Talks

Working Under the Influence of Alcohol or Drugs

#29

Being under the influence of alcohol or drugs temporarily changes people's behavior. The changes are both psychological and physical. These changes cause individuals to do things that they wouldn't ordinarily do or make them forget to do the things they should do. These individuals are much more likely to be involved in a job site accident.

- Remember you can come under the influence of illegal drugs, alcohol, some prescription drugs and some non-prescription drugs.
- The psychological and physical changes that take place while under the influence include the following:
  - —Changes in the way you ordinarily think.
  - —Difficulty in concentrating on what you are doing.
  - —Losing your ability to make good judgements.
  - —Slowing of reflexes.
  - —Loss of depth perception.
  - —Changes in sleep patterns so you are unlikely to get the sleep you need.
- Remember that you can still be under the influence for many hours after taking a substance. For example, if you drink heavily on a work night, you will probably still be under the influence of alcohol when you start work that morning.
- How long you are impaired depends on what you are using, the amount you use, your body weight and what other substances you have in your body.
- Some over-the-counter and prescription drugs cause severe impairment when mixed with alcohol. It may take several hours or more before the effects wear off.
- Now that you know about the effects of drugs and alcohol on the human mind and body, would you want to be performing a hazardous task with coworkers who are under the influence of drugs or alcohol? Neither would they.

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PCA Toolbox Safety Talks

Working Under the Influence of Fatigue

#30

Plumbers tend to work long, hard days and are frequently working in environments that increase worker fatigue. Heat, cold, loud noise and other environmental factors help contribute to fatigue. Also, with today's work schedules, chores, errands, and many other obligations, most Americans average only seven hours of sleep each night. One third of the population averages only six hours of sleep each night. Sleep requirements vary from person to person, but most people need eight hours of sound sleep each night to be properly rested the next day.

- When plumbers are working while fatigued they are less alert, less productive, less efficient, more prone to making errors in judgement and more prone to accidents and injuries.
- Make sure you are rested when you come to work each day.
- Try to get a solid eight hours of sleep each night.
- When you feel yourself starting to get tired at work, be aware that you are not as alert as you are when you are rested.
- Take the breaks you are allotted throughout the day.
- Get off of your feet for awhile.
- Sit down in a quiet comfortable place and rest until it's time to return to work.
- Try to complete the more hazardous tasks earlier in the day whenever possible.
- Never attempt a hazardous task when you have reached the point of exhaustion. Wait until you are rested.
- Know yourself. . .don't push your own limits.

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PCA Toolbox Safety Talks

Airborne Pathogens

#31

Pathogens are microorganisms that cause disease in humans. Plumbers can be exposed to airborne pathogens in certain environments. However, we can easily protect ourselves from the airborne pathogens that we are most likely to encounter while engaged in plumbing work.

- The diseases that are most likely to affect plumbers through airborne pathogens are Legionnaires disease and tuberculosis.
- Legionnaires disease comes from bacteria called Legionella, which has been found in and around plumbing systems.
- If you are working in an area where moisture, oxygen and algae (slime) are present in temperatures between 50-140 F, Legionella may be present.
- Since Legionella is transmitted only by aerosol mist you can protect yourself from exposure by using a respirator.
- Talk to your supervisor before using a respirator. Doing so requires special training, fit testing and a careful respirator selection process.
- Tuberculosis is a concern for plumbers working in areas of buildings that could contain aerosolized tuberculosis. Examples of places where tuberculosis may be present include hospitals, homeless shelters, nursing homes, drug treatment centers, correctional facilities and hospices.
- If you are planning to work in an area where tuberculosis may be present you can protect yourself with the proper respiratory protection.
- Again, talk to your supervisor before using a respirator. Doing so requires special training, fit testing and a careful respirator selection process.

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PCA Toolbox Safety Talks

Bloodborne Pathogens

#32

Bloodborne pathogens are microorganisms present in human blood that cause diseases in humans. Plumbers can be exposed to bloodborne pathogens while performing plumbing work in certain environments. However, we can protect ourselves by preventing contact with human blood, urine, mucus and saliva.

- The diseases that are most likely to affect plumbers through exposure to bloodborne pathogens are hepatitis B (HBV) and human immunodeficiency virus (HIV), which causes acquired immune deficiency syndrome. (AIDS).
- To protect yourself from these diseases treat all blood and body fluids as if they are infectious.
- If you are attempting to help an injured worker, make sure you are wearing the proper personal protective equipment.
- At a minimum you should wear rubber gloves and goggles designed specifically to protect the user from exposure to bloodborne pathogens.
- A breathing mask with a one way valve should also be used if mouth-to-mouth resuscitation is required.
- The personal protective equipment should be readily accessible.
- Also, wear rubber gloves and a full-face shield when you are working in areas where blood and body fluids could be present. Examples are plumbing drainpipes, (especially those in hospitals, urgent care clinics, funeral homes, etc.) and waste water treatment plants.
- If you come into contact with blood or body fluids you should consider getting a hepatitis B vaccination within 24 hours following the exposure. Your employer is required to provide the vaccine if you decide to get one. Contact your supervisor immediately when there is an exposure.

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PCA Toolbox Safety Talks

Aggressive Driving

#33

The leading cause of all occupational fatalities each year is roadway vehicle collisions. There are so many other hazards to think about that we forget how hazardous a road trip can be. Whether you are traveling from one job site to another or just leaving the job site for lunch, don't forget to drive defensively, not aggressively.

- Defensive driving means anticipating what other drivers are going to do and adjusting your driving to avoid a collision. For example, it's usually fairly easy to tell when another driver is going to cut in front of you from another lane. When you see it about to happen, slow down and let the driver in.
- Always buckle up, even for short trips. The impact of being struck by another vehicle doesn't change just because you are only driving a few blocks.
- Obey the speed limits. Even a five mile an hour collision will make your head whip back sharply. The faster you go, the more force your body will have to endure if there is a collision.
- Remember that heavier vehicles take longer to stop than lighter vehicles. A truck or van loaded with materials will take several seconds longer to stop than the same empty truck or van going the same speed.
- Adjust your speed and driving habits based on weather conditions. It takes longer to stop on wet roads and even longer to stop on icy roads. Be especially careful on bridges and overpasses when the temperature is at freezing or below.
- Leave several extra vehicle lengths between your vehicle and the vehicle you are following. Remember it will take a few seconds for you to react to what is happening ahead.
- Obey all traffic rules and regulations. Watch carefully for signs and read each of them as you go. Don't drive any vehicle unless you know it is in good mechanical condition.
- Avoid driving aggressively. Aggressive drivers are dangerous.

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PCA Toolbox Safety Talks

Improper Use of Pipe/Ladder Racks

#34

Plumbing work requires the transportation of pipe, ladders and other materials on vehicles equipped with special racks. Improperly installed racks or materials improperly secured to the rack can be extremely hazardous to others on the road.

- Make sure the racks are securely bolted in place. Use lock washers to keep the nuts from vibrating loose.
- Check the rack frequently to make sure it is secured in place.
- When using a pickup truck, install a steel grate over the back window to keep objects from flying through it during a collision or sudden stop.
- Install safety stops on racks for vans and pickups.
- Avoid overloading the racks with too much material.
- Avoid stacking the load too high in the rack. Place the load so the tie-downs will work effectively.
- Use nylon straps with ratchets, chain binders or come-alongs as tie-downs to secure the load to the rack.
- Use as many tie-downs as you need to effectively secure the load.
- Recheck the security of the tie-downs before you begin.
- Secure ladders to the rack in the same way.
- Use warning flags to mark the end of pipes, ladders or other materials sticking out over the back of the rack. This helps to alert other drivers and pedestrians as well.

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PCA Toolbox Safety Talks

Job Site Vehicle Traffic

#35

A major concern for all plumbers on construction sites is job site vehicle traffic. Each year, plumbers are killed by construction vehicles while working or passing through job site traffic areas. The vehicles involved in these incidents include trucks, backhoes, earthmovers, bobcats, aerial lifts, scissors lifts and forklifts.

- After working for a period of time, all of us get desensitized to the sounds around us. We still hear the sounds subconsciously, but don't think consciously about where they are coming from. This phenomenon frequently causes harmful incidents to occur on construction sites.
- Train yourself to listen consciously the whole time you are working for traffic sounds like engines running, backup alarms and vehicles braking.
- Choose a path to your work area that will expose you to the least amount of vehicular traffic.
- Watch constantly for changing traffic patterns and change your route as necessary to avoid heavy traffic areas.
- Store pipe, hangers and other materials as close to your work area as possible and as far away from heavy traffic areas as you can. Whenever possible arrange it so you won't have to pass through heavy traffic areas to retrieve your materials.
- When you are working in areas where traffic includes vehicles such as forklifts, aerial lifts and scissors lifts, make contact with each operator. Make sure the operators know where you will be working and what you will be doing throughout the day.
- Wear bright colored clothing especially when working in dark buildings.
- Reflective tape on your clothing or reflective stickers (approved specifically for hard hats) on your hard hat will help operators see you much more quickly in dark areas.
- If you witness vehicles operated by any of the trades that have broken back-up alarms, headlights, taillights, back-up lights, turn signals or horns, tell your supervisor immediately. This seemingly insignificant action will help save lives.

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PCA Toolbox Safety Talks

Heavy Construction Equipment

#36

On October 4, 1999 two plumbers were installing a waterline in a trench. The plumbers determined that they did not have enough room in the trench to complete an assembly. They placed the pipe in the bucket of a backhoe to remove it from the trench. The backhoe bucket unexpectedly swung hard to the left striking the 47-year old plumber and pinning him against the side of the trench. He was killed by the impact of the bucket against his body.

- Heavy equipment on construction sites can be deadly because it is difficult for the operators to see and hear everything that is going on around them.
- Make sure equipment operators know where you are at all times when you are working around heavy equipment.
- Communicate with the operator by hand signals or portable radios. If necessary use a coworker to exchange signals with the operator.
- Be sure that the operator acknowledges your presence before you begin working.
- While working, be conscious of the equipment around you.
- Think ahead about the potential hazards like swinging booms, buckets and materials rigging.
- Whenever possible, position yourself outside of the hazard area and always leave yourself a quick way out.
- Ask operators to place forks and heavy equipment buckets firmly on the ground before you start to load or unload them.
- Always stay out from under crane, forklift and bucket loads.
- Train yourself not to get desensitized to the sounds made by heavy equipment. Always be conscious of the potential heavy equipment hazards around you and avoid them.

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PCA Toolbox Safety Talks

Eye Injury Hazards

#37

Eye injuries are more common in the mechanical trade than in any other trade. Within the mechanical trade, plumbers suffer the most eye injuries. Common eye injuries that plumbers face are scratches to the sclera (white of the eye), abrasions and lacerations to the cornea and contusions of the iris, lens, retina or optic nerve from the force of a blunt object. Others include scarring of the cornea from chemical burns and inflammation of the cornea from ultraviolet radiation (welder's flash).

- One of the two most important eye injury prevention techniques is to use safety eyewear whenever there is potential for exposure to an eye hazard. The other is to choose the most appropriate type of safety eyewear for the job at hand. Always ensure that the safety eyewear you plan to use is designed to protect you from the specific eye hazards you will face.
- For protection against impact from flying particles generated by grinding, chipping, drilling, overhead work, etc., use safety glasses that are shaped to protect the eye from the top, bottom and sides, as well as from the front. Impact-resistant safety goggles are another option for impact protection.
- For protection against chemical eye hazards such as acids and caustics, use splash-proof chemical safety goggles.
- When using a cutting torch, wear shaded goggles with #5 shaded lenses. Make sure the goggles are specifically designed for protection against the cutting torch flame, sparks and flying particles.
- When welding, attach a shaded filter plate to your helmet. The shade of lens you will need depends on the type of welding you will be doing. The shade of lens needed for electric arc welding is based on the type of welding you will be performing, size of the electrode you will be using and the amount of electrical current being generated. You will need a #10, #12 or #14 shaded lens.
- The lens you will need for gas metal arc welding is based only on the arc current being generated. You will need a #11, #12 or #14 shaded lens.
- If you are not sure about the correct shade of lens you will need for welding, check with your supervisor before you start work.
- Whenever possible, use a flame resistant screen around your welding area. The screen will help protect the eyes of other workers in the area.
- Be sure to use protective eyewear when brazing too. Use #3 or #4 shaded lenses for brazing operations.

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MCAA PCA Toolbox Safety Talks

Uncontrolled Sources of Energy (Lockout/Tagout)

#38

Unprotected sources of stored energy can be very hazardous to plumbers. Examples of stored energy that may be encountered in plumbing work include:

—electrical (such as panel boxes);
—hydraulic (such as an aerial lift);
—pneumatic (such as an air compressor); or
—thermal (such as steam lines).

- Plumbers can be protected from these hazards if the sources of energy are locked out and tagged out. Lockout means that the source of energy can't be turned on because a locking device has been placed on the switch, lever, valve, etc. Tagout means there is a warning tag attached to the energy source controls to stop others from activating the source of energy.

  If a plumber has to perform maintenance or repair on any process with stored energy, it should be locked out or tagged out before work begins. Only qualified plumbers should engage in the lockout/tagout process.

- Electricity should be locked out or tagged out at the panel box.

- Steam, hydraulic and air-line systems should be shut off and bled out. Otherwise even when the valves are in the off position, there is still hazardous energy stored in the pipes. The valves should be locked out or tagged out.

- Only the person who locked out or tagged out a source of energy should remove the lock and tag.

- Always make sure your procedures comply with your company's lockout/tagout program.

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PCA Toolbox Safety Talks

Poor Housekeeping

#39

Poor housekeeping on the job site is a frequent cause of workplace accidents and worker injuries. These types of accidents can easily be prevented by keeping the workplace clean. Good housekeeping makes jobs more efficient and safe.

- Many of the injuries that occur from poor housekeeping are caused by materials, scrap, debris and trash left lying around the job site.
- Anything left lying around becomes a slipping or tripping hazard.
- Keep all of the materials stored on the job site in a neat and orderly way.
- Clean up scraps, debris and trash as the work progresses.
- Focus on keeping walkways, ramps, ladder platforms, scaffolds and stairways free from excess materials, scrap and debris.
- When you are not using tools and equipment, don't leave them lying around.
- Put tools away in your van or truck as you finish with them.
- Keep hoses, power cords and welding leads from lying in or across heavily traveled areas.
- Keep mud and other slick substances off walkways, ramps, ladders, platforms, scaffolds and stairways.
- If you see slippery surfaces while you are working, clean them up with an absorbent material.
- Throw away greasy, oily rags and other flammable materials in approved storage containers.
- Remember that a clean job site is always a much safer place to work.

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Confined Spaces

#40

On September 10, 1999 a 44-year old plumber entered a utility vault to access existing waterlines. The vault was 9 feet deep. The plumber was found dead inside of the vault by a coworker. The atmosphere inside the vault was tested to determine the cause of death. The results showed that only 14 percent of the air inside the vault was made up of oxygen. The plumber had died from lack of oxygen.

- The primary hazards in confined spaces are lack of oxygen, the presence of toxic gases or vapors and flammable or explosive atmospheres. Never trust your senses to detect lack of oxygen or toxic substances. Human senses can't detect lack of oxygen or toxic gases and vapors which are odorless and tasteless.
- Avoid entering a confined space until you know it has been tested by someone qualified to do so.
- If you have to work in a confined space that may lack oxygen or contain toxic or harmful substances, don't enter until you receive the proper training.
- Do as much work as possible outside the space to limit the time inside and ventilate the space as well as possible.
- Make sure pipeline valves are off and locked or tagged out before entering.
- If you have to do welding, cutting or brazing inside a confined space, you are creating a hazardous atmosphere. Be sure to use an adequate ventilation system.
- Sometimes conditions in confined spaces change while you are working. There should always be an attendant outside the confined space who is in constant contact with the worker inside. The attendant should be properly trained in confined space rescue procedures.
- If a coworker collapses in a confined space, do not attempt to enter the space. Call Emergency Medical Services for a trained rescue crew.

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Missing Portable Tool Guards

#41

Tool guards are devices attached to tools to protect the user from the tool's point of operation. The point of operation is the area on the tool where the work is actually being performed.

- Guards protect the user from rapidly moving parts such as abrasive wheels, wire brushes and saw blades.
- Guards also protect the user and others in the area from flying fragments and sparks.
- The guards are designed specifically to protect the user. However, they are frequently removed from tools because they seem to get in the way of the work.
- Plumbers are frequently injured when the tools they are using have missing or improperly adjusted tool guards.
- Never remove a tool guard except to clean the tool. Make sure the power source is shut off. Then clean the tool and immediately replace the guard. Avoid using materials to wedge guards open.
- Before you use the tool, make sure the guard is adjusted properly. The manufacturer's instruction will tell you how the guard should be adjusted.
- On grinders, the guard should cover the spindle end, nut and flange projections.
- If you find portable tools with missing or defective guards, take them to your supervisor immediately.
- Only use attachments such as abrasive wheels, wire brushes, blades, etc. that are designed specifically for the tool being used. Never modify an attachment to fit and never use off sizes.

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PCA Toolbox Safety Talks

Welding and Hot Metal Hazards

#42

There are a significant number of occupational injuries from welding operations each year. Hazards from welding include electrocutions, eye damage, burns, chemical poisoning and fire. If you are welding or working around welding operations, be aware of these hazards.

- The biggest hazard from welding is the potential for electrocution. Be sure to insulate yourself from the work, the electrode and the electrode holder. Avoid becoming the easiest path to ground.
- To protect your eyes from ultraviolet and infrared radiation burns, wear proper eye protection before looking at an arc. Even if you only have to look at the arc for a second. Different shades of filter plates can be attached to welding helmets. The shade needed depends on the type of welding, size of the electrode and the amount of electrical current. Check with your electrode supplier to determine the appropriate shade you will need.
- Be aware of hot metal hazards. Remember that molten metal will be propelled into the air if it comes into contact with moisture.
- Wear safety glasses with side shields under your helmet to protect your eyes from slag fragments and other flying particles.
- Wear clothing that will protect your body from hot sparks such as flame resistant coveralls, welding gloves, flame resistant leggings and leather high top boots.
- Choose clothes that don't have pockets or cuffs in the legs or sleeves.
- Make sure your work area is well-ventilated to protect you from inhalation hazards. If your work area can't be properly ventilated, you may need respiratory protection. Check with your supervisor before proceeding.
- Keep at least one Class ABC fire extinguisher readily accessible.
- Stop work at least 1/2 hour before leaving the site and check the welding area for smoldering materials.

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Compressed Gas Cylinder Hazards

#43

Compressed gas cylinders present several potential hazards to plumbers. The main hazards are fire, explosion and cylinders propelled by escaping gas when valves get broken (a cylinder will take off like a rocket when a valve gets broken off).

- Whether you are using, transporting or storing cylinders, always keep them secured in their upright position with chains, strong wire or straps.
- Keep them away from all sources of electricity, sparks, flames and other sources of heat. Avoid subjecting them to heat over 125 degrees Fahrenheit.
- Store oxygen cylinders separately from acetylene or other gas fuel cylinders. Always keep cylinders in the vertical position and secure them in your vehicle to prevent them from falling.
- Never take cylinders into confined spaces.
- Inspect all cylinders, hoses, valves and torches before using them. Take all defective parts out of service immediately and replace them with good ones. Clean out torch tips before use. Also, before connecting a regulator to a cylinder valve, clean out the valve by standing to one side so the valve is not pointing at you and quickly open and close the valve.
- Inspect the hoses and cutting torch valves for leaks after opening the cylinder valve. If there are any leaks, turn the cylinder valves off immediately. Take the hose and cutting torch assembly out of service.
- Only use friction lighters to light torches. Never light a torch with a match, cigarette or any other source.
- Before removing a regulator, close the cylinder valve and bleed the gas lines.
- While working, always leave the wrench on the stem of the cylinder valve so it can be turned off quickly in an emergency.
- When cylinders are not being used, always protect the valves by replacing the valve protection caps.

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PCA Toolbox Safety Talks

Struck by Falling Objects

#44

On March 22, 1999 a 38-year old plumber was installing a 21-foot section of 4-inch iron pipe in an overhead ceiling. One of the anchors holding a support brace was improperly installed. The support brace gave way and the pipe fell. The plumber was struck in the head by the pipe. He died at the scene.

- Falling objects present serious hazards for plumbers.
- Falling objects include tools, building materials and equipment. Even hardware such as nuts and bolts can cause severe injuries if they fall far enough. To protect yourself, always wear your hard hat. Also, whenever possible, erect some type of canopy to keep falling objects from hitting you.
- It's usually uncomfortable to wear a hard hat at first. The muscles in your neck and shoulders may even get sore. But the typical hard hat only weighs 14 ounces. Newer hard hats weigh considerably less. You can get used to wearing any hard hat just by wearing it regularly. Before long you will forget it's there.
- Many plumbers complain that hard hats are too hot to wear, particularly in the summer. The truth is that the temperature inside the hard hat is usually cooler than the temperature outside the hat. Tests done at 110 degrees Fahrenheit showed that the temperature inside the hard hat was 5 to 12 degrees cooler than the outside air. Never drill holes in your hat to let heat escape. Even a single hole will significantly weaken your hard hat.
- Hard hats are designed to absorb the force of falling objects and spread the energy out over several parts of the body. The force that is ultimately absorbed by the head, neck, spine and shoulders is significantly less than the force that initially impacts the top of the hard hat.
- Always wear your hard hat while working.
- If you have to work under a scaffold, roof, leading edge, ladder, open door or window or any area where objects could fall, consider placing toeboards and screens on overhead guardrails, hanging a sturdy net or erecting a solid canopy overhead.

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Struck by Equipment

#45

On February 11, 1999 a 48-year old plumber was walking across a road that had been closed off for construction traffic. A forklift operator was driving his lift on the same road and did not see the plumber crossing the road. The plumber was struck by the lift, knocked to the ground and run over by the front tires. The plumber died in the hospital approximately one hour after the incident.

- Another hazard in plumbing is the presence of construction equipment.
- It is easy to become desensitized to equipment backup alarms.
- You may hear the alarm, but may not consciously make the connection between the alarm and danger. Make a conscious effort to listen for backup alarms.
- Make sure the equipment operators in your area know you are there and be sure they can see you.
- If you have to be out of the field of view of an operator for any period of time, make sure you communicate with the operator clearly before you leave his or her sight.
- Be especially aware of equipment being used by workers who may not know you are there.
- If there is equipment operating without backup alarms let the operator and your supervisor know immediately.
- Be aware of operators trying to position equipment in awkward places without someone to guide them. Stay well away from those areas until the equipment is in place.
- Be careful about wearing hooded garments or other clothes that may obstruct your view.
- Make sure that the hearing protection you choose does not completely block out the sound of horns, backup alarms or equipment engines.

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PCA Toolbox Safety Talks

Trench and Excavation Hazards

#46

On December 17, 1998 a 39-year old plumber was installing an 8-inch sewer line in a 3-foot wide trench. The trench was approximately eight feet deep. The trench walls were steep and no trench box or other cave-in protection was in use at the time, even though ground water was present in the trench. The trench caved in on the plumber, killing him.

- A cubic foot of soil (1 foot by 1 foot by 1 foot)) weighs 90 to 140 pounds. A cubic yard (3 feet by 3 feet by 3 feet) weighs over 3000 pounds. That's about the weight of a small pickup truck.
- Even a seemingly small amount of soil can crush a person. Imagine being underneath a falling Ford Ranger.
- Even shallow trench collapses kill workers. Partially buried workers are frequently killed in collapses even when their heads are not covered by the soil.
- Before entering a trench or excavation, make sure a protective system is in place. The walls should be sloped back, benched back, supported by bracing or shoring or equipped with shields such as trench boxes.
- If at least one of these protective systems is not in place, or if you are not sure, don't enter the trench. Ask your supervisor for help.
- While working in a trench or excavation, if you observe any changes in soil conditions such as cracks in a wall or the appearance of water, get out immediately and report to your supervisor. Always have a ladder or other means of quick exit available within 25 feet of every worker.
- Keep spoil piles, pipe and other materials and equipment away from the sides of the trench or excavation. Their weight may cause a collapse. Keep spoil piles at least 2 feet away from the edge.
- If you are around when a trench collapses, do not attempt to rescue your coworkers. All too frequently, untrained rescuers are killed after entering a collapsed trench or excavation.

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PCA Toolbox Safety Talks

Hard Hats

#47

Hard hats are designed to protect workers from falling objects and other potential sources of head injuries, including electrical hazards.

- Falling objects include tools, debris and materials. Objects may fall from a lift, scaffold, floor opening or any other elevated work area. Other potential sources of head injury include being hit by materials being carried by other workers, walking into stationary objects like pipe or duct work or contacting sources of electricity with our heads.
- Hard hats are designed to absorb the force of falling objects. The force is distributed throughout the head, neck, spine and shoulders and not concentrated in one spot as it would be without a hard hat.
- To protect yourself from head injuries, always wear your hard hat. Most hard hats only weigh 14 ounces and some of the newer ones weigh considerably less. Hard hats are easy to get used to wearing. Wear it every day for a few days and you will forget it's there.
- Many workers believe the hats make them too hot. The truth is hard hats help to keep your head cooler than the outside air. Tests done at 110 degrees Fahrenheit showed that the temperature inside the hard hat was 5 to 12 degrees cooler than the outside air.
- Be sure not to turn your hard hat around backwards like a baseball catcher because the bill in the front is designed to deflect falling objects away from your eyes and face. It also helps keep the sun out of your eyes and the rain off your face.
- Always inspect your hard hat before you wear it. If there are any defects whatsoever, discard the hat and get a new one.
- Never drill holes in your hard hat to let heat escape. Even a single hole will weaken it. Don't paint your hard hat either because paint covers up defects and weakens it as well. Hats with holes or paint are worthless and should be discarded. A sticker or two is okay as long as they are approved specifically for hard hats. Adhesives on some stickers weaken hard hats.

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Eye and Face Protection

#48

Plumbers are exposed to eye hazards every day on the job. Countless workers have been spared from eye injuries and blindness because they chose to wear eye protection. Not as important, but still worth consideration is the use of face protection for certain tasks.

- Depending on the source, flying particles can strike with a little bit of force or with a tremendous amount of force. When flying particles hit an eye, the potential damage ranges from temporary irritation to permanent blindness.
- Wear eye protection whenever there is potential for exposure to flying particles, chemicals or other eye hazards such as ultraviolet radiation, infrared radiation or visible glare.
- Wear safety glasses with side shields for protection against flying particles. If you wear regular glasses, you can have prescription safety glasses with side shields made up for you.
- Wear safety glasses with side shields under your welding helmet.
- Wear splash-proof safety goggles when working with chemicals such as solvents or acids. If you wear regular glasses, there are goggles made to fit over them.
- Wear shaded goggles designed specifically for cutting when using cutting torches. Use shaded lenses #3 for brazing and #5 for oxygen/acetylene tasks.
- Attach a shaded filter plate to your welding helmet. The shade you need depends on the type of welding, size of the electrode and the amount of electrical current you are using. If you are not sure about the correct shade, check with your supervisor.
- Wear face shields when using chemicals, grinding, chipping, wire brushing, etc.
- Always wear the appropriate safety glasses or goggles with the face shield. The shield by itself is not made to protect your eyes.

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PCA Toolbox Safety Talks

Hearing Protection

#49

Plumbers are frequently exposed to noise from power tools, machinery, construction equipment and other sources. Noise can be harmful under certain conditions if you don't take measures to protect yourself.

- Whether noise is harmful depends on how loud it is and the length of time you are exposed to it. Determining what is too loud is difficult to do.
- Noise is measured in decibels. Exposure to 90 decibels over an 8 hour period is a recognized threshold for hearing damage. When you are exposed to this much noise for anywhere close to 8 hours, make sure you protect your hearing. Noise levels below 90 decibels over an 8 hour period can still be damaging to some people so it's a good idea to always protect your hearing.
- Since noise above 90 decibels is even more damaging to your hearing, it's a good idea to protect yourself all the time no matter how long you are exposed to it.
- Since you don't have the equipment to measure noise on the job site, remember that an air compressor runs at around 90 decibels and a circular saw at around 100 decibels. Use this knowledge to gauge the noise around you.
- Another way to gauge the noise level is to determine whether you can hear a coworker standing 3 feet away from you when he or she is speaking normally. If not, it's probably too noisy.
- Also, if you hear a ringing sound or feel a tickling sensation in your ears, it's too noisy. Whenever it's that noisy, wear hearing protection.
- There are different types of hearing protection and each blocks out a certain amount of noise. Some types of earmuffs block out more noise than other types of earmuffs. The same goes for earplugs. Whatever you choose, make sure it blocks out enough sound to protect your hearing, but not so much that you can't hear what is going on around you. Make sure you can still hear a warning shout from a coworker or a back-up alarm on a piece of equipment.
- Learn how to properly install your earplugs to get the best protection.

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Foot Protection

#50

With all of the safety concerns in plumbing, it's easy to forget about protecting your feet. However, foot injuries in plumbing occur each year to workers who don't protect their feet from potential foot hazards.

- Foot hazards in plumbing include:
  —dropping tools, materials or equipment on your feet;
  —setting down heavy objects on your feet;
  —equipment/materials rolling up on your feet; and
  —objects with wheels like vehicles, mobile lifts, mobile scaffolds, etc. rolling over your feet.
- The best way to protect yourself is to avoid these potential foot hazards by being conscious about them the whole time you are working.
- Avoid carrying objects which are too heavy for one person alone. Also, avoid carrying too many items at one time so you won't inadvertently drop them.
- When carrying or moving a piece of equipment, machine or other heavy object, think about where your feet are before setting it down. Communicate constantly with those helping you.
- Make sure materials are secured so they can't fall onto your feet.
- When working around a vehicle, mobile scaffold, mobile lift or anything else on wheels, be especially alert. Know where it is at all times and work as far away from it as possible.
- Always wear protective footwear on the job. Wear work boots or work shoes with steel toes.
- When working around heavy objects that could fall on your feet, wear metatarsal guards over your work boots or work shoes.

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Hand Protection

#51

Hand injuries occur every day in plumbing. Some are severe, while others are minor, but they do occur frequently. Plumbers need injury-free hands to do their jobs as effectively as possible. So protect your hands from the obvious hazards.

- The obvious hazards include:
  —pinch points where hands or fingers get pinched between materials or equipment;
  —sharp or jagged edges on materials;
  —getting rings or bracelets caught in tools, materials or equipment;
  —unguarded tools and machines;
  —chemical burns and frostbite.
- Stay alert to avoid the pinch point hazards. Think about what you are doing and what will happen next.
- Inspect materials before you move them. Wear leather gloves when handling objects with sharp or jagged edges or when you are exposed to hot metal or sparks. Always wear welding gloves when welding.
- Take off all rings and bracelets before you start work.
- Check for guards on all tools and machines that are supposed to have them. If any tool or machine is missing a guard or has a damaged or otherwise inoperable guard, don't use it.
- When working with acids, solvents or other chemicals, use neoprene gloves. Use general-purpose latex gloves for work with detergents and mastics. Check the label or Material Safety Data Sheet (MSDS) if you are not sure what type of glove to use.
- Wear gloves when it's cold and don't touch frozen metal with your bare hands. If your fingers get so cold they hurt, stop work and warm them slowly.

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Personal Fall Protection Systems

#52

When plumbers are faced with fall hazards, it is much more comfortable and efficient to use guardrails or hole covers for fall protection than to use personal protective equipment. However, in some situations the preferred fall protection systems are simply not feasible.

- If you must work where you will be exposed to a fall of 4 feet or more when performing plumbing repairs or 6 feet or more when installing new plumbing, you must be protected from falling. When a preferred fall protection system is not feasible, use a personal fall arrest system or a positioning device system.

Personal Fall Arrest Systems

- A personal fall arrest system consists of a full body harness, lanyard, connectors such as D-rings and snap hooks and an anchorage point.
- Every part of the system you use should be inspected each time before you use it. If any parts are worn or damaged, do not use them. Replace them with new parts that are designed specifically to be used with other system parts.
- Never use any part of a system that has been used to arrest a fall until a competent person inspects the entire system and authorizes its use.
- The system should be rigged to ensure that the user never free falls more than 6 feet and stops falling before any part of his or her body can make contact with an object or the surface below.
- Anchorage points should support at least 5,000 pounds per worker. Only locking snaphooks should be used when snaphooks are used to make connections.

Positioning Device Systems

- A positioning device system is a full body harness or body belt rigged to support the user on an elevated vertical surface with both hands free.
- The same general rules regarding inspection and use that apply to personal fall arrest systems also apply to positioning device systems. Exceptions are that positioning device systems should be rigged to keep the user from free falling more than 2 feet and the anchorage must be able to support at least twice the potential impact load of a fall or 3,000 pounds, whichever is greater.

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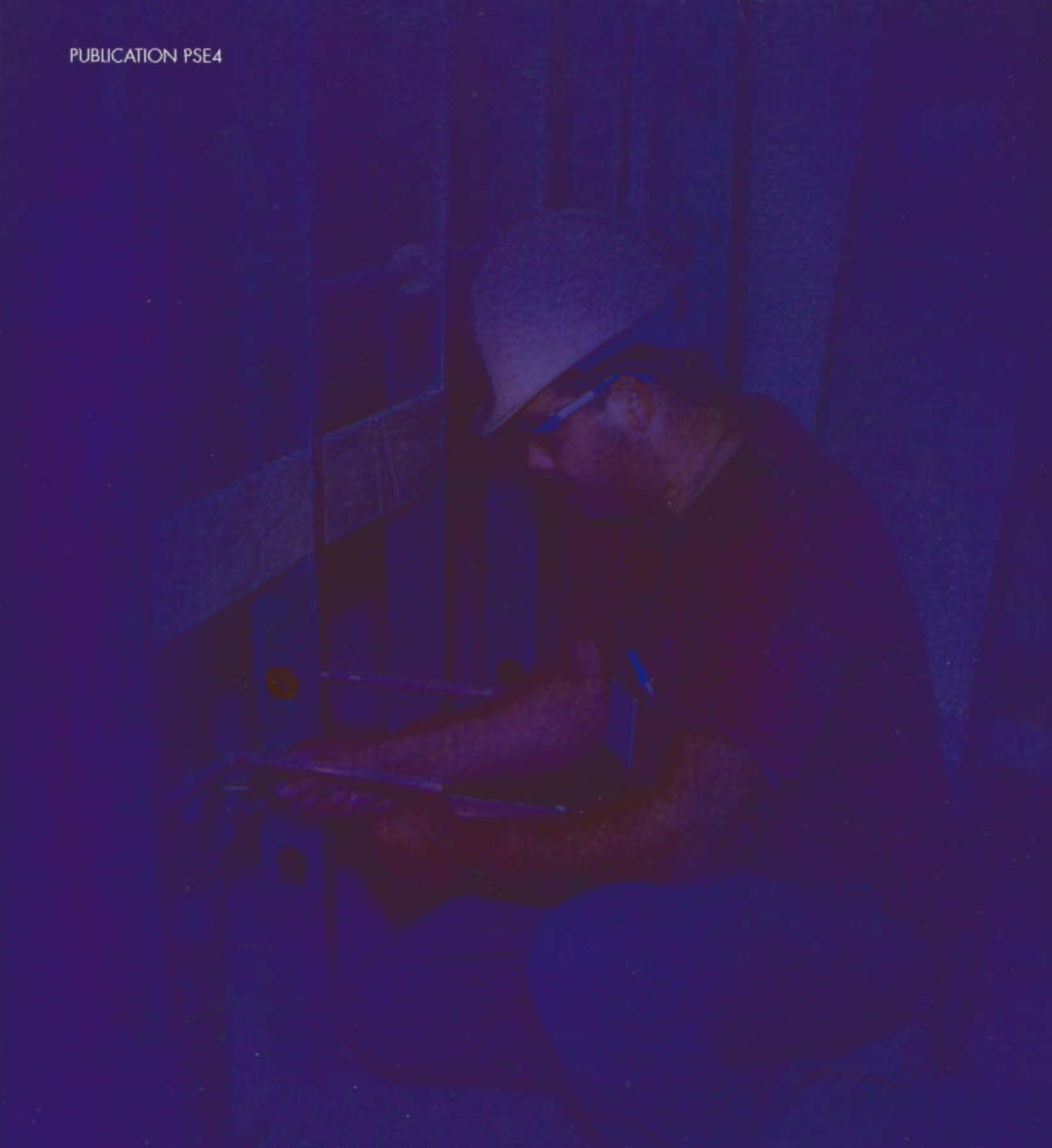

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