

OSHA TRAINING BULLETIN

FOR SUPERVISORS

Issue No. 181 (Includes Supplement)

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September, 1988

Welding Safety

Many important designs and products would be impossible without welding operations. But welding does present potential hazards. Careful training and strict attention to safety procedures are essential if workers are to stay safe.

Welders are usually skilled workers, and welding equipment manufacturers generally provide specific warnings and instructions that should be read and understood by everyone who uses the equipment. But welding's risks are serious enough to warrant extra safety talks and discussions that keep the dangers and protective measures in the forefront of everyone's mind.

OSHA even makes a specific point of listing a supervisor's responsibilities in ensuring welding safety in 29CFR 1910.2522(d)(2)(xiv). These include, but are not limited to, being "responsible for the safe handling of the cutting or welding equipment and the safe use of the cutting or welding process. So if this vital but sometimes hazardous operation takes place in your area, close attention to it is a critical part of your job.

Protective Equipment Can Safeguard

Eye and face protection are as important to a welding process as the tools themselves. Welders are at risk for burns, heat radiation, and flying bits of hot molten metal. The proper protective equipment can limit these risks substantially.

OSHA requires gas welders to wear impact-resistant and heat-resistant goggles or other eye

protection. Nonflammable welding helmets are recommended for many operations.

For arc welders, OSHA recommends wearing helmets and eye protection designed to resist heat, fire, impact, and electricity.

Since the flames and hot metal from both arc and gas welding give off infrared, or heat rays, workers need eye coverings that protect them from long-term exposure, which can lead to cataracts. Safety goggles are available in a wide range of different lens shades, each of which provides protection against the specific infrared hazards of different kinds of welding jobs. Manufacturer's instructions detail which lens goes with which hazard.

Arc welding also creates ultraviolet rays that can burn eyes and skin—much like a very bad sunburn. Again, instructions from the manufacturer and your safety manager should be your guide to selecting the right safety goggles or glasses for the job. It's a good idea to wear a face shield over the glasses for extra protection.

Body Protection

Welders should also wear clothing that will protect them against burns from hot sparks or metal. Very hot work calls for protective leather aprons, leggings, and sleeves. Street clothes are acceptable for some welding jobs, if you follow these precautions:

- Wear long-sleeved shirts. Arc welders should

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Were Trenches Unsafe, and Do Experienced Workers Need Training?

Building contractor Ben Stanley couldn't decide what to do. He hated to call OSHA down on another company, but he hated even more to think that some workmen could be injured or die if he didn't. And that was what Ben was afraid of when he saw County Pipe laying pipe at the construction site next to the one where he was working. Ben had seen many similar jobs and knew it was unsafe to work, as County's employees apparently were doing, in unsupported trenches with dirt piled at the edge. So Ben followed his conscience and called OSHA.

OSHA inspector Jay Finch and a soil engineer arrived at County's worksite the next day. After Finch had completed his inspection and talked to the workers, he cited County for four serious violations.

The first was a violation of 29 CFR 1926.652(b), which requires trenches more than five feet deep in soft or unstable material to be sloped, shored, or otherwise supported. Finch found a County employee working in a ten-foot-deep, unsupported trench dug in what the soil engineer's analysis determined was micaceous silty sand. The engineer said the soil was unstable enough to be removed by hand pressure, making a slide or cave-in a real possibility.

The second serious violation was of 29 CFR 1926.651(i)(1): failure to pile excavated material at least two feet from the edge of the trench. Finch even photographed two County workers in a trench with dirt piled right at the edge. Finch also noted that this trench was more than four feet deep and had no ladder or other way to get out. That translated into a third serious violation for County, this time of 29 CFR 1926.652(h).

As part of his inspection, Finch talked to workers at the site and discovered that none of them had been provided with safety training. Specifically, they had not been trained to recognize the hazards on the job or to handle them safely. And that, Finch concluded, was a serious violation of 29 CFR 1926.21(b)(2).

Workers Experienced, Supervisor Alert

County protested every citation. The company admitted it had no formal training program and hadn't provided workers with any specific training on trench hazards and safety. But, County explained, only experienced, safety-minded employees were assigned to work in the trenches. The other workers, County indicated, weren't smart enough or educated enough to need or understand safety training. And, the company added, the on-site supervisor always took steps to correct anything he saw that was unsafe.

As for the other violations, County disagreed with the soil engineer and claimed the unshored trench was dug in rock called mountain chert that didn't require shoring.

The dirt at the edge of the trench, the company said, had been at least two feet from the edge, but had been pulled closer while the trench was being refilled.

As for the means of exit from the trench, County said workers could get out by climbing the trench's walls or sloping ends. The company pointed out the OSHA regulation states that ladders or other exit means are needed if the worker has to move more than 25 feet to get out. In this trench, County said, the sloping ends were less than 25 feet from the work area.

Were County's defenses adequate? Were its practices safe? How would you rule? To find out the court's decision, turn to page 7.

Preventing Carelessness and Building Safety Common Sense

(Part 1 of 2)

Supervisor Fred Dowling was feeling pretty good. Not only was the company doing well, but all Fred's workers had completed their training—even right-to-know. Fred felt he finally had a handle on his safety talks, and his workers were performing well.

"Looks like there's nothing standing in the way of a good raise on my review next month," Fred was thinking to himself. And that's when the plant manager called him in to burst his bubble.

"I've been going over our accident record, Fred, and your group has the worst one in the plant. You'd better get your act together!"

"How could that be?" Fred wondered. The answer was simple and very common: carelessness. Fred's workers were ignoring or shortcutting safety rules and, in many cases, just not using common sense. Since they had been lucky enough to avoid any serious accidents, Fred hadn't paid much attention. But the number of small accidents and near misses indicated that it was just a matter of time until someone in Fred's department had an experience like one of these real-life accidents:

- A worker moving a metal ladder on an outdoor job made contact with a power line and was electrocuted.
- A worker operating a bulldozer kept going when it started to snow. The machine lost traction, the worker fell off, and the bulldozer ran over him.
- A worker ignored the little shocks he was getting from an electric hand tool for several days—the next day, he was electrocuted by it.

Carelessness is the reason for many on-the-job accidents—probably more than statistics indicate. It's careless behavior that leads to the actual cause of death or injury.

Carelessness is a difficult problem for supervisors to identify and handle, but it can and should be made part of every safety program. The goal: to replace carelessness with safety common sense.

Understanding the Causes

The first step in combating carelessness is understanding the causes. When you know what to look for, you can often step in before a real problem develops.

The main causes of careless, unsafe behavior are:

Complacency. When workers have done a

particular job or task many times, they start to do it on automatic pilot. They may forget a step or precaution or, figuring they haven't had an accident yet, skip a safety step as a shortcut.

Some typical forms of careless, unsafe behavior that fit into this category include:

- Failure to shut off and/or lock out equipment when not in use and before maintenance.
- Removing safety devices
- Working—or moving across the shop floor—too quickly
- Getting on or off equipment—or cleaning or adjusting equipment—when it's moving
- Not using, or removing, protective equipment
- Not checking labels and material safety data sheets before working with hazardous substances.

Inadequate training. This problem is especially common with new and young workers. Their training may have been rushed, or they may not have fully absorbed the instructions. Sometimes, there's not enough follow-up to make sure that newly trained workers actually understand what they learned and are using it on the job.

Training gaps can be especially dangerous for workers who use hazardous substances or workers who are assigned to high-risk tasks like working in confined spaces.

Attitude. This is also often a problem with young workers. They don't have enough experience to recognize the importance of safety regulations. Or they may simply fail to take safety—and even the job itself—seriously. Attitude problems show up not only in failure to use proper equipment and procedures, but in fooling around on the job, throwing things, and teasing or startling people who *are* working conscientiously. Some very hostile or belligerent types may even deliberately flaunt their lack of safety concerns and try to encourage others to follow their "I'm too smart and tough for this" approach.

Distraction. Sometimes workers' minds are on a personal problem—family concerns, a romantic dilemma, an argument they had with a supervisor or co-worker ... or any number of things not related to the job at hand. Distraction may last only a few

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minutes, but it could hang on for days or weeks if it's caused by something serious like marital difficulties, illness in the family, or major financial problems.

Someone who is distracted is not paying attention to the job or may be too upset to do the job correctly.

Many supervisors shy away from these situations, reasoning that a worker's personal life is not their concern. That's true, until that personal life affects on-the-job behavior. Although you're not necessarily "your brother's keeper," you are responsible for your workers' performing their jobs safely.

Emotion. Often closely related to distraction, emotions like anger or depression may translate into inattention to the job or a haphazard approach. Workers may also take out their anger on the equipment—or another worker.

Fatigue. Exhaustion, whether from working too many hours or just lack of sleep, can cause mistakes or impair physical coordination.

Sloppiness. Many workers don't appreciate the importance of good housekeeping on the job. They leave tools and materials lying around, they don't bother to clean up spills and debris, and they block walkways and exits. In other words, they create the conditions that can lead to fire or chemical reaction and provide endless opportunities for the unwary (including themselves) to trip, slip, fall, or get burned or injured by the equipment.

Substance abuse. Drug or alcohol use can impair physical reactions and judgment. Anyone who uses alcohol or drugs on the job is an abuser. And workers whose off-the-job substance use shows up in their work become your concern too. This is another area where supervisors sometimes have to step over the line into personal life in order to ensure the safety

of the individual and fellow workers.

Prevention

The best way to prevent careless accidents is to stop the conditions that create them. You can't prevent people from getting tired or angry, but you can help keep those situations from affecting job behavior. And you can certainly ensure that training is adequate, that workers follow proper procedures, and that good housekeeping practices are a habit in your department.

You have to sharpen your observation skills and train yourself to keep an eye out for situations that could be careless accidents or near misses in the making. And you have to accept the fact that sometimes you're going to have to get personal—to ask what's bothering a worker, or to confront a worker with what you believe is evidence of substance abuse or of an attitude that conflicts with job safety.

Show your safety consciousness by being alert to danger signs and stepping in before things get out of hand. Make workers aware of the causes and consequences of careless behavior, as discussed above. And make it clear that both company policy and common sense demand constant attention to safety.

It's not easy, and it's not always comfortable, to be constantly looking for trouble. But it's the best way to prevent it and help workers learn to police themselves.

Once you've spotted careless behavior, how do you head it off—or turn it around? Next month, we'll look at a number of specific steps you can take to do just that.

OSHA Training Bulletin for Supervisors (formerly *The Hazardous Materials Training Bulletin for Supervisors*) is published monthly; ISSN 0896-9957. Publisher, John F. Brady; Editorial Director, Robert L. Brady, J.D.; Managing Editor, Frank R. Abate; Technical Advisor, P. David Shafer; Assistant Editor, Eleanor H. McKernan; Contributing Editors, Chris Hocker, Barbara Kelly; Art Director, John F. Kallio; Customer Service Manager, Lori Millett. Editorial and business offices are located at 64 Wall St., Madison, CT 06443. Second class postage is paid at Madison, CT, and additional offices. Subscription rate is \$78.54/year. Discounts on multiple subscriptions. POSTMASTER: Send address changes to OSHA Training Bulletin for Supervisors, 64 Wall St., Madison, CT 06443-1513.

DO 074768
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Welding Safety (continued from page 1)

wear clothing made of heavy materials to protect against ultraviolet rays.

- Keep collars and cuffs buttoned.
- Don't wear clothes with cuffs or open pockets that could catch sparks
- Wear high shoes, and keep pant legs over them to keep sparks out.
- Wear flame-resistant head covers (e.g., Nomex).
- Wear clean clothes—grease or oil spots could be flammable.
- Don't wear flammable hair preparations.

For arc welders, special dry welder's gloves are a must to protect against shock to the hands, or electrocution.

Respiratory Protection

Some welding jobs also call for wearing respirators to protect against inhaling fumes and gases. There are special welding respirators available. Follow the instructions of the welding equipment manufacturers, material safety data sheets (MSDSs) for any gas or materials used in a welding operation, and your safety department in choosing the correct respirator. As with any respirator, it should be properly fit-tested for the individual wearer, and each employee must be trained in its use.

Fire Hazards Are a Big Risk

The flames and sparks created in the welding process make fire its greatest hazard. Welding sparks have been known to travel as much as 35 feet. And the spatter—hot metal created by the process—can bounce on the floor or fall through openings. So you need extra caution to keep fires from starting and spreading.

Whether you use arc or gas welders, always follow these precautions:

- Remove flammables from the area before beginning the job.
- Use a combustible-gas indicator to determine if flammable vapors or gases are present in an area where you plan to weld.
- Try to restrict welding operations to separate special rooms with fire-resistant floors.
- If you must weld in a room with a wood floor, wet the floor or cover it with a fire resistant shield.
- Cover with a fireproof blanket any flammables that can't be removed.
- Close or cover any ducts that could carry sparks to combustible items in other areas.

- Keep the welding area free of trash or debris that could catch fire.

- Keep fire extinguishers nearby. Check them regularly and make sure they're in good working order and that workers know how to use them.

- Assign a firewatcher to welding jobs.

If you're using gas welders, take these additional steps to prevent fires:

- Keep cylinders away from sparks and spatter.
- Don't run over gas hoses.
- Don't use oxygen to blow away dust. It increases the likelihood of combustion if any ignition source—even static electricity—is present.
- Use proper lubricants, not grease or oil, on the connections of compressed-oxygen cylinders.
- Don't smoke!

Keep in mind that the gases used for welding—acetylene, butane, natural gas, propane, propylene—are not only flammable. They're also potentially explosive. Before you start a job, check the MSDS for the gas you're using to make sure you're aware of all the hazards and safety precautions.

Fumes and Gases

Another welding hazard is fumes and gases. The fumes are actually microscopic metal particles that are suspended in the air. Fluxes, plating, dirt, oil, and other substances can also create fumes and gases when they're heated by the welding process.

To avoid respiratory problems and lung damage from inhaling these airborne substances, follow instructions for selecting and using respiratory protection. In addition, keep these safety procedures in mind:

- Use local ventilation, such as an exhaust system.
- Place fans to the side so fumes will blow away from you.
- Don't get too close to the arc on an arc welder. Welders with poor eyesight should use safety eyeglasses under their helmets, or a magnifier in their helmets if they can't see the job.
- Leave the area immediately and get medical attention if you feel sick or uncomfortable.

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Gas Cylinder Handling and Storage

Cylinders of welding gas must be handled with extreme care. Since different gases require different procedures, the first step is to *read the label*. If a cylinder doesn't have a label, or the label is illegible, don't use it. Never handle a cylinder if you don't know exactly what's in it. See the accompanying box for other tips on safe gas-cylinder handling and storage.

GAS CYLINDER SAFETY TIPS

- Check equipment and hoses regularly for leaks.
- Open valves slowly—and keep them closed when cylinders aren't in use or are empty.
- Turn off gas when you leave the area.
- Transport cylinders by strapping them to carts. *Don't let them fall or bang into one another.* If a valve is knocked off, the cylinder could explode.
- Never roll or drop a cylinder.
- Use cylinders only in areas with good ventilation.
- Light flames according to manufacturer's instructions. Do it promptly, or the gas could build up in the area and explode when you light it.
- Store cylinders away from flammables or heat sources, on a level, fireproof floor, in a dry, ventilated area.
- Always keep cylinders upright and properly secured.
- Don't use a leaking cylinder.
- Keep cylinders away from sparks, molten metal, etc.

Arc Welder Handling and Storage

Arc welders are electric, so you must also follow the rules of electrical safety to avoid shock or electrocution. Keep these precautions in mind:

- Turn off power before touching electric parts.
- Ground the object you're welding with a separate electrical connection.
- Use the correct cable size.
- Make sure cable insulation isn't worn or frayed.
- Don't wear metal jewelry; it could become an electricity conductor.
- Don't weld in the rain. Moisture carries electricity.

Confined Spaces

Welding in confined spaces brings additional risks to welding operations. Confined spaces, any place

that's hard to get in or out of and with poor natural ventilation, call for extreme attention to safety to counter the hazards of fire, explosion, lack of oxygen, and dangerous levels of toxic gases and fumes. Carefully train anyone who will be assigned to weld in a confined space, and make sure that everyone is aware of these safety basics:

- Insist on an entry permit.
- Test the atmosphere in the area before entry—and periodically after you're in there—for oxygen levels, flammability, and dangerous levels of toxic substances.
- Wear protective equipment, including the appropriate respirator.
- Have a buddy in protective equipment ready in case of trouble. The welder in the confined space should be connected to the outside by a safety harness.
- Ventilate the space.
- Keep welding machines and gas cylinders outside the space.
- Shut off equipment when welding operation stops, such as for lunch or overnight.
- Have first-aid equipment readily available.

Tripping and Falling Hazards

Yet another potential danger in welding operations is tripping and falling.

Welding helmets and goggles limit the wearer's vision. So it's a good idea to check the floor before a job to make sure there's nothing welders can trip over while they're working. They'll also have to keep track of the hoses (on gas welders) and cables (on arc welders) to avoid getting tangled up or tripping over them.

Reduce the risk of falling during above-ground welding operations by assigning a buddy to keep an eye out so as to alert the welder to any hazardous situations. A job that's on a scaffold or very high above the ground might also call for wearing a body harness.

Conclusion

Welding can be done professionally and safely if workers fully understand the risks and carefully follow the rules. It can be a complicated task for a worker using protective equipment, taking action to prevent fires, and trying to complete a job that requires skill and practice.

As a supervisor, you can help workers balance the needs of attention to safety and attention to the job at hand by:

- Providing thorough training.

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Excuses Don't Equal a Safety Program

County went down for the count. The judge upheld all four serious violations.

The unshored trench was a clear violation, since the company didn't dispute the worker's presence in it. The judge noted that the soil engineer's experience gave his analysis of the soil more weight than County's unsupported description.

The soil engineer's expertise also contributed to the judge's decision to uphold the serious violation regarding means of exit from the trench. Workers could not climb the walls or sloping ends as County claimed, said the soil engineer, because the dirt was too loose.

The judge wasn't impressed by County's report that the excavated dirt had been at least two feet from the trench originally. The inspector's photograph of the dirt pile was, the judge found, solid evidence of a serious violation.

Finally, the judge said that correcting unsafe acts spotted on the job did not equal a safety training program. Even if County had maintained a totally safe job site, the lack of hazard and safety training for workers would still be a serious violation.

Safety Training Is for Everyone

The company in this case seemed to show a total disregard for worker safety. It allowed unsafe and illegal conditions on the job and didn't even give workers a chance to evaluate and handle the hazards through proper training.

The lesson here is very simple. *Employers must provide workers with training in identifying the hazards they encounter on the job and on ways to deal with them safely.*

County's contention that it only gave hazardous jobs to experienced workers is irrelevant. If these workers were never told the risks of, say, unshored trenches, their experience wouldn't help them in a cave-in.

And this company's belief that some workers are not intelligent or educated enough to understand safety training is ridiculous. If they're smart enough to do their jobs, they're smart enough to do them safely. OSHA doesn't limit training requirements to workers above a certain IQ or education level; it requires training for *all workers exposed to hazards on the job*. It's up to the company to develop a training program that will get the message across to its particular workers. If workers have trouble reading, for instance, then films, posters, and demonstrations might be effective training tools. There are many tools available, and it's every company's responsibility to choose the ones that will get the important safety training job done.

- Checking for potential fire risks and eliminating or neutralizing them before the job begins.
 - Ensuring that appropriate protective equipment is used.
 - Assigning buddies and firewatchers to welding jobs.
- Use the checklist on page 8 to help you keep tabs on your workers' welding safety.

Welding Safety Checklist

	Yes	No
Do workers:		
Understand welding hazards?	☐	☐
Read and follow manufacturers' instructions?	☐	☐
Use impact-and heat-resistant eye and face coverings?	☐	☐
Wear helmets or goggles that protect against infrared rays?	☐	☐
Wear clothing that covers skin to prevent burns?	☐	☐
Wear leather aprons, leggings, and sleeves for very hot work?	☐	☐
Avoid cuffs, pockets, or low shoes that could catch sparks?	☐	☐
Wear flame-resistant head covers?	☐	☐
Wear dry welder's gloves for arc welding?	☐	☐
Use respirators to prevent inhaling dangerous fumes and gases?	☐	☐
Are welding operations performed:		
In special rooms with fire-resistant floors or wood floors that are wet or covered with fire-resistant shields?	☐	☐
After areas are tested for presence of flammables?	☐	☐
After flammable items are removed from area or covered by fireproof blankets?	☐	☐
In areas free of combustible trash or debris?	☐	☐
After items that could be tripped over are removed?	☐	☐
After ducts that could carry sparks are covered or closed?	☐	☐
In areas where smoking is strictly prohibited?	☐	☐
In areas with adequate ventilation, and with fans blowing fumes away from workers?	☐	☐
With working fire extinguishers, and possibly an assigned firewatcher, nearby?	☐	☐
Are gas cylinders:		
Checked for label instructions before use?	☐	☐
Checked regularly for leaks?	☐	☐
Kept away from heat and flammable items?	☐	☐
Turned off when not in use?	☐	☐
Moved and handled to prevent dropping or rolling?	☐	☐
Stored upright, and properly secured, in a separate, dry, ventilated, fireproof room?	☐	☐
Are arc welders:		
Turned off before electrical parts are touched?	☐	☐
Grounded with an electric connection separate from that of the item being welded?	☐	☐
Used with correct size cable, in good condition?	☐	☐
Used according to general electrical safety guidelines?	☐	☐
When welding in confined spaces:		
Is atmosphere tested before and during operations for flammability level, amount of oxygen, and toxics?	☐	☐
Do workers use protective equipment, including respirators?	☐	☐
Is equipment kept outside the space?	☐	☐
Is the space ventilated?	☐	☐
Is equipment shut off when workers leave the area?	☐	☐
Is a buddy, equipped with protective equipment, assigned to each worker in the confined space?	☐	☐
Is first-aid equipment readily available?	☐	☐

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