



WORKPLACE TIPS

Getting the Most From Your Protective Apparel

By JAMES P. ZEIGLER, Ph.D.

Pete, an apprentice pipefitter, had never worked on a project that required protective clothing. At his new job at a chemical processing plant, he was required to wear a full-body protective suit for the better part of each work day.

On his first day, Pete was issued protective coveralls and a protective jacket to wear over his street clothes. After donning the garments, he was asked to perform several simple exercises to ensure that the added clothing would not restrict the range of movement needed to perform his job. Properly outfitted for work, he reported to his site supervisor, John, a

seasoned chemical supervisor with a reputation for mentoring new employees.

John smiled when he saw the outfit that Pete was wearing. "Before you tackle your work today, let's talk for a few minutes about protective clothing," John suggested.

John spent the next hour discussing the company's philosophy about protective clothing. He explained the importance of selecting and caring for apparel so that it protects the worker both on and off the job.

"Your choice of protective garments and the way you use them can affect your

safety long after you leave the job," John explained. "Using your equipment properly can even protect your home and family against hazards that you might unintentionally bring home from work," he continued. "That's very important in the chemical business, because we deal with a lot of hazardous substances that you can carry with you when you leave work—on your clothes or your skin . . . even in your hair. We call this the 'take-home' problem and do everything we can to avoid it at our plant."

John briefed the new employee on the different styles and fabrics of protective

SELECTING THE PROPER WORK BOOT

Dentists say, "Floss the teeth you want to keep." But what can you do for your feet? Selecting the right foot protection is a good start.

According to statistics from the U.S. Dept. of Labor and the National Institute for Occupational Safety and Health (NIOSH), 84,000 U.S. employees suffered foot injuries that required time off the job in 1998. A survey of injured workers by the Bureau of Labor Statistics suggests that fewer than one-quarter of those injured were wearing safety shoes at the time of their accidents, although 72 percent were aware of company policies that required appropriate footwear.

Through its Personal Protective Equipment for General Industry Standard, OSHA has established footwear guidelines for many occupations. These rules are designed to protect workers from external dangers such as electrical shock, crushed toes and slips. Among the occupations for which the agency says foot protection should be routinely considered are shipping/receiving clerks, carpenters, electricians, machinists, boiler makers, plumbers, pipefitters, erectors, press operators, welders and materials handlers. Protective shoes and boots must provide impact and compression

protection to the foot. Where necessary, footwear that provides puncture protection may be needed as well. (See www.cdc.gov/od/ohs/manual/ppprotect.htm.)

OSHA's standard requires that protective footwear comply with ANSI Z41-1991, which separates protective footwear into six categories; each item is marked with the criteria it meets. According to OSHA, "Safety shoes or boots with impact protection are required to be worn in work areas where carrying or handling materials such as packages, objects, parts or heavy tools, which could be dropped; and for other activities where objects might fall onto the feet."

The agency adds, "Safety shoes or boots with compression protection are required for work activities involving skid trucks (manual materials handling cars) or other activities in which materials or equipment could potentially roll over an employee's feet. Safety shoes or boots with puncture protection are required where sharp objects such as nails, wire, tacks, screws, large staples, scrap metal, etc., could be stepped on by employees, causing a foot injury."

"The most common safety features in work shoes are steel toes, electrical hazard protection and slip-resistant outsole materi-

als," explains Mark Morgan, a footwear specialist with Wolverine World Wide Inc., a Rockford, MI, firm that produces HyTest Boots and Shoes and Wolverine Boots & Shoes. "The steel toe protects feet from heavy impact or high compression loads in the event of an accident," he says. For some occupations, electrical-hazard-rated footwear, tested to 14,000 volts, offers a measure of protection for the wearer who may inadvertently step on a live electrical wire. "But," Morgan warns, "[protective shoes] are only secondary protection to good judgment." For occupations where workers walk on wet or slippery surfaces, slip-resistant footwear also offers an added measure of protection.

Beyond shoe construction, fit is another consideration, according to Morgan and Dr. Jacqueline Wertsch, a professor of physical medicine and rehabilitation at the Medical College of Wisconsin. "Patients break toes when things drop on them," says Wertsch, "But, if your shoes don't fit, you can get injured from the inside."

For example, most people's feet are different, and a pair that is right for one foot may be wrong for the other. "Your shoe size can change from morning to night, and if you have steel-toe shoes and your toes are pushing

against the steel on one side, yet they're good on the other, it's a problem," Wertsch explains. "If one shoe fits properly but the other does not, one foot might scrape on the inside of the steel-toe and become infected. Or, toes can be scrunched backward causing foot damage or back pain."

According to Wertsch, if a worker has different-sized feet, it is best to purchase two pairs of protective shoes and wear one shoe from each pair. However, since that can be cost-prohibitive, Morgan offers these tips for achieving the best fit when buying a single pair.

- Wear the type of sock you intend to wear while working.
- Have a qualified sales representative measure your foot.
- Select the boot with the appropriate safety features.
- Do not lace the footwear too tightly.
- Walk around in the boots to see whether any tight spots exist or whether they slip in the heel.
- Wiggle toes to make sure you have enough room under the steel toe.
- Squat to determine whether the toe cap bites into the bridge.
- Remove the boot and try it on again.

Information provided by Wolverine World Wide Inc., Rockford, MI.

garments available, how they are chosen, when they should be worn and for what exposures they should be used. He discussed the proper way to don and doff, and adjust garments; how to avoid carrying home contaminants from the workplace; and the proper way to maintain and dispose of contaminated apparel in a safe, environmentally sound manner.

John and Pete also discussed the limitations of protective clothing and agreed that no ensemble can provide 100-percent protection. "Remember, suiting up does not make us superheroes," John said. "It's still important to exercise caution and use good judgment when working in hazardous areas.

"We want to be sure we get full value from our inventory of protective apparel," John continued, "and we believe that both the employer and the employee share this responsibility."

To check Pete's understanding of his protective equipment and the points they discussed, John gave him an on-the-spot quiz, which Pete passed with flying colors.

As they concluded their discussion, John handed Pete the company's list of informal guidelines for using protective apparel. "Keep it handy," John said. "It's a good reminder of the ways we can work together to ensure that you're safe at work, and that you and your family are getting the most protection from your

protective apparel." Pete posted the list on his locker door.

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GUIDELINES FOR USING PROTECTIVE CLOTHING

- 1. Select the barrier protection that's right for the job.** Garments made from high-barrier protective fabrics are required for many of today's work situations. If contact with hazardous fluids, gases or particles is expected, be sure to wear protective clothing made from materials that are designed for service in a broad range of hazardous environments. Make sure that all components of your protective equipment ensemble work together; this includes respirators, gloves, and foot and eye protection, as well as apparel.
- 2. Make sure that your garments are intact and well-made.** Be certain that each garment is free from defects, such as punctures, tears and severely worn spots. On sewn garments, make sure that there are no small rips or missing stitches along the seams. Look for a small tail of thread at the end of each stitch line; it is there to protect against unraveling. If garments have taped seams, check that seams are completely covered and that tape is securely fastened.
- 3. Be certain that your garments fit properly.** Try on all garments to make sure they fit well and allow a full range of motion. The size designations for protective clothing may not be the same as those for regular clothing. Always refer to the manufacturer's sizing chart. If garments are too small, stretching and bending will be difficult and seams may rip. There should be plenty of fabric in the underarm and seat areas to allow a full range of motion so that you can perform your job without overstressing the seams. Garments that are too large can be awkward to work in safely and may present a tripping or snagging hazard.
- 4. Manage heat stress.** If heat and humidity are expected in the work environment, heat stress is a potential hazard. Learn how to manage heat stress: recognize the symptoms, monitor the heat and humidity, and know how to regulate your work activities accordingly. Consider the use of supplemental cooling equipment to cool either the environment or your body. Select protective clothing that "breathes." Garments should combine barrier protection and thermal comfort for hazardous particle situations. Avoid more-porous, lower-barrier materials, as well as the less breathable, less durable microporous film composites.
- 5. Wear garments correctly.** Learn the correct way to don, doff and adjust each type of protective garment that you are issued. Know how to remove apparel without contaminating your hair, skin or clothing. In most cases, do not remove respirators until all contaminated clothing has been removed and properly contained.
- 6. Properly care for garments.** Inspect all clothing and equipment before and after each wearing. Do not use items that appear to be damaged or defective. Limited-use protective apparel requires minimal care, since it is disposed of after one or just a few uses. Reusable garments that have become contaminated should be laundered by your employer; never take contaminated apparel home to be cleaned.
- 7. Beware of the "take-home" problem.** To prevent hazardous materials from traveling from the workplace into your car or home, always wear the proper apparel in the correct manner. Take care to doff garments without contaminating your skin, hair or street clothing. Showering provides an added precaution but cannot totally eliminate contaminants from skin and hair. *Never take contaminated garments home for any reason.*

barrier fabrics. Zeigler has particular expertise in protective apparel research testing, protective apparel industry regulations and standards, and weapons of mass destruction. He serves as chair of the particulates subcommittee on the American Society for Testing and Materials Committee F23 on Protective Clothing, and is a member of the National Fire Protection Assn. technical committees for Emergency Medical Services, and Hazardous Materials Protective Clothing and Equipment.