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Dropped Object Prevention: ANSI/ISEA 121-2018

History:

The ANSI/ISEA 121-2018, American National Standard for Dropped Object Prevention Solutions standard comes in response to the thousands of workers each year in the U.S. who are injured (and hundreds who have died) from being struck by falling objects, such as hand tools, instrumentation, small parts, structural components and other items that have to be transferred and used at heights.

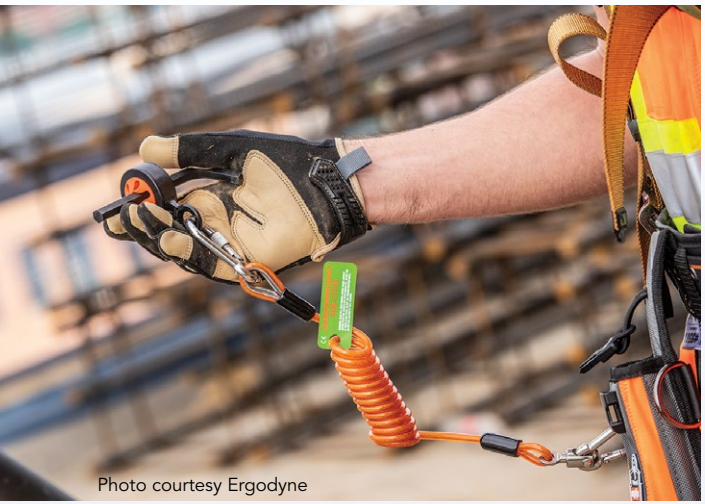

Photo courtesy Ergodyne

In 2016, the Bureau of Labor Statistics reports there were 255 fatalities and 47,920 reported injuries from dropped objects in the U. S., making this the third-leading cause of injuries on the jobsite, according to OSHA. Compared to 2015, deaths from dropped objects were up approximately 3% with injuries increased by nearly 7%.

ISEA formed the Dropped Object Prevention Group, which included leading safety equipment manufacturers, to standardize solutions available to protect workers from objects dropped from heights. The standard was developed "from scratch" and is not a revision of anything. Before this standard, many workers have been tethering their tools and equipment using duct tape or rope. This standard guides employers and workers toward safer, more reliable solutions.

Key Compliance Requirements:

Developed by the ANSI and the International Safety Equipment Association (ISEA), ANSI/ISEA 121-2018, American National Standard for Dropped Object Prevention Solutions establishes minimum design, performance and labeling requirements for solutions and testing that mitigate this hazard.

The standard addresses four active controls against dropped objects, including:

- ✔ Anchor Attachments
- ✔ Tool Attachments
- ✔ Tool Tethers
- ✔ Containers

The standard will not include passive controls like netting and toeboards, nor will it include longstanding falling object PPE, like hard hats, eyewear and safety footwear. The standard is limited to the identified scope as and offers further guidance in various appendices. Utilization and use of the equipment outlined in this standard may differ between manufacturers offering it and employers using it.

Why Standard is Important:

Objects dropped from height can strike with a great deal of force, and the only way to reduce the chance of injury or harm from dropped objects is to prevent these accidental drops. Again, according to the Bureau of Labor Statistics, overall "struck-by" injuries were up 8.7% during the 2013-2014 period; more than 52,000 "struck by falling object" OSHA-recordable incidents occur each year in the U.S., according to OSHA, with 5% percent of all workplace fatalities in 2015 due to strikes by a falling object. And they are projected to increase to 9% by the end of 2018. In fact, one insurance company said it paid out more than $5 billion in workers' compensation claims from 2013-2014. Damage to equipment, structures or the environment are not included in these claims.

ANSI/ISEA 121-2018 is groundbreaking, in that it requires dropped object prevention (DOP) solutions to go through dynamic drop-testing to be considered fit for use. Dynamic drop-testing involves dropping an object of known weight multiple times. If the DOP device being tested prevents a drop, it passes; if the device breaks and the object drops, it fails.

Compliance Assistance:

→ Copies of the standard can be purchased online from ISEA: https://bit.ly/2LkwxQV

→ Visit OSHA online at https://bit.ly/2DrpxO8 for more information.

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"This is big, because it establishes tethering systems as best practice when it comes to falling object safety," said Nate Bohmbach, Product Director at Ergodyne and the Chairman of the ISEA committee that developed this standard. "To date, many have been content with PPE such as hard hats or administrative controls, such as barricade tape, but those do not prevent items from falling, nor do they eliminate potential injury. Tethering systems prevent the items from falling altogether, and without this standard, there would be nothing to differentiate duct tape and string from a properly rated tool lanyard and attachment point."
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Hand Impact Protection: ANSI/ISEA 138 ANSI/ISEA 138

History:

According to OSHA, of the 145,000 recordable injuries in today's workplace and government agencies, 63% are made up of cuts; 18% are due to crush and bone breakage. These numbers present a tremendous opportunity to improve and educate.

Photo courtesy Superior Glove

ANSI/ISEA 138 is specifically designed for industrial gloves and the special protection they offer to workers. Many people mistakenly believe hand impact injuries only affect a narrow range of industries, such as the off-shore oil and gas sector, mining and construction. In reality, impact-related injuries are a common danger for manufacturing, warehouse and transport workers. The bones and soft tissues in the back of the hand are all vulnerable to impact injuries, varying from bumps and bruises to severe fractures.

To date, there had been no commonly agreed performance standard or test method in North America for dorsal (back of hand) impact protection. Although many PPE manufacturers produce a wide range of protective gloves with new designs and materials constantly entering the market, there is either little differentiation between the materials used for impact protection; or performance claims can't be readily validated.

The lack of any objective performance standard has created a serious challenge for employers responsible for selecting appropriate PPE for industrial workers.

Why Standard is Important:

Finally, in the U.S., leading glove manufacturers and material suppliers have collaborated to develop new, voluntary standard from the International Safety Equipment Association—ISEA, an American National Standards Institute-accredited standards developing organization.

ANSI/ISEA 138, American national standard for performance and classification for impact-resistant hand protection, aims to improve on the somewhat limited treatment of impact performance recently incorporated into the main European hand protection standard, EN 388. That standard took its cues from an existing motorcycle impact standard for hand protection. Whereas EN 388 covers the knuckles, ANSI/ISEA 138 covers knuckles and fingers, which is critical for industrial glove users whose fingers are frequently at risk. The oil and gas sector, which is a large user of impact-protection gloves, has collected figures through the International Association of Drilling Contractors showing that, in 2016, fingers remained the most vulnerable part of the body in terms of both lost time and recordable injuries.

The ANSI/ISEA 138 standard, however, is specifically designed for industrial gloves and the special protections they offer. The defined ISEA 138 levels will give greater choice and flexibility to the end-user. Scaled performance levels help employers make a choice that meets the needs of their workforce, giving them the confidence to choose protective gloves that are both appropriate to potential risk and hazard levels.

The standard provides a reliable starting point to which end-users can apply all the variables affecting their specific workforce needs, including tasks, work environments, budgets, etc.

Key Compliance Requirements:

- ✔ define an agreed test method;
- ✔ include defined performance levels;
- ✔ specify a pictogram mark for each of the defined levels for compliant gloves;
- ✔ and require that product be tested in a laboratory having a certificate of accreditation meeting the requirements in ISO/IEC 17025:2017, General requirements for the competence of testing and calibration laboratories.

Compliance Assistance:

OSHA's library contains a general PPE assessment for employers, with checklists for specific topics, including hand/arm protection: https://bit.ly/2IVomdD. Or go to the standard itself: https://bit.ly/2DbNbhv.

Emergency Eyewash & Shower Equipment: ANSI/ISEA Z358.1-2014

History:

Emergency eyewash stations, as well as shower equipment, are addressed by ANSI/ISEA Z358.1-2014: American National Standard for Emergency Eyewash and Shower Equipment. This standard, written and published by the International Safety Equipment Association (ISEA), an ANSI-accredited standards developing organization, establishes minimum performance and use guidelines for eyewash and shower equipment for the emergency treatment of the eyes or body of someone who has been exposed to hazardous materials.

Photo courtesy Haws®

Regarding personnel safety, there are multiple factors to take into account when handling hazardous materials in factories, laboratories or other workplaces. Emergency showers and eyewash stations need to remain visible, easily accessible and reliable. They are a final level of protection, in many cases, as they can sufficiently combat any chemicals or other hazardous materials that may make contact with one's eyes or body.

OSHA regulations address emergency eyewash and shower equipment in 29 CFR 1910.151. Specifically, 1910.151(c) states: "Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use." However, this is the only federal requirement for emergency eyewash and shower equipment. OSHA has often referred employers to ANSI Z358.1 as a recognized source of guidance for protecting employees who are exposed to injurious corrosive materials. The standard has also been adopted by many governmental organizations and the International Plumbing Code.

Why Standard is Important:

The first 10-15 seconds after exposure to a hazardous substance, especially a corrosive substance, are critical. Delaying treatment, even for a few seconds, may cause serious injury.

This ANSI standard establishes minimum performance and use requirements for eyewash and shower equipment for the emergency treatment of the eyes or body of a person who has been exposed to hazardous materials. It covers the following types of equipment: emergency showers, eyewashes, eye/face washes and combination units.

Key Compliance Requirements:

The standard contains specific language for both showers and eyewashes, including performance, installation, maintenance and training components.

EMERGENCY SHOWERS

Performance: A means shall be provided to ensure that a controlled flow of flushing fluid is provided at a velocity low enough to be non-injurious to the user.

- ✔ Emergency showers shall be capable of delivering flushing fluid at a minimum of 75.7 liters/minute (20gpm) for a minimum of 15 minutes. If shut-off valves are installed in the supply line for maintenance purposes, provisions shall be made to prevent unauthorized shut off.
- ✔ Emergency showers shall provide a flushing fluid column that is at least 208.3cm (82in) and not more than 243.8cm (96in) in height from the surface on which the user stands.
- ✔ The spray pattern shall have a minimum diameter of 50.8cm (20in) at 152.4cm (60in) above the surface on which the user stands. The center of the spray pattern shall be located at least 40.6cm (16in) from any obstruction. The flushing fluid shall be substantially dispersed throughout the pattern.

- ✔ Emergency showers shall be designed, manufactured and installed in such a manner that, once activated, they can be used without requiring the use of the operator's hands.
- ✔ Emergency showers shall be constructed of materials that will not corrode in the presence of the flushing fluid. Stored flushing fluid shall be protected against airborne contaminants.

Installation: When the self-contained emergency shower is installed, its installation shall be verified in accordance with manufacturer's instructions. It is the installer's responsibility to ensure that emergency showers shall:

- ✔ Be assembled and installed in accordance with the manufacturer's instructions, including flushing fluid delivery requirements.
- ✔ Be in accessible locations that require no more than 10 seconds to reach. The emergency shower shall be located on the same level as the hazard; the path of travel shall be free of obstructions that may inhibit its immediate use.
- ✔ Be located in an area identified with a highly visible sign, positioned so the sign shall be visible within the area served by the emergency shower. The area around the emergency shower shall be well-lit.
- ✔ Be positioned so that the shower pattern is dispersed such that the top of the flushing fluid column is at least 208.3cm (82in) and not more than 243.8cm (96in) from the surface on which the user stands. The center of the spray shall be at least 40.6cm (16in) from any obstruction.
- ✔ Be connected to a supply of flushing fluid per the manufacturer's installation instructions to produce the required spray pattern for a minimum period of 15 minutes. Where the possibility of freezing conditions exists, the emergency shower shall be protected from freezing or freeze-protected equipment shall be installed. If shut-off valves are installed in the shower line for maintenance purposes, provisions shall be made to prevent unauthorized shut off.
- ✔ Deliver tepid flushing fluid. In circumstances where chemical reaction is accelerated by flushing fluid temperature, a facilities safety/health advisor should be consulted for the optimum temperature for each application.
- ✔ When the plumbed emergency shower is installed, its performance shall be verified in accordance with the following procedures:
  1. With the unit correctly connected to the flushing fluid source and the valve(s) closed, visually check the piping connections for leaks;
  2. Open the valve to the full-open position. The valve shall remain open without requiring further use of the operator's hands.
  3. With the valve in the fully opened position, measure the diameter of the spray pattern. It shall be a minimum of 50.8cm (20in) at 152.4cm (60in) above the standing surface. The flushing fluid shall be substantially dispersed throughout the pattern.
  4. Using the flowmeter or other means, determine that the rate of flow is at least 75.7 liters/minute (20gpm).
  5. Using a temperature gauge or other means, determine that the flushing fluid is tepid.


Photo courtesy Haws®

Maintenance and Training:

Manufacturers shall provide operation, inspection and maintenance instructions with emergency shower equipment. Instructions shall be readily accessible to maintenance and training personnel.

- ✔ Plumbed emergency showers shall be activated weekly for a period long enough to verify operation and ensure that flushing fluid is available.
- ✔ Self-contained emergency showers shall be visually checked weekly to determine if flushing fluid needs to be changed or supplemented. Such inspection shall be conducted in accordance with manufacturer's instructions.
- ✔ Employees who may be exposed to hazardous materials shall be instructed in the location and proper use of emergency showers.
- ✔ All emergency showers shall be inspected annually to assure conformance with this standard.

EYEWASH EQUIPMENT

Performance:

A means shall be provided to ensure that a controlled flow of flushing fluid is provided to both eyes simultaneously at a velocity low enough to be non-injurious to the user.

- ✔ The eyewash shall be designed and positioned in such a way as to pose no hazard to the user.
- ✔ Nozzles and flushing fluid units shall be protected from airborne contaminants. Whatever means is used to afford such protection, its removal shall not require a separate motion by the operator when activating the unit.
- ✔ Eyewashes shall be designed, manufactured and installed in such a manner that, once activated, they can be used without requiring the use of the operator's hands.
- ✔ Eyewashes shall be constructed of materials that will not corrode in the presence of the flushing fluid.
- ✔ Eyewashes shall be capable of delivering flushing fluid to the eyes not less than 1.5 liters/minute (0.4gpm) for 15 minutes. If shut-off valves are installed in the supply line for maintenance purposes, provisions shall be made to prevent unauthorized shut off.
- ✔ Eyewashes shall be designed to provide enough room to allow the eyelids to be held open with the hands while the eyes are in the flushing fluid stream.
- ✔ Eyewashes shall provide flushing fluid to both eyes simultaneously. A test gauge for making determination of a suitable eyewash pattern shall be a minimum 10.16cm (4in) in length with two sets of parallel lines equidistant from the center. The interior set of lines shall be 3.18cm (1.25in) apart and the exterior lines shall be 8.26cm (3.25in) apart. Place the gauge in the stream of the eyewash. The flushing fluid shall cover the areas between the interior and exterior lines of the gauge at some point less than 20.3cm (8in) above the eyewash nozzle(s).

Photo courtesy Haws®

Maintenance and Training:

Manufacturers shall provide operation, inspection and maintenance instructions with eyewashes. Instructions shall be readily accessible to maintenance and inspection personnel.

- ✔ Plumbed eyewashes shall be activated weekly for a period long enough to verify operation and ensure that flushing fluid is available.
- ✔ Self-contained eyewashes shall be visually checked weekly to determine if flushing fluid needs to be changed or supplemented. Such inspection shall be conducted in accordance with manufacturer's instructions.
- ✔ Employees who may be exposed to hazardous materials shall be instructed in the location and proper use of emergency eyewashes.
- ✔ All eyewashes shall be inspected annually to assure conformance with this standard.

Compliance Assistance:

The standard is available at the ANSI Webstore, along with information, specifications, performance guidelines, and illustrations for emergency shower and eyewash stations: https://bit.ly/2Rj5JjY

Read more at the ANSI Blog: Standard for Emergency Eyewash and Shower Stations: ANSI/ISEA Z358.1-2014 https://bit.ly/2Rj17KP

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Machine Safety: ANSI B11 Series

History:

B11 Standards, Inc., founded in 2010, is an ANSI-accredited Standards Developing Organization that administers and develops the ANSI B11 series of American National Standards and Technical Report on machine/machine too/machinery safety. B11 Standards Inc. is accredited by ANSI as the U.S. Technical Advisory Group Administrator to ISO Technical Committee 199 (machinery safety standards) and ISO Technical Committee 39 Subcommittee 10 (machine tool safety standards).

B11 Standards Inc. also participates in a very large number of both national and international standards development activities.

B11 Standards, Inc. is accredited by ANSI as the United States Technical Advisory Group (TAG) Administrator to two International Standards Organization (ISO) Technical Committees (TC), ISO/TC 199 on Machinery Safety and ISO/TC 39 / SC 10 on Machine Tool Safety.

Why Standard is Important:

The organization believes that standards provide a bridge between research, innovation and the market, helping to boost growth, jobs and competitiveness. They are a valuable tool for market dissemination of research and development results. This helps contribute to the objectives of overall market innovation and competitiveness.

The B11 ASC is comprised of organizations representing different stakeholder groups having a substantial interest and competence in the overall scope of B11 standards. It is recognized by ANSI as the body that evaluates and votes on final draft standards (or technical reports) developed by B11 writing subcommittees for approval as American National Standards and ANSI Technical Reports by the ANSI Board of Standards Review.

Key Compliance Requirements:

Safety of Machines: This can be a single machine or a machinery system(s).

This Type-A standard applies to new, existing, modified or rebuilt power driven machines, not portable by hand while working, that are used to process materials by cutting; forming; pressure; electrical, thermal or optical techniques; lamination; or a combination of these processes. This includes associated equipment used to transfer material or tooling, including fixtures, to assemble/disassemble, to inspect or test, or to package. The associated equipment, including logic controller(s) and associated software or logic together with the machine actuators and sensors, are considered a part of the industrial machinery.

The B11 standards and reports have an ISO A-B-C level structure:

Type-A standards (basis standards) give basic concepts, principles for design and general aspects that can be applied to machinery; Type-B standards (generic safety standards) deal with one or more safety aspects or one or more types of safeguards that can be used across a wide range of machinery; Type-B1 standards are on particular safety aspects (e.g., safety distances, surface temperature, noise); Type-B2 standards are on safeguards (e.g., two-hand controls, interlocking devices, pressure sensitive devices, guards); and Type-C standards (machinery safety standards) deal with detailed safety requirements for a particular machine or group of machines.

The ANSI B11.0 is a type-A standard that applies to a broad array of machines. The machine-specific (type-C) B11 standards contain detailed safety requirements for a particular machine or group of machines. The ANSI B11.0, ANSI B11.19 and the machine-specific B11 standards are intended to be used concurrently by the supplier and user of machines. When a type-C standard deviates from one or more provisions dealt with by this standard or by a type-B standard, the type-C standard takes precedence.

Compliance Assistance:

→ To purchase/download the standard: https://bit.ly/2FK8dqi

→ OSHA's machine guarding/safety assistance: https://bit.ly/2SmcJwL

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ISO 12100:2010 Safety Of Machinery-Design Risk Assessment & Reduction

History:

According to the WTO/TBT Agreement of 1995, member nations are required to create standards, such as compulsory standards, voluntary standards and conformance assessment processes, by integrating said standards with international standards—like the ISO and IEC standards. Facilities and machines conform to ISO/IEC standards. This makes it possible to, in general instances, make these facilities and machines conform to the technical criteria of various countries in order to increase unity around the world. Thus, allowing for fewer restrictions to worldwide trade.

Key Requirements:

SO 12100:2010 (ISO 12100) specifies basic terminology, codes and a methodology for achieving safety in the design of machinery. It stipulates principles of risk assessment and risk reduction to aid designers in reaching this objective. These principles are grounded on information and experience of the design, use, incidents, accidents and risks related to machinery.

Within the standard, procedures are defined for identifying hazards; approximating and evaluating risks throughout relevant stages of the machine life cycle; and for the elimination of hazards or sufficient risk reduction. Direction is provided on the documentation and verification of the risk assessment and risk-reduction process. ISO 12100:2010 is additionally intended to be utilized as a base for the preparation of type-B or type-C safety standards. It doesn't contract with risk and/or damage to domestic animals, property or the environment.

Why the Standard is Important:

The ISO 12100 standard substitutes ISO 12100-1:2003, ISO 12100-2:2003 and ISO 14121-1:2007. The new standard will benefit designers who identify risks during the design stage of machine production, decreasing the potential for accidents.

The risk assessment procedures provided in ISO 12100 are offered as a series of logical steps, helping designers to methodically define the limits of the machinery; identify risks of hazards such as crushing, cutting, electric shock or fatigue; and estimate potential dangers, fluctuating from machine failure to human error.

By providing a best practices framework at the international level, ISO 12100 will help eradicate technical barriers to trade, while at the same time upholding the safety and health of users of machinery, in line with necessities of national legislations of countries around the world. This is an especially important standard for machine builders.

Differences Between ISO and ANSI Standard:

Before a manufacturer can reap the benefits of safety practices, they need to understand which machine standards to follow. In terms of performing a risk assessment, the international standard ISO 12100:2010, and the North American standard ANSI B11.0-2010 are similar in many ways, but they also differ.

ANSI B11.0 is a significant document for machinery safety and for the safety of end-users. The scope of the standard focuses on new, modified or rebuilt power-driven machines, not portable-by-hand, used-to-shape and/or form metal, or other materials by cutting, impact, pressure, electrical or other processing techniques, or a combination of these processes. The ISO 12100 standard is geared more toward original equipment manufacturers (OEMs), while ANSI B11.0 covers not only machine builders, but also end-users.

This means there may be some subtle terminology in ANSI B11.0 geared for end-users that may not have a direct correlation with the ISO standards. Other than that, the risk assessment principals and requirements documentation are almost the same for both standards.

The ANSI B11.0 standard references the similarities between the two:

"This standard has been harmonized with international (ISO) and European (EN) standards by the introduction of hazard identification and risk assessment as the principal method for analyzing hazards to personnel to achieve a level of acceptable risk. This standard integrates the requirements of ANSI/ISO 12100 parts 1 and 2, and ISO 14121 (now combined into a single standard–ISO 12100), as well as selected U.S. standards. Suppliers meeting the requirements of this ANSI B11.0 standard may simultaneously meet the requirements of these ISO standards."

There is an equivalency between the two standards. If a builder designs a machine to ANSI B11.0 and ships it to Europe or any non-North American country, it would, for all practical purposes, have met ISO 12100 or EN ISO 12100 requirements because of the harmonization. The same is true for machines built offshore that meet ISO 12100 specifications before being shipped to North America. Both standards are globally recognized.

Compliance Assistance:

Designers who are interested in purchasing the full guide for *ISO 12100:2010 Safety Of Machinery - General Principles for Design - Risk Assessment And Risk Reduction Standard* can visit: https://bit.ly/2E4XsfA

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"Moving parts, extreme temperatures, constant noise and sharp edges comprise only a few of the hazards innate to machinery. Accidents involving machinery incur high costs, both in human terms and also economic and societal ones. Helping to assure the safety and health of consumers is a key component of ANSI's goal. Vast reduction of injury can be accomplished by considering safety hazards from the initial concept and design of machinery. ISO 12100 Safety of Machinery-General Principals for Design-Risk Assessment and Risk Reduction, available through ANSI, establishes basic terminology, and is used to aid in decision-making through the design process." - Julie Wallace, Sr. Product Manager, American National Standards Institute (ANSI)

American National Standards Institute, 212-642-4900, www.ansi.org

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OSHA's Crystalline Silica Standard

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History:

The health risks associated with exposure to dust containing crystalline silica are well-known today, but it is important to note this wasn't always the case. In 1700, Dr. Bernardino Ramazzini found evidence of silicosis in stone cutters. Approximately 200 years later, Dr. Alice Hamilton, a physician whose work resulted in significant safety and health reforms, documented silica-related illnesses being common in granite workers. In the early 1900s, granite cutters in Vermont acknowledged there was a connection between the dust they were inhaling and resulting fatal illnesses.

A slow up-hill battle ensued, and employees struggled to attain proper ventilation and equipment. The real breakthrough came in the 1930s, when federal government responded in 1938. U.S. Secretary of Labor Francis Perkins held a National Silicosis Conference and initiated a campaign to "Stop Silicosis," asserting that: "Our job is one of applying techniques and principles to every known silica dust hazard in American industry. We know the methods of control—let us put them in practice."

Why Standard is Important:

Silicosis deaths have declined in recent years, but it does not detract from the severity of the problem. From 2005-2014, silicosis was listed as an underlying or a contributing cause of death on over 1,100 death certificates in the U.S., and most deaths from silicosis go undiagnosed and unreported. In addition, those numbers of silicosis deaths do not include additional deaths from other silica-related diseases, such as COPD, lung cancer and kidney disease. It is import to always be obtaining current data and updating procedures, as the industry continues to learn more about avoiding inhalation of silica.

This year, the final rule on Occupational Exposure to Respirable Crystalline Silica went into effect. OSHA estimates that this new rule will save over 600 lives annually, preventing more than 900 new cases of silicosis, and it will also provide net benefits of about $7.7 billion per year.

"More than 80 years ago, Labor Secretary Frances Perkins identified silica dust as a deadly hazard and called on employers to fully protect workers," quoted U.S. Secretary of Labor Thomas E. Perez. "This rule will save lives. It will enable workers to earn a living without sacrificing their health. It builds upon decades of research and a lengthy stakeholder engagement process—including the consideration of thousands of public comments—to finally give workers the kind of protection they deserve and that Frances Perkins had hoped for them." (U.S. Department of Labor)

Key Compliance Requirements:

The standard for general industry and maritime (29 CFR 1910.1053) requires employers to:

- ✔ Assess employee exposures to silica if it may be at or above an action level of 25 µg/m3 (micrograms of silica per cubic meter of air), averaged over an 8-hour day;
- ✔ Protect workers from respirable crystalline silica exposures above the permissible exposure limit (PEL) of 50 µg/m3, averaged over an 8-hour day;
- ✔ Limit workers' access to areas where they could be exposed above the PEL;
- ✔ Use dust controls to protect workers from silica exposures above the PEL;
- ✔ Provide respirators to workers when dust controls cannot limit exposures to the PEL;
- ✔ Use housekeeping methods that do not create airborne dust, if feasible;
- ✔ Establish and implement a written exposure control plan that identifies tasks that involve exposure and methods used to protect workers;
- ✔ Offer medical exams—including chest X-rays and lung function tests—every three years for workers exposed at or above the action level for 30 or more days per year;
- ✔ Train workers on work operations that result in silica exposure and ways to limit exposure; and
- ✔ Keep records of exposure measurements, objective data and medical exams.

Compliance Assistance:

OSHA's *Small Entity Compliance Guide for the Respirable Crystalline Silica Standard for General Industry and Maritime* is a good resource for information on how to implement changes in the work environment and educate employees on the new procedures. https://bit.ly/2zqQgHt

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OSHA 1910.138: Hand Protection, General Requirements

History:

Back in the day, workers considered it a sign of durability and hardiness to not wear gloves when performing tasks in the workplace. Most never considered wearing gloves to keep a better grip on tools, prevent knuckle busters and burns, or just to keep the hands clean. This attitude is often still a problem in today's workforce. Hand injuries, including injury to fingernails and fingers, are often written off as first-aid usage and near-misses. That is why OSHA has come up with its 1910.138 standard outlining the general requirements employers should contemplate when selecting PPE equipment for hand protection.

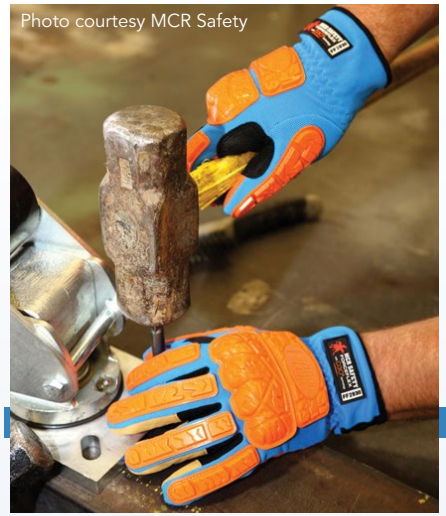
Photo courtesy MCR Safety

Compliance Requirements:

The requirement is clearly stated on OSHA's website:

Standard 1910.138(a) General requirements: *"Employers shall select and require employees to use appropriate hand protection when employees' hands are exposed to hazards, such as those from skin absorption of harmful substances; severe cuts or lacerations; severe abrasions; punctures; chemical burns; thermal burns; and harmful temperature extremes."*

Standard 1910.138(b) deals with the selection of such protective hand gear: *"Employers shall base the selection of the appropriate hand protection on an evaluation of the performance characteristics of the hand protection relative to the task(s) to be performed, conditions present, duration of use, and the hazards and potential hazards identified."*

Why Standard is Important:

Many consider the use of gloves hard to comply with and unnecessary. Yet, more categories and classifications of gloves for broader purposes exist than ever before—cut-resistant, chemical protective, electrically-rated, infection control—just to name a few.

The PPE standard for hand protection, 29 CFR 1910.138, specifies the selection criteria to be used when providing hand protection, and ensures that employers provide their workers with PPE that is relevant to their work. OSHA advises employers to use manufacturers' data on the effectiveness of any given product to protect against cold, as well as employee feedback, in selecting hand protection.

As stated in paragraph 2 of Appendix B, Assessment and Selection: *"It should be the responsibility of the safety officer to exercise common sense and appropriate expertise to accomplish these tasks."*

Compliance Assistance:

OSHA has put out a *Guide for Personal Protective Equipment*, which includes a section outlining their policies on hand protection. Supervisors and people in charge of worker safety wishing to seek out more information can consult this comprehensive guide to personal protective equipment. www.osha.gov/Publications/osha3151.pdf


Photo courtesy MCR Safety

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"The OSHA 1910.138 is one of the most important standards of protection that directly relates to the overall mission of MCR Safety. 'We Protect People' is what MCR Safety does on a daily basis by manufacturing safety gear utilizing the latest technology in raw materials. We may not shoulder a weapon or wear a badge. However, we do take pride in keeping America's workforce safe and injury free with MCR Safety Personal Protective Gear. #WeProtectPeople" *MCR Safety, www.mcrsafety.com, 800-955-6887*

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ANSI MH29.1-2012: Safety Requirements For Industrial Scissors Lifts

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History:

In 2014, the International Building Code (IBC) officially recognized ANSI code MH29.1:2012 as the authority over industrial scissors lifts.

The reference can be found in Chapter 30, section 3001.2. This was considered a big win at the time, since some states and municipalities go strictly by the IBC, and it clearly separates industrial scissors lifts from elevators. Rider mezzanine lift approvals are now much easier. This recognition helped those who had problems getting job approval by empowering them to let their inspectors know that industrial scissors lifts are in now included in the IBC.

Compliance Requirements:

Mobile and stationary industrial scissors lifts raise, lower and position materials and personnel in various applications but are different from other conveyances, such as aerial work platforms (AWP) and elevators. MH29.1 has been revised to better illustrate that personnel operate and may themselves be raised or lowered by industrial scissors lifts.

Photo courtesy Advance Lifts Inc.

This standard now defines dock lifts, work access lifts and lift tables as the three categories of industrial scissors lifts and identifies their differences and similarities. The responsibilities of manufacturers, users, owners and operators have been reordered, consolidated and enhanced. Lastly, the requirements within the standard have been revised where needed to ensure they are stated using mandatory language.

The over-arching goal to the latest version of MH29.1: 2012 is to better conform to other equipment codes recognized by the ICC board and the International Building Code (IBC) by establishing mandatory and unified language. IBC now recognizes ANSI code MH29.1:2012 as the authority over industrial scissors lifts.

The second goal is to provide clarity to the definitions contained within the code and further delineate between industrial scissors lifts and the aerial-type scissors lifts. The modifications to the definitions describe and define which type of scissors lifts may have riders on-board and the ones upon which riders are not allowed.

The final goal for establishing these new safety standards is that users of industrial scissors lifts are insured that the manufacturers who design and build are releasing products that hold to the highest of regulated standards and safety requirements.

Compliance Assistance:

To order a complete copy of the ANSI MH29.1:2012 Standard of Safety Requirements visit MHI.Org–LMPS industry section: https://bit.ly/2PBxSBi

The Lift Manufacturers Product Group (LIFT) members are the resource for industry best practices, standards, information and equipment that lifts, rotates, tilts and otherwise positions materials. Industry scissors lifts and tilters can also improve the working interface between people and the materials they must move to reduce injury, increase productivity, and eliminate wasted motion, while providing a significant return on investment.

In 2017, LIFT made an excerpt from the MH29.1 standard (ANSI MH29.1:2012-Industrial Scissor Lifts Safety Requirements) available for free download on the MHI website.

LIFT members wanted to ensure access to the key responsibilities in safety requirements for owners and users of scissor lifts. The sections referring to these responsibilities have been extracted and made available. Download the free excerpt at https://bit.ly/2C3YMOm.

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RIDER MEZZANINE LIFTS

HIGH CYCLE LIFTS

DOCK LIFTS

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OSHA 1910: 1200—HazCom Standard

History:

OSHA refers to this Hazard Communication Standard (HCS) as the one "that gave workers the right to know now gives them the right to understand."

Photo courtesy Avery

To be specific: On March 26, 2012, OSHA amended the 1983 hazard communication standard to align with the Globally Harmonized System for the Classification and Labelling of Chemicals (GHS). The Hazard Communication Standard of 1983 gave the workers the "right to know," but the updated Globally Harmonized System gave workers the "right to understand."

In order to ensure chemical safety in the workplace, information about the identities and hazards of the chemicals must be available and understandable to workers.

OSHA's 1910: 1200 HCS requires:

- ✓ Chemical manufacturers and importers to evaluate the hazards of the chemicals they produce or import, and prepare labels and safety data sheets to convey the hazard information to their downstream customers;
- ✓ All employers with hazardous chemicals in their workplaces to have labels and safety data sheets for their exposed workers, and train them to handle the chemicals appropriately.

The OSHA Hazard Communication Standard is composed of five key elements. These five elements are:

1. Materials Inventory: A list of the hazardous materials present in your work area.
2. Material Safety Data Sheets: A detailed description of each hazardous material listed in the Materials Inventory.
3. Labeling: Containers of hazardous materials must have labels which identify the material and warn of its potential hazard to employees.
4. Training: All employees must be trained to identify and work safely with hazardous materials.
5. Written Program: A written program must be developed which ties all of the above together.

OSHA cites the most penalized industries as follows:

- ✓ Foundation, Structure and Building Exterior Contractors
- ✓ Automotive Repair and Maintenance
- ✓ Building Finishing Contractors
- ✓ Architectural and Structural Metals Manufacturing
- ✓ Machine Shops; Turned Product; and Screw, Nut and Bolt Manufacturing

Key Compliance Requirements:

As of June 2016, HCS required employers to have updated alternative workplace labeling and hazard communication programs in effect, and to provide additional employee training for newly identified physical or health hazards. These were considered significant changes to the standard.

Major changes to the Hazard Communication Standard

- ✓ **Hazard classification:** Provides specific criteria for classification of health and physical hazards, as well as classification of mixtures.
- ✓ **Labels:** Chemical manufacturers and importers are required to provide a label that includes a harmonized signal word, pictogram and hazard statement for each hazard class and category. Precautionary statements must also be provided.
- ✓ **Safety Data Sheets:** have a specified 16-section format.
- ✓ **Information and training:** Employers are required to train workers on the labels elements and safety data sheets to facilitate recognition and understanding.

Compliance Assistance:

To see the standard in its entirety, go to: https://bit.ly/2zHZcsd

Also, the Hazard Communication page on OSHA.gov includes downloadable versions of the revised 1910.1200 Final Rule and appendices, updated to align with the GHS; a comparison of the Hazard Communication Standard, issued in 1994 (HazCom 1994), with the revised Hazard Communication Final Rule issued in 2012 (HazCom 2012); frequently asked questions on the revisions; and new guidance materials on the revisions. The page also contains the full regulatory text and appendices of HazCom 1994.

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OSHA 1910.136(a): Foot Protection

History:

As part of the rules and regulations regarding workplace safety, the Occupational Safety & Health Administration (OSHA) requires protective footwear for workers in industrial settings. Occupational foot protection is included in the Personal Protective Equipment (PPE) section of the Occupational Safety and Health Standards, specifically 29 CFR 1910.136.

The existing OSHA standards for PPE are contained in Subpart I of OSHA's general industry standards. These standards were adopted in 1971 from established federal standards and national consensus standards. Originally, 29 CFR 1910.136 incorporated the ASTM F2412-05 Standard Test Methods for Foot Protection, F2413-05 Standard Specification for Performance Requirements for Protective Footwear and the American National Standards Institute (ANSI) American National Standard for Personal Protection-Protective Footwear (ANSI Z41-1999 and Z41-1991). In March 2005, the ANSI Z41 reference was withdrawn and replaced by the ASTM Standards.


Photo courtesy Impacto

In 2007, OSHA issued a rule requiring employers to provide PPE at no cost to their employees when the PPE is used to comply with OSHA standards. Specific to footwear, the rule said employers aren't required to pay for non-specialty, safety-toe protective footwear when the employee is able to wear it off the workplace. But, if employees are required by employers to keep non-specialty safety-toe protective footwear at the workplace, companies must pay for that footwear. If the safety-toe protective footwear is a non-standard "specialty" item, such as non-skid shoes, the employer must pay for them. OSHA also orders employers to pay for required footwear using metatarsal protection.

Why Standard is Important:

According to data from the U.S. Bureau of Labor Statistics, a total of 5,190 workers died from an occupational injury in 2016. This number increased by 7% from 2015 and is the highest count since 2008.

Companies that do not comply with OSHA regulations can find themselves with citations and fines. Fees for violations start at a few thousand dollars, but OSHA raised its maximum penalties in 2018 from $12,600 to $12,934 for "serious" and "other-than-serious" violations. Plus, "willful or repeat" violations can now carry a maximum of $129,336.

BLS data also reports approximately 120,000 workers annually suffer from toe, foot and ankle injuries, which average six days to heal. Adding up the cost of OSHA fines, plus the loss in productivity caused by an injury and possible workers' compensation costs, as well as the possibility of an additional hire, lack of foot protection can mean big bucks for a company.

Key Compliance Requirements:

OSHA's 1910.136 (a) standard says: *"The employer shall ensure that each affected employee uses protective footwear when working in areas where there is a danger of foot injuries due to falling or rolling objects, or objects piercing the sole, or when the use of protective footwear will protect the affected employee from an electrical hazard, such as a static-discharge or electric-shock hazard, that remains after the employer takes other necessary protective measures."*

OSHA suggests protective footwear be worn in situations involving the following: corrosive or poisonous materials; electrical hazards; static electricity that could cause an explosion; heavy objects that could roll onto feet; sharp objects that could puncture the foot; molten metal that could splash onto feet; and hot or slippery surfaces.

Employers are responsible to ensure employees wear footwear that protects against the hazards they will encounter on the job. The footwear also must meet industry consensus standards, such as ASTM F2412-11, Standard Test Methods for Foot Protection, which requires footwear's performance to be evaluated for impact and compression resistance in the toe area; metatarsal and puncture protection; conductive properties to reduce hazards from static electricity buildup; electrical hazards from stepping on a live wire; and static dissipative properties.

OSHA recommends companies conducting an assessment either by an in-house safety staff member or by an outside consultant to determine the correct protective footwear.

Compliance Assistance:

For more information, please visit: https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.136

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OSHA 1926.350-Gas Welding & Cutting

History:

During the late 1800s, gas welding and cutting was developed. The production of oxygen, the liquefying of air, along with the introduction in 1887 of a blow pipe or torch, helped the expansion of both welding and cutting. Before 1900, hydrogen and coal gas were mixed with oxygen; but, in about 1900, a torch appropriate for use with low-pressure acetylene was developed, and the oxyacetylene gas welding and cutting processes were propelled. Today, OSHA provides their 1926.350 standard, which defines the safety requirements involved in such work.

Standard Requirements:

There are many requirements which may possibly apply to your business; they can all be accessed on OSHA's website.

A list of OSHA Training Requirements are as follows for 1926.350–Gas Welding and Cutting:

1. Before a regulator to a cylinder valve is connected, the valve shall be opened slightly and closed immediately. (This action is commonly termed "cracking" and is intended to clear the valve of dust or dirt that may otherwise move into the regulator.) The person cracking the valve must stand to one side of the outlet and not in front of it. The valve of a fuel gas cylinder can't be cracked where the gas would spread welding work, sparks, flame or other possible causes of ignition.
2. The cylinder valve should be opened slowly to prevent impairment to the regulator. For quick closing, valves on fuel gas cylinders cannot be opened more than 1-1/2 turns.
3. Fuel gas shall not be used from cylinders through torches or other devices which are equipped with shutoff valves without dropping the pressure through a suitable regulator attached to the cylinder valve or manifold.
4. Before a regulator is detached from a cylinder valve, the cylinder valve should be closed and the gas freed from the regulator.
5. If the valve on a fuel gas cylinder is unlocked, and there's a leak around the valve stem, the valve must be closed and the gland nut tightened. If this action does not stop the leak, the use of the cylinder should be stopped, then properly tagged and removed from the work area.
6. If a leak should develop at a fuse plug or other safety device, the cylinder shall be removed from the work area.

Photo courtesy Glove Guard LP

Additional Information:

Because of their volatility, extra safety precautions must be observed when using the combination of gases required for welding or cutting operations. It is important to remember not to handle compressed gas cylinders roughly, because the contents are under pressure. Moreover, compressed gas cylinders should be fastened securely with a chain or strap in an upright position to a wall or cart. Regulators

should be removed and protective caps replaced before moving or transporting any compressed gas cylinder.

When using compressed gas:

- ✓ Keep fire extinguishing equipment readily accessible near welding or cutting operations, if combustible materials are present.
- ✓ Locate CGCs away from areas where they may be struck or subjected to physical damage. They must be a safe distance from arc welding, cutting operations or any other source of heat, sparks or flame.
- ✓ Periodically check connections for leaks to prevent fires or explosions. Use a direct-reading instrument, or apply soapy water to connections and check for bubbles. Repair leaks immediately.
- ✓ Use acetylene tanks only while in an upright position.
- ✓ Open cylinder valves as required by the type of gas.

Why the Standard is Important:

The purpose of these requirements is to ensure the safe handling and use of compressed gas cylinders used for welding and cutting. They cover handling, use and storage as they apply to workers and supervisors. Compressed gas cylinders can have internal pressure of up to 2,500lbs per square inch. Mishandling such equipment could prove disastrous to workers and a facility. Dipping, tilting over or exposing a cylinder to heat can cause flaws or cracks in the cylinder's shell, which can result in a shrapnel-laden explosion.

Many companies are already implementing these requirements in the products they offer. For example, part (a) (7) of 1926.350 clearly states that, "A suitable cylinder truck, chain or other steadying device shall be used to keep cylinders from being knocked over while in use."

One such product, the BottleChock™ restraint by Glove Guard, restricts both vertical and horizontal movement and is a viable storage solution for cylinders, drums, piping or other cylindrical objects. Thus, it fully complies with OSHA's 1926.350 standard.

Compliance Assistance:

There are many resources you can take advantage of as a supervisor or as a worker to learn more about OSHA's 1926.350 Standard. J.J. Keller offers a Compressed Gas Cylinders-Online Training Course, https://bit.ly/2zOP5BR and the OSHA website provides their interpretation letters, which explain the requirements and how they apply to specific circumstances. https://bit.ly/2LfmZVf

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NFPA 68: Explosion Protection

History:

The National Fire Protection Association's NFPA 68-2018: Standard on Explosion Protection by Deflagration Venting provides benchmarks for deflagration vents to diminish the potential harm brought on by the dispensation of combustible dust, which is surprisingly abundant in some work facilities.

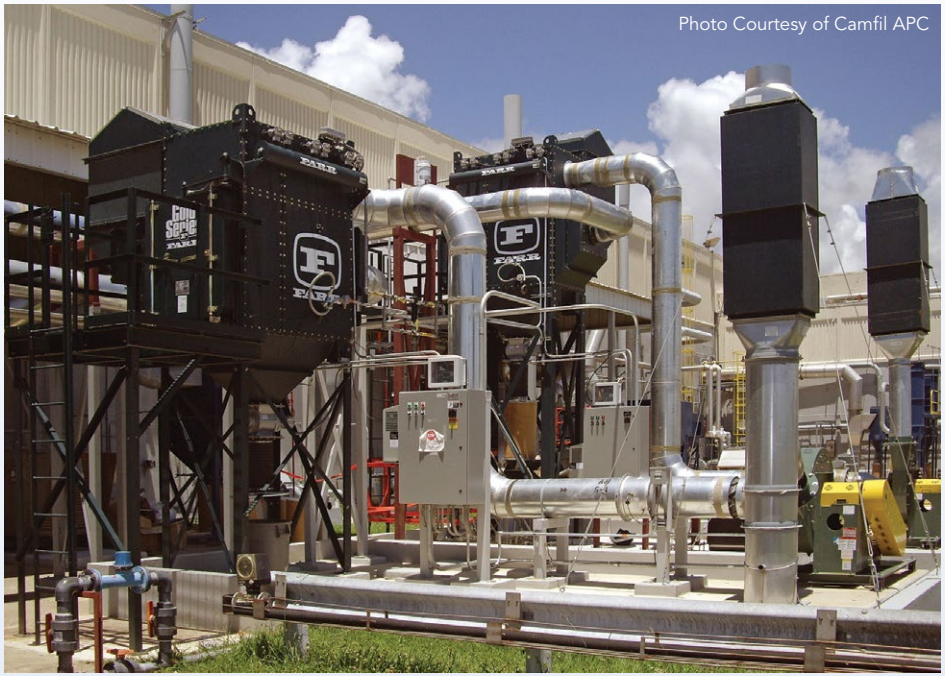
Deflagration is a combustion that spreads through a gas or along the surface of an explosive at a swift rate, driven by the transfer of heat.

Many voluntary consensus standards were/are aimed towards providing safe environments when combustible dusts and particulate solids are present. NFPA 652-2019: Standard on the Fundamentals of Combustible Dust outlines the basic principles on these, while NFPA 654-2017: Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids complements it, contributing rules and strategies for the stages of the manufacturing, processing, blending, conveying, repackaging and handling of combustible particulate solids/hybrid mixtures.

Compliance Requirements:

The NFPA guide lists the following basic principles that are common to the venting of deflagrations:

1. The vent design must be sufficient to prevent deflagration pressure inside the dust collector from exceeding two-thirds of the ultimate strength of the weakest part of the dust collector, which must not fail. This principle does anticipate that the dust collector may deform. Expect some downtime with the dust control system after an explosion.
2. Dust vent explosion operation must not be affected by snow, ice, sticky materials or comparable interferences.
3. Dust explosion vent closures must have a low mass per unit area to reduce opening time. NFPA recommends a maximum total mass divided by the area of the vent opening of 2.5 lbs./ft2.
4. Dust explosion vent closures should not become projectiles as a result of their operation. The closure should be correctly restrained without affecting its purpose.
5. Vent closures must not be affected by the process settings which it protects or by conditions on the non-process side.
6. Explosion vent closures must release at overpressures close to their design release pressures. Magnetic or spring-loaded closures will satisfy this criterion when properly designed.
7. Explosion vent closures must reliably withstand fluctuating pressure differentials that are below the design release pressure.
8. Dust explosion vent closures must be inspected and properly upheld in order to ensure dependable operation. In some cases, this may mean replacing the vent closure at appropriate time intervals.



These dust collectors are equipped with passive and active controls that include an explosion vent and ducting, as well as a chemical isolation system mounted on the inlet duct.

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"Our mission is to provide dust collection equipment that is compliant to all relevant standards in the safety and NFPA world. NFPA 68 is imperative in our ability to design safe, reliable and cost-effective systems that help prevent and mitigate combustible dust hazards." - Brian Richardson, Technical Departments Manager for Camfil APC

Camfil APC, (870)933-8048, www.camfilapc.com

EXPLOSION PROTECTION BY DEFLAGRATION VENTING: 2018 UPDATES

The new version of NFPA 68 Standard on Explosion Protection by Deflagration Venting has made some slight modifications to the design equations that could affect the calculated vent size under special circumstances. Given the fact that NFPA 68 is a standard, calculations for new explosion mitigation designs should reflect these changes, so as to comply with fire and building codes.

The standard was official updated to go into effect and approved as an ANSI standard on Nov 30, 2017.

In the 2018 edition, a requirement has been added to adjust the K_{st} values for certain metal dusts if the K_{st} value was obtained in a vessel smaller than 1 m^3, and an equation has been added to determine the hydraulic diameter for rectangular enclosures.

The chapter on venting gas mixture and mist deflagrations (68-15) was reorganized to clarify the order and applicability of the various adjustments and corrections to required vent area, and a new annex was added to implement the equations and calculation procedures, including partial volume effects. The requirements for determining K_G were replaced with determining P_{max} and the equations to determine the turbulent flame enhancement were revised.

The chapter on venting dust and hybrid mixture deflagrations (68-19) was also reorganized in order of intended execution. The equation for determining vent area for elevated or subatmospheric pressure was revised, and an example calculation was added to the annex. In addition, the method of determining enclosure volume for dust collectors was revised, and a definition for "flexible filter" has been added. Requirements for the use of plastic buckets in bucket elevators have been moved from the annex to the body of the standard.

9. The supporting structure for the dust collector must be strong enough to endure any reaction forces developed as a result of operation of the dust explosion vent.
10. Industrial exhaust system ductwork connected to the dust collector could also require explosion venting.

Why Standard is Important:

When deflagrations or explosions befall, vents can help. These frequently are installed in numerous at-risk industrial process components, including those designed to alleviate or control hazards of combustible dust, such as dust collectors, process vessels, duct/piping networks and industrial assemblies.

OSHA has presented evidence that facilities which process agricultural products, agricultural dusts carbonaceous dusts, chemical dusts, metal dusts, or plastic dusts are in danger of experiencing a combustible dust explosion.

Many of these solid, organic materials, metals and non metallic inorganic materials are not normally combustible, but if the particles are of a certain size or concentration, they present fire or deflagration hazards. The standard helps eliminate the chance of an explosion occurring.

Compliance Assistance:

The full standard requirement can be downloaded on the Nation Fire Protection Association's official website: https://bit.ly/2EdcBfN

This dust collector is equipped with an explosion vent with vertical upblast defector plate. *Photo Courtesy of Camfil APC*

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FR/Electrical Safety-NFPA 70E Standard

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History:

According to the U.S. Bureau of Labor Statistics' Census of Fatal Occupational Injuries and Survey of Occupational Injuries data compiled by Electrical Safety Foundation International (ESFI), there were 154 electrical fatalities in the U.S. during 2016, a 15% increase over the 2015 total.


Photo courtesy Tingley Rubber Corporation

Exposure to electric current increased one place, to sixth on the list of occupational exposures leading to fatal injuries on the job. And electrocutions constituted the vast majority of electrical fatalities, while electrical burns of all degrees were responsible for four fatalities in 2016.

Despite these bleak numbers, decades ago, the grim statistics of fatalities and serious injuries stemming from electrical accidents were even worse. This is why on February 16, 1972, the Occupational Safety and Health Administration (OSHA) incorporated the 1971 edition of the National Fire Protection Association's (NFPA) National Electrical Code (NEC), NFPA 70-1971, as the electrical standard for general industry. On January 16, 1981, OSHA revised its electrical installation standard, replacing the incorporation by reference of the 1971 NEC with relevant requirements from Part 1 of the 1979 edition of NFPA 70E. This revision simplified and clarified the electrical standard.

In 1981, safety-related work practice requirements were added, and in 1995, the concepts of "limits of approach" and "arc flash" were introduced. The last two decades have concentrated on personal protective equipment (PPE) requirements and the development of electrical safety programs and policies by employers.

> "Electrical accidents are usually caused by unsafe conditions of some variety due to unsafe equipment and installations, unsafe work environments or work practices, or a combination of all three."

The current emphasis is on a business' duty to have a comprehensive electrical safety program that is integrated with the occupational health and safety management system. The 2015 edition defined risk-management terminology and aligned the standard's requirements to risk management principles.

Why Standard is Important:

The previous fatality statistics give additional support to the widely recognized characterization of electricity being a serious workplace hazard. The human body will conduct electricity if direct body contact is made with an electrically energized part, while similar contact is made at the same time with another conductive surface.

Simply put, electricity will find the fastest and easiest way to the ground, even if that is through a human body. Currents at levels as low as 3 milliamperes traveling through the body can cause serious, even fatal, injuries.

The NFPA created the NFPA 70E standard to address the electrical safety requirements for employees. Also titled as Standard for Electrical Safety in the Workplace, NFPA 70E was originally developed at OSHA's request. In fact, some suggest

OSHA writes the safety decrees companies are required to follow and NFPA describes to businesses how they should follow them.

NFPA 70E assists companies in complying with OSHA 1910 Subpart S and OSHA 1926 Subpart K. The standard helps companies and employees avoid workplace injuries and fatalities due to shock, electrocution, arc flash and arc blast.

Burns due to electrical accidents can be very serious. There are three basic types: electrical, which are the result of electric current flowing through the tissues; arc burns, which are the result of high temperatures produced by electric arcs or explosions close to the body; and thermal contact burns, which are typically caused by skin coming into contact with hot surfaces, such as electric conductors, conduits or other energized equipment. Any of these burns can happen simultaneously with each other.

Additionally, electric arcs can start fires and cause damage to equipment. In environments that have explosive gases or vapors or combustible dust in them, electric arcs can cause explosions.

Electrical accidents are usually caused by unsafe conditions of some variety due to unsafe equipment and installations, unsafe work environments or work practices, or a combination of all three.

Key Compliance Requirements:

As in 2015, the 2018 edition of NFPA 70E continues to focus on risk management principles. Some of the major changes for 2018 are:

- ✔ Risk Assessment Procedure: This requirement emphasizes addressing human error and its negative consequences.
- ✔ Hierarchy of Risk Controls Methods: Listed according to their priority, they are the following:
  1. Elimination
  2. Substitution
  3. Engineering controls
  4. Awareness
  5. PPE
- ✔ Establishing an Electrically Safe Work Condition: These are a set of instructions on how to logically set up an electrical safety program.
- ✔ Estimating the Likelihood of Occurrence of an Arc Flash Incident: This is a table to help assess the risk of an arc flash and applies to the incident energy analysis method.
- ✔ Selection of Arc-Rated Clothing using Incident Energy Analysis Method: This is a table providing guidance on how to select gear when using the incident energy analysis method.

Compliance Assistance:

Copies of the standard can be purchased online from: https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=70E

From more information, please visit: www.nfpa.org

Photo courtesy Tingley Rubber Corporation

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Combustible Dust Standard: NFPA 652

History:

Combustible dust is any fine material that can catch fire and explode when mixed with air. OSHA defines combustible dust as "…a solid material composed of distinct particles or pieces, regardless of size, shape or chemical composition, which presents a fire or deflagration hazard when suspended in air or some other oxidizing medium over a range of concentrations."

This does not always mean the types of material normally considered either combustible or dangerous. It can include metal dust, wood dust, plastic or rubber dust, coal dust, biosolids, dust from certain textiles—even organic dust, like flour, sugar, paper, soap and dried blood.

Why Standard is Important:

Photo courtesy Nilfisk

If a company has processes that create dust or use powders, then it has a responsibility to determine if a combustible dust hazard exists. NFPA 652: Standard on the Fundamentals of Combustible Dust, 2016 edition, became effective Sept. 2015. This standard was created to promote and define hazard analysis, awareness, management and mitigation. The standard also issues a new term, "Dust Hazard Analysis," or DHA, to differentiate this analysis from the more complex forms of process hazard analysis methods currently found in industry. NFPA 652 is the starting point for this analysis. It will guide you step by step in identifying hazards and what to do next.

The NFPA standards have required a process hazard analysis since 2005. NFPA 652 takes this requirement further by making this requirement retroactive to existing installations, with a deadline. A DHA is now required for new installations and upgrades to existing installations. The standard allows three years to complete this DHA. To illustrate the importance of this hazard analysis, many OSHA citations regarding combustible dust hazards list the lack of a hazard analysis at the top of the citation.

Combustible dusts are created during the transportation, handling, processing, polishing and grinding of the materials. Abrasive blasting, crushing, cutting and screening dry materials can also create dust.

The types of workplaces most at risk of combustible dust include:

- ✔ Food production
- ✔ Woodworking facilities
- ✔ Metal processing
- ✔ Recycling facilities
- ✔ Chemical manufacturing (rubber, plastics, pharmaceuticals)
- ✔ Grain elevators
- ✔ Coal-fired power plants

Any workplace that generates dust might be at risk, however. This is why it's essential to conduct a thorough risk assessment.

Key Compliance Requirements:

The purpose of a dust-collection system is to remove and isolate dust away from people who can inhale it and process areas where it could accumulate and become a deflagration hazard. The DHA will identify the following conditions that may exist external or internal to the system that contribute to a fire or deflagration hazard:

- ✔ Presence of oxygen: Air is the oxidant
- ✔ Presence of fuel: Combustible dust where ever it is found, including floors, elevated surfaces, inside ducts, and inside process enclosures and machines
- ✔ Dispersion of fuel: includes pulse cleaning inside dust collector; use of compressed air for cleaning; and events that can dislodge dust from elevated surfaces
- ✔ Ignition sources: Sparks, electrical shorts, hot work, electrostatic discharge, flames, rotating equipment, hot surfaces
- ✔ Containment locations: inside pipes; inside dust collectors; and inside any process enclosure or machine

Compliance Assistance:

Because so many different types of workplaces might contain potential combustible dust risks, it's essential to conduct a thorough risk assessment. Failing to comply with this standard can leave you open to serious fines and even more serious injuries, if an incident occurs.

OSHA offers a lengthy list of materials that could produce combustible dust: https://bit.ly/1Lni5C7

Become familiar with NFPA 652: Standard on the Fundamentals of Combustible Dust: https://bit.ly/2KD03Po. It provides basic principles and requirements for identifying and managing fire and explosion hazards from combustible dust.

OSHA looks to this standard for guidance when it comes to best practices for preventing combustible dust fires and explosions. Those who don't take the necessary steps to protect workers can be fined for violations under 18 different standards as part of OSHA's Combustible Dust National Emphasis Program: https://bit.ly/2Rd1Eh8. This includes the General Duty Clause and 29 CFR 1910.22, the main housekeeping standard.

For an in-depth discussion of combustible dust, see the article titled "How to Prevent Combustible Dust Incidents in the Workplace" in *WMHS*'s November 2018 issue: https://bit.ly/2zsbRPM

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Medical Services/First Aid: Focus on AEDs

History:

First aid is emergency care provided for injury or sudden illness before emergency medical treatment is available. The first aid provider in the workplace is someone who is trained in the delivery of initial medical emergency procedures, using a limited amount of equipment to perform a primary assessment and intervention while awaiting arrival of emergency medical service (EMS) personnel. A workplace first aid program is part of a comprehensive safety and health management system that includes: Management Leadership and Employee Involvement; Worksite Analysis; Hazard Prevention and Control; and Safety and Health Training.

The basic elements for a first aid program at the workplace include:

- ✔ Identifying and assessing the workplace risks that have potential to cause worker injury or illness.
- ✔ Designing and implementing a workplace first aid program.
- ✔ Instructing all workers about the first-aid program, including what workers should do if a coworker is injured or ill. Putting the policies and program in writing is recommended.
- ✔ Providing for scheduled evaluation and changing of the first aid program to keep the program current and applicable to emerging risks in the workplace, including regular assessment of the adequacy of the first aid training course.

The Occupational Safety and Health Act of 1970 (OSH Act) requires employers to comply with hazard-specific safety and health standards and regulations, as issued and enforced by either OSHA or an OSHA-approved State Plan. In addition, employers must provide their employees with a workplace free from recognized hazards likely to cause death or serious physical harm under Section 5(a)(1), the General Duty Clause of the Act. Employers can be cited for violating the General Duty Clause if there is a recognized hazard and they do not take steps to prevent or abate the hazard. However, failure to implement this guide is not, in itself, a violation of the General Duty Clause. Citations can only be based on standards, regulations and the General Duty Clause.

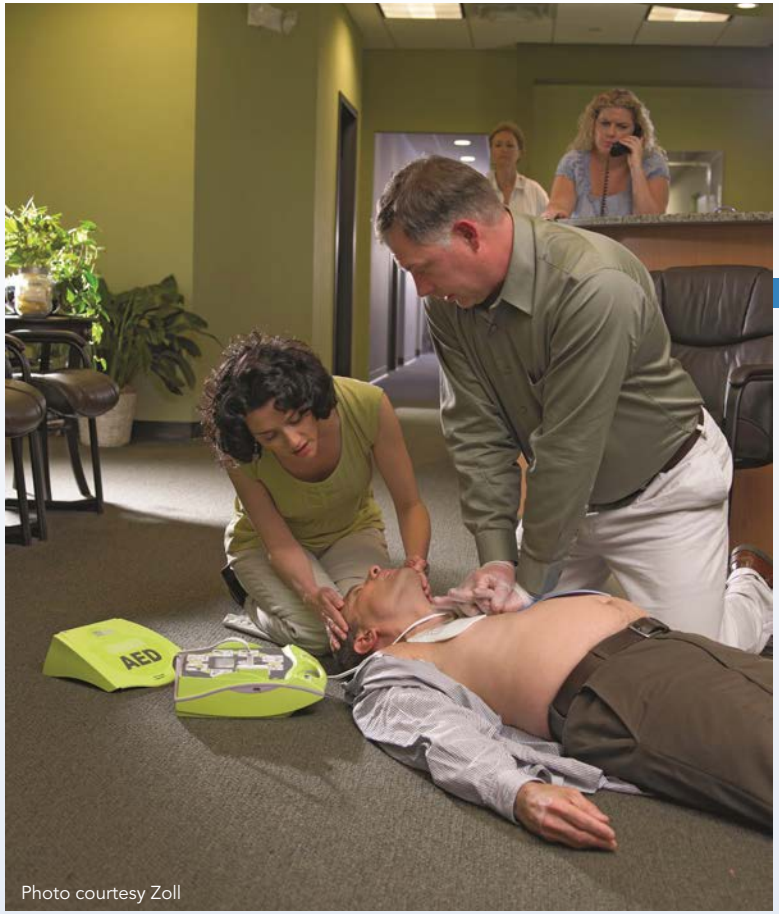

Photo courtesy Zoll

The OSHA requirement at 29 CFR 1910.151(b) states, *"In the absence of an infirmary, clinic or hospital in near proximity to the workplace which is used for the treatment of all injured employees, a person or persons shall be adequately trained to render first aid. Adequate first aid supplies approved by the consulting physician shall be readily available."*

Why Standard is Important:

There were 5,703 work-related fatalities in private industry in 2004. In that same year there were 4.3 million total workplace injuries and illnesses, of which 1.3 million resulted in days away from work. Occupational illnesses, injuries and fatalities in 2004 cost the U.S. economy $142.2 billion, according to National Safety Council estimates. The average cost per occupational fatality in 2004 exceeded $1 million.

To cover the costs to employers from workplace injuries, it has been calculated that each and every employee in this country would have had to generate $1,010 in revenue.

Sudden cardiac arrest (SCA) may also occur at work. According to recent statistics from the American Heart Association, there are 250,000 out-of-hospital SCAs annually. The actual number

of SCAs that happen at work are unknown. If an employee collapses without warning and is not attended to promptly and effectively, the employee may die. Sudden cardiac arrest is caused by abnormal, uncoordinated beating of the heart or loss of the heartbeat altogether, usually as a result of a heart attack.

First Aid Supplies

It is advisable for the employer to give a specific person the responsibility for choosing the types and amounts of first aid supplies and for maintaining these supplies. The supplies must be adequate; should reflect the kinds of injuries that occur; and must be stored in an area where they are readily available for emergency access.

An automated external defibrillator (AED) should be considered when selecting first aid supplies and equipment. A specific example of the minimal contents of a workplace first aid kit is described in American National Standards Institute ANSI Z308.1-2003, Minimum Requirements for Workplace First Aid Kits. The kits described are suitable for small businesses. For large operations, employers should determine how many first aid kits are needed, and if it is appropriate to augment the kits with additional equipment and supplies.

Employers who have unique or changing first aid needs should consider upgrading their first aid kits. The employer can use the OSHA 300 log, OSHA 301 reports or other records to identify the first aid supply needs of their worksite. Consultation with the local fire and rescue service or emergency medical professionals may be beneficial.

By assessing the specific needs of their workplaces, employers can ensure the availability of adequate first aid supplies. Employers should periodically reassess the demand for these supplies and adjust their inventories.

Automated External Defibrillators

With recent advances in technology, automated external defibrillators (AEDs) are now widely available, safe, effective, portable and easy-to-use. They provide critical and necessary treatment for sudden cardiac arrest (SCA) caused by ventricular fibrillation—the uncoordinated beating of the heart leading to collapse and death.

Using AEDs as soon as possible after sudden cardiac arrest (within 3-4 mins) can lead to a 60 % survival rate. CPR is of value, because it supports the circulation and ventilation of the victim until an electric shock delivered by an AED can restore the fibrillating heart to normal.

All worksites are potential candidates for AED programs because of the possibility of SCA and the need for timely defibrillation. Each workplace should assess its own requirements for an AED program as part of its first aid response. A number of issues should be considered in setting up a worksite AED program: physician oversight; compliance with local, state and federal regulations; coordination with local EMS; a quality assurance program; and a periodic review, among others.

Compliance Assistance:

Additional information about AED program development can be found at the following websites:

- ✔ OSHA website: www.osha.gov
- ✔ American Heart Association: www.americanheart.org
- ✔ American College of Occupational and Environmental Medicine: www.acoem.org
- ✔ American Red Cross: www.redcross.org
- ✔ Federal Occupational Health: www.foh.dhhs.gov
- ✔ The National Center for Early Defibrillation, at www.early-defib.org, can provide additional information about AED program development.

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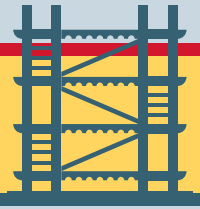
1 FALL PROTECTION (1926.501)
7,270 VIOLATIONS

TRAINING COURSES OFFERED:
> Safety Matters: Walking-Working Surfaces
> Fall Protection: Case History
> Personal Fall Protection: Your Lifelines

2 HAZARD COMMUNICATION (1910.1200)
4,552 VIOLATIONS

TRAINING COURSES OFFERED:
> HazCom: Are You GHS-Ready?
> HazCom: In Sync With GHS

3 SCAFFOLDING (1926.451)
3,336 VIOLATIONS



TRAINING COURSES OFFERED:
> Scaffold Safety
> Scaffolds: Safety At All Levels

4 RESPIRATORY PROTECTION (1910.134)
3,118 VIOLATIONS

TRAINING COURSES OFFERED:
> Safety Matters: Respirator Safety
> PPE: Inspect and Respect
> Respirator Safety: A Sure Fit

5 LOCKOUT/TAGOUT (1910.147)
2,944 VIOLATIONS

TRAINING COURSES OFFERED:
> Safety Matters: Lockout/Tagout
> Lockout/Tagout Make No Mistake
> Lockout/Tagout: No Escape

6 LADDERS (1926.1053)
2,812 VIOLATIONS

TRAINING COURSES OFFERED:
> Safety Matters: Walking-Working Surfaces
> Stairways & Ladders
> Stairways And Ladders: A Safe Step

7 POWERED INDUSTRIAL TRUCKS (1910.178)
2,294 VIOLATIONS

TRAINING COURSES OFFERED:
> Forklifts: Understanding the Risks!
> Forklift Basics: Safe From The Start
> Forklift Fundamentals: Get The Facts

8 FALL PROTECTION TRAINING REQUIREMENTS (1926.503)
1,982 VIOLATIONS

TRAINING COURSES OFFERED:
> Safety Matters: Walking-Working Surfaces
> Fall Protection: Case History
> Personal Fall Protection: Your Lifelines

9 MACHINE GUARDING (1910.212)
1,972 VIOLATIONS

TRAINING COURSES OFFERED:
> Safety Matters: Machine Guarding
> Machine Guarding: Safeguard Your Future

10 EYE AND FACE PROTECTION (1926.102)
1,536 VIOLATIONS

TRAINING COURSES OFFERED:
> Safety Matters: Personal Protective Equipment
> PPE: Inspect & Respect

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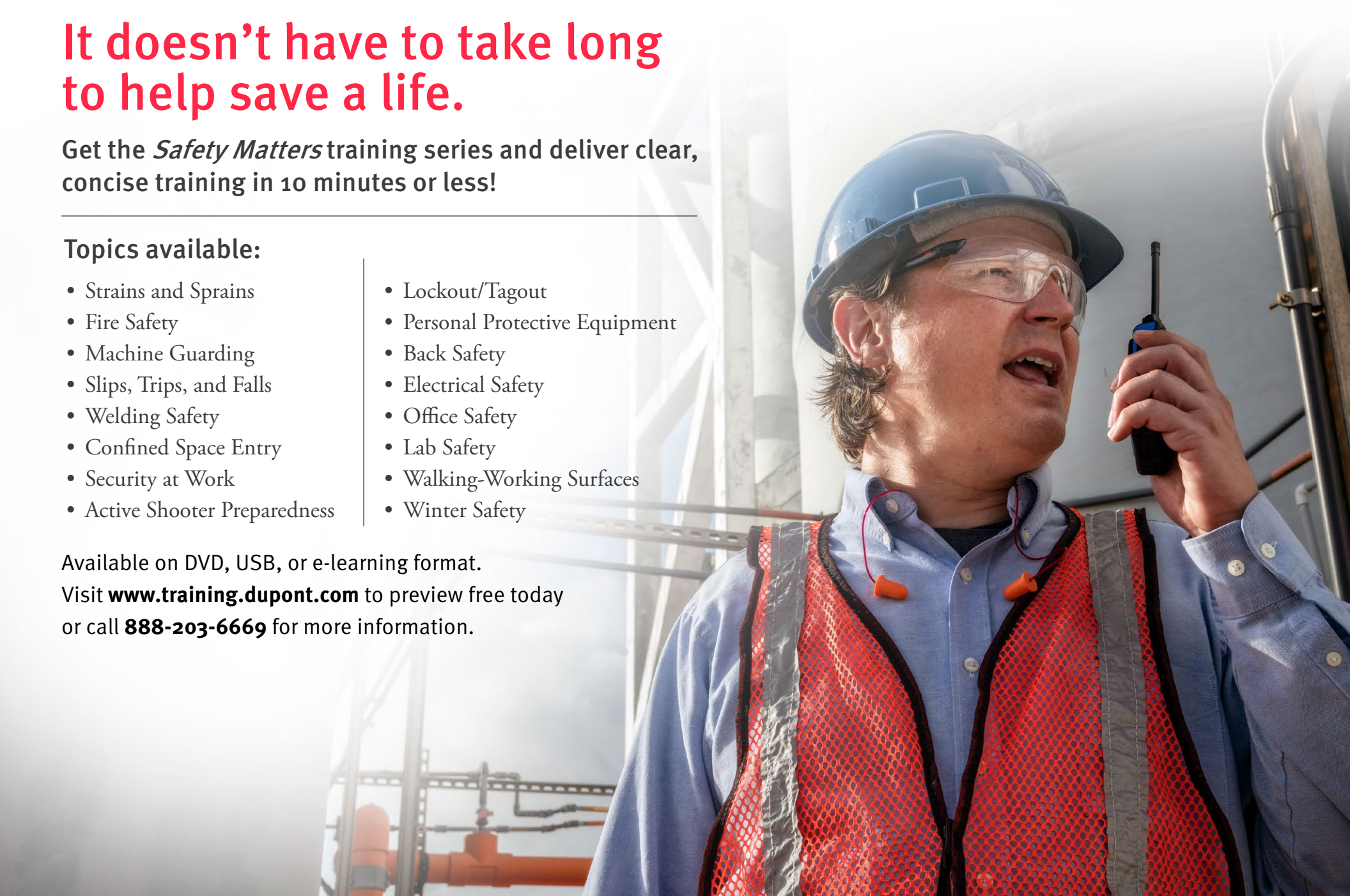

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