# UNDERSTANDING OSHA SAFETY STANDARDS IN THE CONSTRUCTION INDUSTRY

Honeywell

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# WHY PPE MATTERS IN CONSTRUCTION

**Construction workers face risks of falling while working at height, respiratory illnesses from exposure to silica dust, hazardous noise from operating loud machinery, struck-by hazards from dropped objects and more. There were 1,282 construction fatalities on the job in 2020, accounting for about 47% of all worker fatalities in that year.[1]**

Workplace injuries and fatalities are not only devastating but can also be extremely costly. The average cost of a construction fatality is almost 4.5 million, while the average cost of a non-fatal injury is about $42,000.[2] That's why it's important to equip your workers with head-to-toe PPE solutions they can trust – regardless of whether you work in institutional and commercial construction, specialized industrial construction, infrastructure and heavy construction or residential construction.

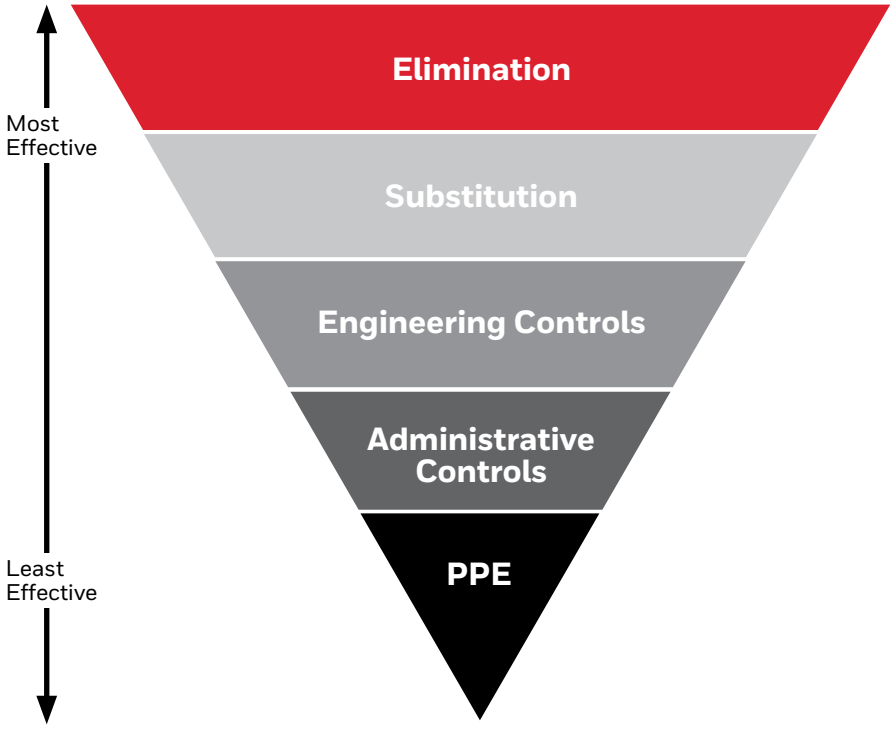
Understanding your specific jobsite hazards, the OSHA construction requirements and finding the right PPE for your workplace applications can be challenging. This whitepaper aims to provide an overview of key OSHA standards for many of the hazards in the construction industry, frequently cited construction violations and PPE solutions that can help protect workers.

## 10 MOST FREQUENTLY CITED CONSTRUCTION VIOLATIONS[3]

- Duty to have fall protection (1926.501)
- Ladders (1926.1053)
- General requirements (1926.451)
- Fall Protection - Training (1926.503)
- Eye and Face Protection (1926.102)
- General Safety and Health Provisions (1926.20)
- Head Protection (1926.100)
- Specific Excavation Requirements (1926.651)
- Aerial Lifts (1926.453)
- Hazard Communication (1910.1200)

# HIERARCHY OF CONTROLS IN CONSTRUCTION

Implementing a Hierarchy of Controls plan as recommended by NIOSH helps prevent accidents before they happen.[4] The most effective way to help keep workers safe is by eliminating or substituting hazards. When that's not possible, engineering controls can help isolate workers from the hazard. Administrative controls help change the way people work by reducing or rotating schedule work times in contaminated areas to reduce exposures. In environments where hazards still exist after control measures have been used, companies should provide workers with the correct PPE.




# KEY OSHA STANDARDS BY MAIN CONSTRUCTION HAZARDS

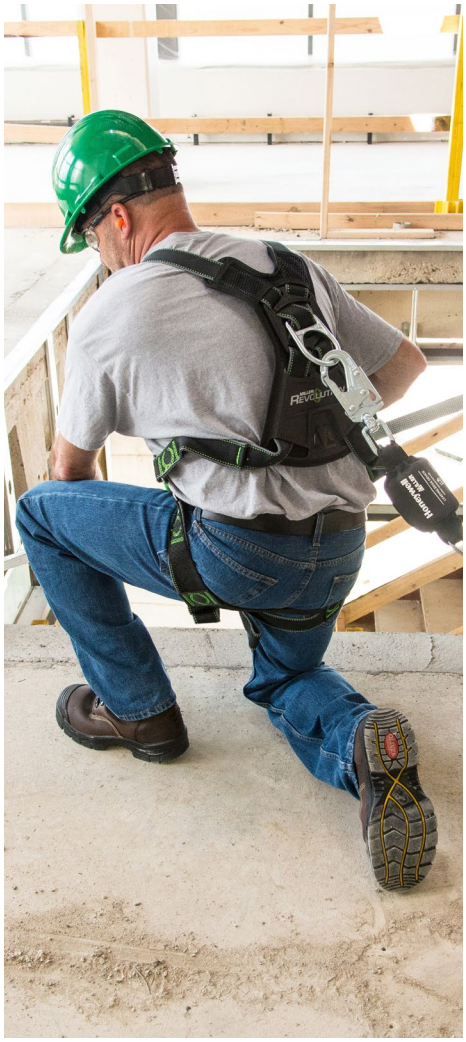
## Working at Height

Falls are the leading cause of construction deaths, accounting for about one-third of all fatalities in the industry.[5] To help prevent falls, employers are required by OSHA to assess walking and working surfaces in the workplace to ensure they have the necessary strength to support workers and assess whether fall protection is needed based on the 29 CFR 1926.501 requirements. If so, workers should be provided with fall protection systems that meet the criteria for 29 CFR 1926.502.[6]

Under Subpart M of the construction standards 29 CFR Part 1926, fall protection must be worn in construction worksites when working 6 feet or more above a lower level. Fall protection in construction is also required when working over dangerous equipment and machinery, regardless of the fall distance.

Subpart M also states workers may need to wear fall protection in certain areas and applications such as ramps, runways or walkways as well as on a steep roof, near wall openings or walking/working surfaces with holes.[6]

Employers should provide fall protection such as personal fall arrest systems, safety net systems or guardrail systems. OSHA outlines the fall protection systems criteria and practices in 29 CFR 1926.502. The standards are laid out below highlighting a few noteworthy requirements:[6]



### 29 CFR 1926.502(b) - Guardrail Systems

- 29 CFR 1926.502(b)(1) requires the top edge height of top rails to be 42 inches (plus or minus 3 inches) above the walking/working level
- 29 CFR 1926.502(b)(2) requires midrails, screens and other structural members to be at least 21 inches high when installed between the top edge of the guardrail system and the walking/working surface

### 29 CFR 1926.502(c) - Safety Net Systems

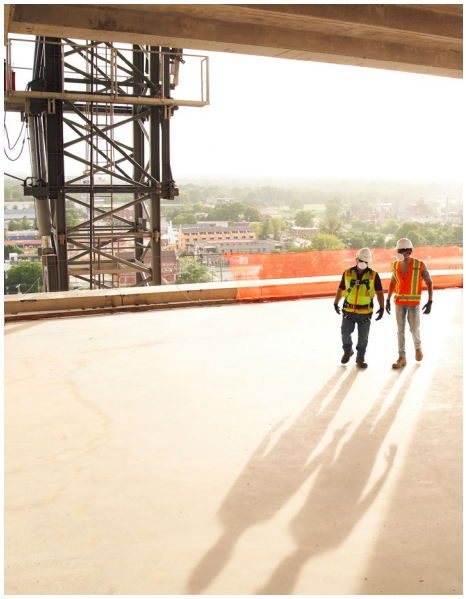
- Safety nets must be installed as close as practicable under the walking or working surface and never more than 30 feet below that level

### 29 CFR 1926.502(d) - Personal Fall Arrest Systems

- CFR 1926.502(d)(16)(iii) requires fall protection to be rigged so that a worker can neither free fall more than 6 feet nor contact any lower level
- CFR 1926.502(d)(21) requires fall protection to be inspected for wear, damage and deterioration before each use

### 29 CFR 1926.502(e) - Positioning Device Systems

- 29 CFR 1926.502(e)(1) requires body belt or body harness systems to be set up so that a worker can free fall no farther than two feet
- 29 CFR 1926.502(e)(2) requires body belts or harnesses to be secured to an anchorage capable of supporting at least twice the potential impact load of a worker's fall or 3,000 pounds depending on whichever is greater



### 29 CFR 1926.502(f) - Warning Line Systems

- 29 CFR 1926.502(f)(1) states the warning line must be erected around all sides of roof work areas

### 29 CFR 1926.502(g) - Controlled Access Zones

- 29 CFR 1926.502(g)(1) states that controlled access zones must be defined by a control line or by any other means that restricts access

### 29 CFR 1926.502(h) - Safety Monitoring Systems

In addition to assessing working at height hazards and providing suitable fall protection, employers are required to provide a fall protection training program under 29 CFR 1926.503.[6] The program should include how to recognize and minimize fall hazards.

# FALLING OR FLYING OBJECTS

There are more than 700 workplace fatalities each year in the U.S. from workers being struck by falling objects.[7] Workers can experience injuries such as cuts, abrasions, concussions, blurred vision or even blindness from falling or flying objects. The risk is high when working around power tools as particles come off a grinder and during applications such as pushing, pulling or prying tasks that cause materials to be airborne.

OSHA states workers are at risk from falling objects when standing or working beneath cranes, scaffolds or other work happening overhead. OSHA standard 1926.100 for construction requires workers to wear a hard hat when working in areas where there is a possible danger of head injury from impact, falling or flying objects, electrical shock or burns.[8]

To help protect against flying objects, workers should be equipped with eye and face protection. The OSHA construction standard 1926.102 states employers should ensure affected employees use appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation. The standard also states employers should supply eye protection that provides side protection when there are flying object hazards.[9]

## DID YOU KNOW?

Eyewear with features such as anti-fog lenses and UV protection should be considered when choosing safety solutions for your workers. Safety glasses with anti-fog solutions help workers transition from indoor to outdoor environments without impaired vision as the coatings help control moisture condensation. UV protection and different lens tints help block out sunlight, allowing workers to complete diverse applications while protecting their eyes.

# CRYSTALLINE SILICA DUST

About 2.3 million people in the U.S. are exposed to silica at work.[10] Crystalline silica dust is present when construction workers are crushing stone, rock, concrete, brick, block and mortar as well as cutting, sawing, grinding and drilling. Inhaling crystalline silica dust can lead to diseases such as silicosis, lung cancer, chronic obstructive pulmonary disease (COPD) and kidney disease.

OSHA's standard 29 CFR 1926.1153 "requires employers to limit worker's exposure to respirable crystalline silica and take other steps to protect workers. Employers can either use a control method laid out in Table 1 of the construction standard, or they can measure workers' exposure to silica and independently decide which dust controls work best to limit exposures in their workplaces to the Permissible Exposure Limit (PEL)."[11]

## TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS AROUND SILICA[12]

| EQUIPMENT/TASK | ENGINEERING AND WORK PRACTICE CONTROL METHODS | REQUIRED RESPIRATORY PROTECTION AND MINIMUM ASSIGNED PROTECTION FACTOR (APF) | |
|---|---|---|---|
| | | < 4 hours per shift | > 4 hours per shift |
| Stationary masonry saws | Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. | None | None |
| Handheld power saws (any blade diameter) | Use saw equipped with integrated water delivery system that continuously feeds water to the blade | | |
| | Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions when used outdoors | None | APF 10 |
| | Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions when used indoors or in an enclosed area | APF 10 | APF 10 |
| Handheld power saws for cutting fiber-cement board | For tasks performed outdoors only:<br>• Use saw equipped with commercially available dust collection system<br>• Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions<br>• Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency | None | None |
| Walk-behind saws | Use saw equipped with integrated water delivery system that continuously feeds water to the blade | | |
| | Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions when used outdoors | None | None |
| | Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions when used indoors or in an enclosed area | APF 10 | APF 10 |
| Drivable saws | For tasks performed outdoors only:<br>• Use saw equipped with integrated water delivery system that continuously feeds water to the blade<br>• Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions | None | None |
| Rig-mounted core saws or drills | • Use tool equipped with integrated water delivery system that supplies water to cutting surface<br>• Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions | None | None |
| Handheld and stand-mounted drills (including impact and rotary hammer drills) | • Use drill equipped with commercially available shroud or cowling with dust collection system<br>• Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions<br>• Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism<br>• Use a HEPA-filtered vacuum when cleaning holes | None | None |
| Dowel drilling rigs for concrete | For tasks performed outdoors only:<br>• Use shroud around drill bit with a dust collection system. Dust collector must have a filter with 99% or greater efficiency and a filter-cleaning mechanism | APF 10 | APF 10 |
| Vehicle-mounted drilling rigs for rock and concrete | Use dust collection system with close capture hood or shroud around drill bit with a low-flow water spray to wet the dust at the discharge point from the dust collector or operate from within an enclosed cab and use water for dust suppression on drill bit | None | None |

**TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS AROUND SILICA[12N] (CONT.)**

| EQUIPMENT/TASK | ENGINEERING AND WORK PRACTICE CONTROL METHODS | REQUIRED RESPIRATORY PROTECTION AND MINIMUM ASSIGNED PROTECTION FACTOR (APF) | |
|---|---|---|---|
| Jackhammers and handheld powered chipping tools | Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact when used outdoors | None | APF 10 |
| | Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact when used indoors or in an enclosed area | APF 10 | APF 10 |
| | OR use tool equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions | | |
| | Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism when used outdoors | None | APF 10 |
| | Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism when used indoors or in an enclosed area | APF 10 | APF 10 |
| Handheld grinders for mortar removal | Use grinder equipped with commercially available shroud and dust collection system | APF 10 | APF 25 |
| | Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions | | |
| | Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism | | |
| Walk-behind milling machines and floor grinders | Use machine equipped with integrated water delivery system that continuously feeds water to the cutting surface | None | None |
| | Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions OR | | |
| | Use machine equipped with dust collection system recommended by the manufacturer | None | None |
| | Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions | | |
| | Dust collector must provide the air flow recommended by the manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism | | |
| | When used indoors or in an enclosed area, use a HEPA-filtered vacuum to remove loose dust in between passes | | |
| Small drivable milling machines (less than half-lane) | Use a machine equipped with supplemental water sprays designed to suppress dust. Water must be combined with a surfactant | None | None |
| | Operate and maintain machine to minimize dust emissions | | |
| Crushing machines | Use equipment designed to deliver water spray or mist for dust suppression at crusher and other points where dust is generated (e.g., hoppers, conveyers, sieves/sizing or vibrating components, and discharge points) | None | None |
| | Operate and maintain machine in accordance with manufacturer's instructions to minimize dust emissions | | |
| | Use a ventilated booth that provides fresh, climate-controlled air to the operator, or a remote control station | | |

# HAZARDOUS NOISE LEVELS

Construction workers experience the second-highest rate of occupational exposure to noise hazards.[13] However, 53% of noise-exposed construction workers report not wearing protective devices.[14] Continuous exposure to noise greater than 85 decibels can lead to temporary or permanent hearing loss, tinnitus (ringing in the ears) and limits the ability to understand speech.

The OSHA regulation for hearing protection in construction is CFR 1926.101, which states ear protective devices should be provided and worn in work environments where noise level or duration of exposure exceeds 85 dBA in an 8-hour time-weighted average.[15]

| 93 dB | 100 dB | 102 dB | 105 dB | 110 dB | 115 dB | 116 dB | 120 dB | 121 dB | 130 dB |
|---|---|---|---|---|---|---|---|---|---|
| Table Saw | Bulldozer | Impact Wrench | Chop Saw | Chain Saw | Hammer Drill | Generator | Hammer on Nail | Oxygen Torch | Jackhammer |

Noise-induced hearing loss (NIHL) is preventable with the right hearing protection such as earplugs or earmuffs. Employers should educate their workers on site-specific noise hazards and hold training classes to help ensure compliance. Fit testing and Smart Hearing solutions are best practices and can also help identify compatible solutions for your work environment, informing the hierarchy of controls.

# IMPLEMENTING A SAFETY PPE PROGRAM WITH TRAINING

Incorporating PPE into your workplace goes beyond selecting the most suitable safety solutions – it's about building a holistic culture of safety. Implementing a Hierarchy of Controls and providing training for your workers can help prevent workplace fatalities, injuries and illnesses.

OSHA estimates that construction companies save $4 - $6 for every $1 invested in safety programs.[16] Proper safety training helps reduce accidents and injuries, increase employee safety and awareness, and makes your business more compliant with safety laws while protecting the bottom line. When purchasing PPE, consider choosing manufacturers that provide technical training when it comes to OSHA-related subjects. Leading manufacturers can also help with PPE site surveys that evaluate the hazards alongside the environmental health and safety person on-site.

# NOT ALL PPE IS CREATED EQUAL

It is important to equip your workers with the right solutions that are stylish, comfortable and fit properly to help ensure better worker compliance in the construction industry. With so many PPE options on the market, let Honeywell be your guide to helping provide all workers with the safety they need.

At Honeywell, safety is in our DNA. For decades, we've helped protect more than 500 million workers every day. We take a consultative approach that goes beyond recommending the right respiratory protection. We can work with you to build a comprehensive safety program for your workforce.

With our legacy as an expert in respiratory protection and our continued innovation in safety solutions, our passion lies in helping protect more workers in more environments. Our innovative products continue to meet ever changing worker needs. Built with a high level of comfort, durability and protection, our PPE solutions help protect workers when and where they need it most.

[1]OSHA, https://www.osha.gov/data/commonstats
[2]NCBI, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2491397/
[3]OSHA, https://www.osha.gov/pls/imis/citedstandard.naics?p_naics=23&p_esize=&p_state=FEFederal
[4]NIOSH, https://www.cdc.gov/niosh/topics/hierarchy/default.html
[5]CDC, https://www.cdc.gov/niosh/construction/statistics.html
[6]OSHA, https://www.osha.gov/sites/default/files/publications/OSHA3146.pdf
[7]NSC, https://www.nsc.org/workplace/safety-topics/struck-by-objects
[8]OSHA, https://www.osha.gov/laws-regs/regulations/standardnumber/1926/1926.100
[9]OSHA, https://www.osha.gov/eye-face-protection/standards
[10]OSHA, https://www.osha.gov/silica-crystalline
[11]OSHA, https://www.osha.gov/sites/default/files/publications/OSHA3681.pdf
[12]OSHA, https://www.osha.gov/laws-regs/regulations/standardnumber/1926/1926.1153
[13]OH&S, https://ohsonline.com/Articles/2021/10/01/Workplace-Noise.aspx?Page=1
[14]CDC https://www.cdc.gov/niosh/updates/upd-10-07-21.html
[15]OSHA https://www.osha.gov/noise
[16]OSHA https://www.osha.gov/sites/default/files/publications/osha3163.pdf

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