

## TECHNICAL INFORMATION PAPER SERIES: EMERGENCY PREPAREDNESS IN CONSTRUCTION



## LEARN THE BASICS OF OSHA COMPLIANCE IN PLANNING FOR WORK SITE EMERGENCIES.

On a construction site, emergencies and disasters can strike anywhere, anytime causing potentially catastrophic injuries to workers and/or damage to property.

That's why contractors should plan for workplace emergencies at all job sites to minimize employee injuries/illnesses and loss of property when an emergency strikes.

### Types of emergencies.

Workplace emergencies can be a direct result of:

- Construction operations (i.e., occupational injury or illness)
- Indirect conditions (i.e., adverse weather conditions)
- A combination of both

Impact varies, too:

- Emergencies can affect one employee, area, or operation
- They can jeopardize an entire construction project, community, or region

### What workplace emergencies are.

OSHA defines a workplace emergency to be:

**“A situation that threatens workers, customers, or the public; disrupts or shuts down operations; or causes physical or environmental damage. Emergencies may be natural or man-made, and may include hurricanes, tornadoes, earthquakes, floods, wildfires, winter weather, chemical spills or releases, disease outbreaks, releases of biological agents, explosions involving nuclear or radiological sources, and many other hazards.”**

Emergencies may also include:

- Fire hazards
- Extended power loss
- Utility strikes
- Acts of terrorism



### Preplanning is critical.

Most contractors understand the value of emergency planning, but many lack the necessary level of preplanning and attention to detail needed for an effective contractor emergency preparedness plan.

While contractors can never preplan for all potential workplace emergencies, having a sound plan with clearly defined roles and responsibilities can help minimize loss when an emergency occurs. Preplanning also helps employers and workers anticipate other unpredictable situations.

### First response: Life safety and stabilization.

Life safety is always the first priority. The actions taken in the initial minutes of an emergency are critical:

- **A prompt warning** to employees to evacuate, shelter or lockdown can save lives.
- **A call for help to public emergency services** that provides full and accurate information will help the dispatcher send the right responders and equipment.
- **An employee trained to administer first aid** or perform CPR can be lifesaving.
- **Action by employees with knowledge of operations and process systems** can help control a disaster and minimize property damage and/or environmental release.



The second priority is the stabilization of the incident and property conservation. There are many actions that can be taken to minimize potential damage:

- **Use of fire extinguishers** by trained employees can extinguish a small fire.
- **Forecasting severe weather events** hours before they arrive provides valuable time to protect a work site.
- **Establish a plan and have resources on hand**, or quickly available, to prepare a site. The plan should also include a process for damage assessment, salvage, protection of undamaged property, and cleanup following an incident.

These actions to minimize further damage and business disruption are good examples of property conservation.

### OSHA STANDARDS

Several OSHA standards address emergency planning requirements, including:

- [29 CFR 1910.38](#): Emergency Action Plans
- [29 CFR 1926.35](#): Employee Emergency Action Plans
- [29 CFR 1910.120\(q\)](#): Hazardous Waste Operations and Emergency Response (HAZWOPER)
- [29 CFR 1910.156](#): Fire Brigades; and
- [29 CFR 1910.146\(k\)](#), [29 CFR 1926.1211](#): Permit-Required Confined Spaces.

### 1926.35 Emergency Action versus 1926.65 Emergency Response.

For workplace emergencies involving uncontrolled release of a hazardous substance, contractors must determine if their employees will be involved as responders – or not.

**1. If employees WILL be responders, an emergency response plan is required.**

The contractor must comply with all provisions of OSHA Standard [29 CFR 1926.65\(q\)](#):

**“Emergency response to hazardous substance releases” (HAZWOPER), including the need to develop an emergency response plan.”**

Elements of an emergency response plan, as outlined in 1926.65(q)(2), include:

1. Pre-emergency planning and coordination with outside parties
2. Personnel roles, lines of authority, training, and communication
3. Emergency recognition and prevention
4. Safe distances and places of refuge
5. Site security and control
6. Evacuation routes and procedures
7. Decontamination
8. Emergency medical treatment and first aid
9. Emergency alerting and response procedures
10. Critique of response and follow-up
11. PPE and emergency equipment

OSHA considers 1926.65 to have broad coverage for emergency response, applying to all employers who will have their employees respond to an “uncontrolled” release of a hazardous substance. Typical products found on construction sites which may fall into this category include:

- Fuels
- Oils
- Waterproofing products
- Paints and related products, and
- Starting fluids

However, a small spill or leak of a hazardous substance would not necessarily constitute an emergency or potential emergency covered under this HAZWOPER standard.

**2. If employees WON'T be responders, an emergency action plan (EAP) is required.**

OSHA Standard 1926.65(q)(1) states:

**“Employers who will evacuate their employees from the danger area when an emergency occurs, and who do not permit any of their employees to assist in handling the emergency, are exempt from the requirements of this paragraph if they provide an emergency evacuation plan in accordance with 1926.35 of this part.”**

In this case, contractors are NOT required to have an emergency response plan, but must have an emergency action plan (EAP).



This plan of action is used by the majority of contractors and other establishments that don't routinely handle extremely large quantities of hazardous materials.

Even if your company isn't specifically required to do so, establishing an EAP is an effective method to adequately protect your employees and your business during an emergency incident. An EAP that includes employee involvement during the planning process is usually the most effective.

Although most companies don't anticipate an emergency or disaster to occur at their site, the development of an EAP will help:

- Minimize confusion
- Protect employees
- Help prevent property damage in the event it does occur



**Assessing the workplace should be part of the EAP.**

The best way to protect yourself and others is to prepare for an emergency before it happens by doing a thorough assessment of the workplace.

Consider all potential emergencies that can be reasonably expected in the workplace and evaluate each site to see if it's sufficiently prepared. The emergency action plan (EAP) should address:

- Types and locations of hazardous materials (refer to Safety Data Sheets)
- Potentially dangerous operations or conditions
- Chemical storage sites
- Remote job sites
- Workplace communication systems
- Employee work shifts
- Means of egress
- Evacuation routes and means to maintain routes in all ground and weather conditions
- Fixed and portable fire extinguishing systems
- Employee alarm systems
- Protection of visitors and members of the public
- Adverse weather conditions



**With more than 10 employees, a written plan is required.**

A written plan is more effective, since it documents workplace evacuation procedures and allows employees to easily review previous communications.

In fact, OSHA Standard 1926.35(e)(3) requires a written plan for employers with greater than 10 employees:

**“The employer shall review with each employee upon initial assignment those parts of the plan which the employee must know to protect the employee in the event of an emergency. The written plan shall be kept at the workplace and made available for employee review. For those employers with 10 or fewer employees the plan may be communicated orally to employees and the employer need not maintain a written plan.”**

Contractors can establish one generic EAP with addendums for each location to clarify site-specific conditions and procedures to follow. The EAP should be reviewed during employee orientation meetings and refresher training programs, such as toolbox talks.

**EMERGENCY ACTION PLAN ELEMENTS**

According to OSHA Standard 1926.35, an emergency action plan must include, at a minimum, the following elements:

**1. Emergency escape procedures and emergency escape route assignments:**

Evacuation policies, procedures and escape route assignments are put into place so that employees understand:

- Who’s authorized to order an evacuation
- Under what conditions an evacuation would be necessary
- How to evacuate
- What routes to take

### Preplanned maps and site floor plans.

Preplanning is necessary to determine escape routes from each area of the site to a designated safe location(s) or refuge area(s). Designate both primary and secondary escape routes from each work area.

The safe refuge area(s), commonly referred to as “muster point(s)” should be a designated location or locations at least 50 - 100 feet from the main work area or site entrance.

The use of site floor plans or site maps that clearly show the escape routes and refuge area(s) should be included in the plan. Floor plans or site maps should also identify each work site location by an identifying description. Examples:

- Building name
- Lay down area
- Break area
- Chemical storage area, etc.

If the site has more than one building, then separate floor plans or maps should be developed. Floor plans or site maps should be posted throughout the site as well as included in the company’s written emergency action plan. Consider escape routes for remote work areas, varying ground and weather conditions, and responsibilities to maintain emergency escape routes.

Ensure that evacuation routes and emergency exits meet the following conditions:

- Clearly marked and well lit
- Wide enough to accommodate the number of evacuating personnel
- Unobstructed and clear of materials and debris at all times
- Unlikely to expose evacuating personnel to additional hazards

### Shelter-in-place procedures.

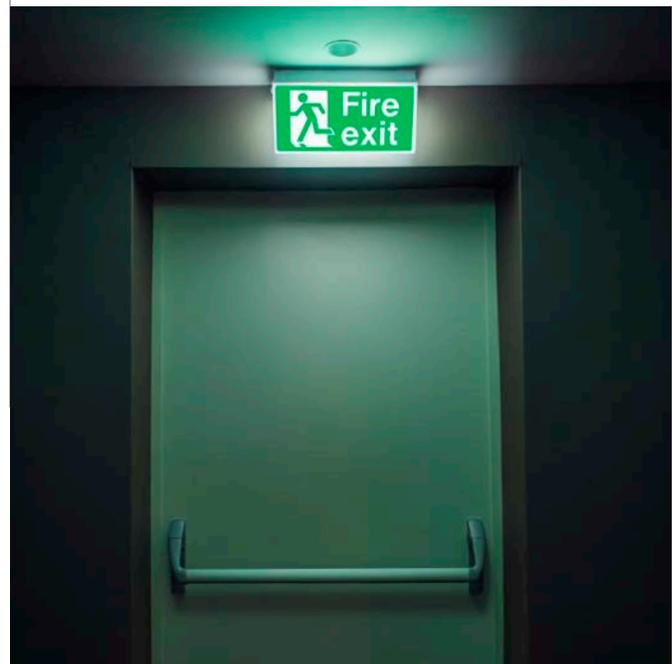
Contractors should also be prepared to implement a “shelter-in-place” procedure for emergencies that would cause more harm to employees attempting an evacuation.

“Shelter-in-place” means selecting an interior room or rooms within your workplace, and taking refuge there. In many cases, local authorities will issue advice to a shelter-in-place via TV or radio.

Conditions that make it safer to remain indoors rather than to evacuate employees:

- An adverse weather event (e.g., tornado, hurricane, blizzard)
- Release of a chemical, biological, or radiological contaminant
- A terrorist act may cause conditions that make it safer to remain indoors rather than to evacuate employees

The EAP should establish an incident commander who will determine if the emergency warrants an evacuation or “shelter-in-place” procedure. Refer to OSHA’s [Emergency Action Plan - Shelter-in-Place](#) for additional guidance.





**2. Procedures to be followed by employees who remain to perform critical operations before they evacuate:**

The employer should outline procedures to be taken by employees selected and trained to remain behind to attend or care for essential operations or processes until their evacuation becomes necessary. These designated employees are usually personnel in supervisory positions who must ensure:

- Critical operations are properly shut down
- All workers or occupants safely evacuate the site

This section of the EAP should also require the immediate evacuation of all personnel in the event of a catastrophic emergency incident, such as an explosion or natural gas leak. Employees assigned to remain behind must be capable of recognizing when to abandon the operation or task and evacuate themselves before their egress path is blocked.

Critical operations which require specific procedures during an emergency may include:

- Designated employees remain behind briefly to operate fire extinguishers

- Chemical processes that must be shut down in stages
- Monitoring power supplies, water supplies and other essential services that cannot be shut down for every emergency alarm
- Shutting down individual tools, equipment or machines
- Lowering crane booms
- Turning off gas lines or fuel systems
- Shutting down automated systems
- Terminating confined space entries
- Directing the safe evacuation of employees, visitors, customers and guests
- Notifying the appropriate response team (fire, police, ambulance)

**Special consideration should be planned for any disabled occupants, where applicable.**

Disabled or impaired occupants can have a variety of limitations which increases their risk in the event of an emergency, including:

- Sensory problems such as deafness and blindness
- Mobility problems, and
- Intellectual problems

Disabled occupants cannot be expected to evacuate without assistance, and thus the procedure to safely evacuate them, such as using the buddy system, must be established in the emergency action plan. Special consideration should also be planned for employees who don't understand English to ensure appropriate communication during an emergency incident.

The goal is an immediate evacuation of all personnel from a job site when the evacuation alarm is sounded with only a slight delay for employees assigned to ensure an orderly and complete evacuation.

**3. Procedures to account for all employees after emergency evacuation has been completed:**

Employers are required to establish procedures to account for all occupants (employees, contractors, customers, clients, guests, etc.) after an emergency incident. This is necessary to accurately inform rescue personnel (fire, police, emergency response team) of those persons believed missing.

- a. **Head count:** Designated persons or team leaders, such as management or supervisory personnel, should conduct a head count of those that have safely evacuated the site to determine if anyone requires medical assistance.
- b. **Names and locations:** Team leaders should be instructed to identify the names and last known locations of anyone not accounted for and pass this information to rescue personnel. The team leader should also have the authority of moving personnel to an alternative refuge area if conditions worsen.

Generally, one team leader should have responsibility for approximately twenty (20) employees during an emergency incident. Each team leader should check remote rooms and other enclosed areas for employees who may be trapped or otherwise unable to evacuate.

- c. **Daily log:** Maintaining a daily company log is an effective method to quickly determine the number of people occupying an area/building/site. This information is essential during an emergency incident. Since most construction job sites are multi-employers' settings, the general contractor must take responsibility for communicating with all subcontractors in developing an accurate daily log.



**d. Communications between safe refuge areas.**

If more than one safe refuge area or common meeting area is planned, then communications between safe refuge areas must be maintained to determine an accurate total head count of those safely evacuated. Cellular phones and portable radios are commonly used to maintain communication amongst refuge areas. Each refuge area should be assigned a team leader. Employees should remain at the refuge area until directed by rescue personnel or until the site has been determined safe to reenter.

- e. **Tracking underground personnel.** One particular standard, 1926.800 Underground Construction, provides specific requirements to account for all individuals underground by way of a check in/check out procedure (typically a “brass board,” which is used to tag in individuals who are underground and removed when topside). This keeps a constant and accurate count of underground personnel in the event of an emergency.

**4. Rescue and medical duties for those employees who are to perform them:**

The emergency action plan should include:

- **Names and/or job titles of responders** - those employees designated to perform rescue and medical duties.
- **A written evaluation** to ensure that the medical facility or facilities near the work site can handle routine and emergency incidents. This evaluation should include provisions for different work shifts (if applicable).
- **A provision that sufficient ambulance service is available** to handle any emergency. This requires advance contact with ambulance services to ensure they're available during all work shifts, and are familiar with the site location(s). If the emergency is rescue-oriented, such as in a high rise rescue or a confined space rescue, fire departments or other designated rescue services need to be apprised of the workplace(s) to ensure they can perform the rescue safely.
- **Consider site access roads for rough terrain or remote work areas** to ensure that rescue personnel can reach victims of an emergency event. Generally, the general contractor is responsible for maintaining emergency access roads for all ground and weather conditions.
- **First-aid supplies provided for emergency use.** These supplies should be appropriate for the hazards reasonably expected and suggested by a physician or licensed health care provider. Refer to OSHA [Medical and First Aid Safety and Health Topics](#) for more information on first aid kits.
- **Emergency phone numbers posted in conspicuous places** (e.g., company bulletin boards, job trailers, etc.). Most communities utilize "911" as an emergency number for fire, police and ambulance services. However, any additional digit(s) which must be dialed to get an outside number, must also be listed on the emergency phone numbers.



**5. The preferred means of reporting fires and other emergencies:**

A chain of command should be established to minimize confusion during an emergency incident and to ensure that employees understand who has authority for making decisions.

An emergency response team coordinator and/or team leaders should be selected in advance and their roles should include:

- **Assessing the situation** and determining whether an emergency exists that requires activating the emergency procedures.
- **Sounding the employee alarm(s)** and directing evacuating personnel to the designated safe refuge area(s).
- **Contacting all outside emergency services**, such as fire, police, and/or ambulance.
- **Directing the shutdown** of critical site operations.

**Be specific about reporting systems.**

The emergency action plan should specifically indicate, by site building or site location, the means to report emergencies, such as:

- Air horns
- Public address systems
- Sirens
- Telephones

Typically, the use of cellular phones, and/or portable radios are recognized as a primary means of communication and should be utilized and incorporated into the EAP to contact outside emergency services. For pre-existing systems, such as those found during renovation projects, the employer may use the site's manual pull box alarms so long as the employer determines that they remain functional.

**Make sure alarms are visible and recognizable.**

Alarms should be audible or seen by all people in the site and should have an auxiliary power supply (e.g., battery supply) in the event electricity is affected. The alarm should be distinctive and recognizable as a signal to evacuate the work area or perform actions designated under the EAP.



**Devise a crisis communication plan.**

Team leaders should be prepared to meet with emergency response personnel, lead them to the emergency scene(s) and advise them on potential hazards that may remain. Contractors should consider developing a [Crisis Communication Plan](#) to help ensure that effective communication is maintained throughout the entire incident cycle.

Team leaders should be assigned to:

- Speak to the media
- Advise senior management of conditions
- Meet with employees, victims and their families
- Work with investigators
- Alert the general public and community when applicable

A business must be able to respond promptly, accurately and confidently during an emergency in the hours and days that follow. Many different audiences must be reached with information specific to their interests and needs. The image of the business can be positively or negatively impacted by public perceptions of the handling of the incident.

**Handle the media with a unified response.**

If the incident is serious, then the news media will probably be on scene or calling to obtain details. There may be numerous requests for information from local, regional or national media.

The challenge of managing large numbers of requests for information, interviews and public statements can be overwhelming. Organize your response by:

- **Prioritizing requests** for information and development of press releases and talking points can assist with the need to communicate quickly and effectively.
- **Developing a company policy** that only authorized spokespersons are permitted to speak to the news media.
- **Communicating the policy to all employees** explaining that it is best to speak with one informed voice.

**6. Names or regular job titles of persons or departments to be contacted for further information or explanation of duties under the plan:**

The EAP should identify employer contact persons, by names and/or job titles, that can further explain or clarify what's expected of employees, supervisors and designated rescue and medical personnel (e.g., first aid responders) during an emergency incident.

The emergency response team coordinator and/or team leaders are usually selected as the contact personnel for the EAP.

## ADDITIONAL BEST PRACTICES

Although not specifically required by OSHA's EAP standard, other emergency preparedness actions include:

- **Inviting external emergency responders to tour the site** to learn about hazards, construction operations, protective features and systems, and proper actions to take (or not to take) during emergencies. Tours should account for different shifts of firefighters;
- **Coordinating tours for volunteer firefighters** at times that accommodate their work schedules;
- **Arranging training drills for responders** and facility personnel to practice emergency procedures together;
- **Designating a facility liaison** to coordinate with emergency responders and keep them updated if hazards or processes change;
- **Designating one or more emergency contact persons** that are knowledgeable of the site's hazards and processes and ensure their contact information is quickly accessible during emergencies;
- **Designating staff responsible to inventory** and maintain emergency equipment and supplies;
- **Including a description of the alarm system in the emergency plan** to be used to notify workers (including disabled workers) to evacuate and/or take other actions. The alarms used for different actions should be distinctive and might include horn blasts, sirens, or even public address systems;
- **Identifying the site of an alternative facility for communications** to be used in the event the primary facility is inaccessible because of emergencies, such as a fire or explosion; and
- **Storing original or duplicate copies** of accounting records, legal documents, worker emergency contact lists, building plans, HAZMAT lists, and other essential records at a secure on-site or off-site location.



## Administering the plan.

The task of administering and organizing the EAP is vital to its effectiveness. The team leader who has this responsibility will usually be the response leader in the event of an emergency.

**Primary responsibilities.** The team leader must ensure that:

- All personnel clearly understand their roles and responsibilities within the EAP
- Emergency resources, both financial and personnel, are kept at adequate levels in step with the size and progress of the project

**Other responsibilities.** Generally, the assigned team leader of the EAP should also be responsible for the following:

- Assessing the situation to determine whether an emergency exists requiring activation of the emergency procedures
- Supervising all efforts in the area, including evacuating personnel
- Coordinating outside emergency services, such as medical aid and local fire departments, and ensuring that they're available and notified when necessary
- Directing the shutdown of process and operations when required

**Managing change.** It's very important to review the EAP on a regular basis, such as annually, as well as after an emergency event has occurred. Changes may be necessary where deficiencies became apparent as the plan went into action. Operations and personnel change frequently on construction projects, and thus revisions to the EAP will be needed; an outdated plan will be of little use in an emergency.

Content changes to the EAP should be made in these instances:

- An employee’s emergency actions or responsibilities change
- New equipment, hazardous materials, or processes are introduced that affect evacuation routes
- Site layout and emergency agency contact information

Developing a generic EAP, with addendums or revisions for each location to clarify site specific conditions and procedures, is the most effective method to administer an EAP for construction operations.

**Personal protective equipment.**

If employees need personal protective equipment (PPE) to safely evacuate the site during an emergency incident, this provision must be included in the EAP. PPE may include:



- Safety glasses, goggles, or face shields
- Escape respirators
- Chemical suits, hoods, gloves, or boots
- Special body protection for abnormal environmental conditions such as extreme temperatures

**Multi-employer settings.**

For construction job sites with several contractors, employers are encouraged to coordinate their plans with the other employers at the site. A site-wide or standardized plan for the entire site is acceptable provided that each employer informs their respective employees of their duties and responsibilities under the plan. The general contractor or construction manager should be responsible for coordinating emergency planning for all contractors working on the site.

**Hurricane preparedness.**

In addition to having a EAP plan in place, it’s important to be familiar with the warning terms used for hurricanes, as well as the local community’s emergency plans, warning signals and shelters.

A contractor’s EAP should include a provision that personnel will monitor weather conditions and will follow instructions from the local authorities if an adverse weather condition occurs. Personnel should be trained on the hurricane warning terms as listed below. (Refer to [Hurricane Preparedness and Response - Preparedness | OSHA Administration](#) for more information.)

- **Hurricane/tropical storm watches** mean that a hurricane or tropical storm is possible in the specified area.
- **Hurricane/tropical storm warnings** mean that a hurricane or tropical storm is expected to reach the area, typically within 24 hours.



## EVACUATION DRILLS

Conducting evacuation drills at construction sites is the best way to evaluate if the emergency planning met the requirements of the site and determine the overall effectiveness of the EAP.

Evacuation drills permit employees to become familiar with the emergency procedures, their egress routes and assembly locations, so they can respond properly if an actual emergency should occur. Drills should be conducted as often as necessary to keep employees prepared. Include outside resources, such as fire and police departments, when possible. After each drill, gather management and employees to evaluate the effectiveness of the drill. Identify the strengths and weaknesses of your plan and work to improve it.

### Recommendations for drills.

1. **Hold them at unexpected times.** Evacuation drills should be conducted at random intervals to determine if additional employee training is necessary. Schedule them:
  - » In varying workplace conditions
  - » During different processes or operations
  - » During varied seasonal workloads
  - » During varied weather conditions

Prior knowledge of a drill should be limited to team leaders only so that the response will replicate an actual emergency. Providing advanced notification of a drill to all supervisory personnel is never recommended since the goal is to achieve successful response to an unplanned emergency event.

2. **Include emergency responders.** Whenever possible, drills should include outside services such as fire and police departments. Prior notification and coordination of the drills with these outside services is critical so as not to affect the fire/police departments' primary emergency response duties. The frequency of evacuation drills should be dependent upon the potential hazards at the site and the complexity of the site's layout, but should be done at least annually. We also recommend that if a construction operation is advancing to another phase, the contractor should inform the outside services and schedule more frequent drills.
3. **Evaluate drills.** Each drill should be timed from the alarm notification until all employees have been safely evacuated and accounted for at the designated safe area(s). Following each drill, employers should complete a written evaluation of performance with recommendations to improve evacuation provisions. This written evaluation should be shared with employees so they become active partners of the plan.

## EMPLOYEE TRAINING

Provide employees with an overview of the EAP, including evacuation routes, alarm systems, reporting procedures for personnel, shutdown procedures, and types of potential emergencies. Review any special hazards on the site such as flammable materials, fuel storage areas, toxic chemicals, radioactive sources, or water-reactive substances. Clearly communicate to employees who will be in charge during an emergency to minimize confusion.

### Team leaders' responsibilities.

Team leaders designated to assist in emergency evacuation procedures should be aware of:

- The workplace layout and alternative escape routes
- Employees with special needs who may require extra assistance
- How to use the buddy system
- Hazardous areas to avoid during an emergency evacuation



### What EAP training should include.

- Types of emergencies that can be reasonably expected in the workplace
- Individual roles and responsibilities
- Threats, hazards and protective actions
- Notification, warning and communication systems and procedures
- Means for locating personnel in an emergency
- Emergency response procedures
- Evacuation, shelter and accountability procedures
- Location and use of common emergency equipment
- Emergency shutdown procedures

### EAP employee training programs should be provided:

- Initially when the plan is developed
- For newly hired employees
- When new equipment, operations, or processes are introduced
- When the layout of the site changes
- When employees' responsibilities or designated actions under the plan change
- When drills demonstrate that employee performance should be improved
- At least annually

## FIRST AID

Employers should make an effort to obtain estimates of EMS (emergency medical services) response times for all construction job sites and for all work-shifts, and they should use that information when planning their first-aid program.

### Consult local emergency responders.

When developing a workplace first-aid program, consultation with the local fire and rescue service or emergency medical professionals may be helpful for response time information and other program issues. Because it can occur at the job site, non-occupational events such as SCA (sudden cardiac arrest), should be considered by employers when planning a first-aid program.

### Formalize procedures by putting them in writing.

Always put the first-aid program policies and procedures in writing. Policies and procedures should be communicated to all employees, including those workers who may not read or speak English. Language barriers should be addressed both in instructing employees on first-aid policies and procedures and when designating individuals who will receive first-aid training and become the on-site first-aid providers.

**Follow OSHA recommendations for emergency medical assistance.**

OSHA Standard [1926.50 Medical services and first aid](#) relates to emergency medical assistance on construction job sites:

**“In the absence of an infirmary, clinic, hospital, or physician, that is reasonably accessible in terms of time and distance to the worksite, which is available for the treatment of injured employees, a person who has a valid certificate in first-aid training from the U.S. Bureau of Mines, the American Red Cross, or equivalent training that can be verified by documentary evidence, shall be available at the worksite to render first aid.”**

What does this mean? See below:

- **Prompt first aid on-site or in proximity.**

The primary requirement addressed in this standard is that an employer must ensure prompt first-aid treatment for injured employees, either by providing for the availability of a trained first-aid provider at the work site, or by ensuring that emergency treatment services are within reasonable proximity of the work site. The basic purpose of the standard is to assure that adequate first aid is available in the critical minutes between the occurrence of an injury and the availability of a physician or hospital care for the injured employee.



- » **On-site.** One option this standard provides employers is to ensure that a member of the workforce has been trained in first aid. This option is, for most employers, a feasible and low-cost way to protect employees, as well as putting the employer clearly in compliance with the standard. OSHA recommends, but doesn't require, that every workplace include one or more employees

who are trained and certified in first aid, including CPR. Multi-employer job sites should have at least one employee trained/certified in first aid and CPR for each employer on-site, and/or the general contractor should provide the proper level of certified personnel. A first-aid responder working for a subcontractor shouldn't be expected to be the first-aid resource for other subcontractors.

- » **In proximity.** The other option for employers is to rely upon the reasonable proximity of an infirmary, clinic or hospital. OSHA has consistently taken the view that the reasonable availability of a trained emergency service provider, such as fire department paramedics or EMS responders, would be equivalent to the “infirmary, clinic, or hospital” specified by the literal wording of the standard. Emergency medical services can be provided either on-site or by evacuating the employee to an off-site facility in cases where that can be done safely.

The requirements that emergency medical services must be “**reasonably accessible**” or in near proximity to the workplace are stated only in general terms. An employer who relies on assistance from outside emergency responders as an alternative to providing a first-aid-trained employee must take these factors into account:

1. **Proximity.** The employer must take appropriate steps prior to any accident (such as making arrangements with the service provider) to ascertain that emergency medical assistance will be promptly available when an injury occurs. While the standard doesn't prescribe a number of minutes, **OSHA has long interpreted the term “near proximity” to mean that emergency care must be available within no more than 3-4 minutes from the workplace**, an [OSHA Interpretation 03/23/2007](#) that has been upheld by the Occupational Safety and Health Review Commission and by federal courts.

2. **Timeliness.** Medical literature establishes that, for serious injuries such as those involving stopped breathing, cardiac arrest, or uncontrolled bleeding, **first aid treatment must be provided within the first few minutes** to avoid permanent medical impairment or death. Therefore, in the absence of a medical facility within close proximity to the construction job site (less than 3 - 4 minutes away) to the workplace that can be used for treatment of injured employees, the employer must ensure that persons are adequately trained/certified to render first aid.
3. **Location of employees.** When estimating response times, contractors should **consider locations of employees throughout the job site**. For example, the response time to reach an employee working on an upper floor, on a scaffold, on a lift, within a trench, or at a remote area of the site, would be significantly longer than an employee working at ground level near the site entrance. In addition, potential delays to or from the medical facility to the job site, due to traffic and weather conditions, must also be considered.
4. **Infectious disease.** Any persons designated by the company as first-aid responders need to **protect against the hazards of bloodborne pathogens** including hepatitis B and HIV. It's recommended that employers in the construction industry follow the provisions in the OSHA Bloodborne Pathogens Standard (1910.1030).

### CARDIOPULMONARY RESUSCITATION (CPR)

In addition to first-aid requirements of 29 CFR



1910.151, several OSHA standards also require training in CPR because sudden cardiac arrest from asphyxiation, electrocution, or exertion may occur.

CPR may keep the victim alive until EMS arrives to provide the next level of medical care. However, survival from this kind of care is low, only five to

seven percent, according to the [American Heart Association \(AHA\)](#). For more information on administering CPR, refer to the [AHA Guidelines for CPR & Emergency Cardiovascular Care](#).

The OSHA standards requiring CPR training are:

- 1910.146 Permit-required Confined Spaces
- 1910.266 Appendix B: Logging Operations – First-Aid and CPR Training
- 1910.269 Electric Power Generation, Transmission and Distribution
- 1910.410 Qualifications of Dive Team
- 1926.950 Construction Subpart V, Power Transmission and Distribution

### AUTOMATED EXTERNAL DEFIBRILLATORS (AED)

According to the American Heart Association (AHA):

- Sudden cardiac arrest (SCA) is a leading cause of death in the United States
- Each year, emergency medical services treats about 383,000 victims of SCA before they reach the hospital
- Less than 12 percent of those victims survive
- SCA can happen to anyone at any time
- It's important for companies and organizations to implement AED programs so employees are prepared to respond to an SCA emergency

With recent advances in technology, AEDs are now widely available, safe, effective, portable, and easy to use. They provide the critical and necessary treatment for SCA caused by ventricular fibrillation, the uncoordinated beating of the heart that can lead to collapse and death.



Using AEDs as soon as possible after sudden cardiac arrest, within 3-4 minutes, can lead to a 60% survival rate.

(Source: The American Heart Association in collaboration with International Liaison Committee on Resuscitation)

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 work sites 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 work site AED program:

- Physician oversight
- Compliance with local, state and federal regulations
- Coordination with local EMS
- A quality assurance program
- A periodic review, among others

The AHA has published *Key Steps to Implementing an AED Program* [AHA Implementing an AED Program](#), which provides information on SCA, heart attacks and defibrillation. It also emphasizes the importance of AED programs and outlines key steps to implementing a program, as listed below.

1. Medical oversight
2. Work with local EMS
3. AED selection
4. AED technical support
5. AED program support
6. AED placement
7. Training of AED users
8. Awareness training of all employees
9. AED maintenance

#### Other sources on AED program development.

- The American College of Occupational and Environmental Medicine at [www.acoem.org](http://www.acoem.org)
- The American Red Cross at [www.redcross.org](http://www.redcross.org)
- Federal Occupational Health at [www.foh.psc.gov](http://www.foh.psc.gov)
- The National Center for Early Defibrillation at [www.early-defib.org](http://www.early-defib.org)

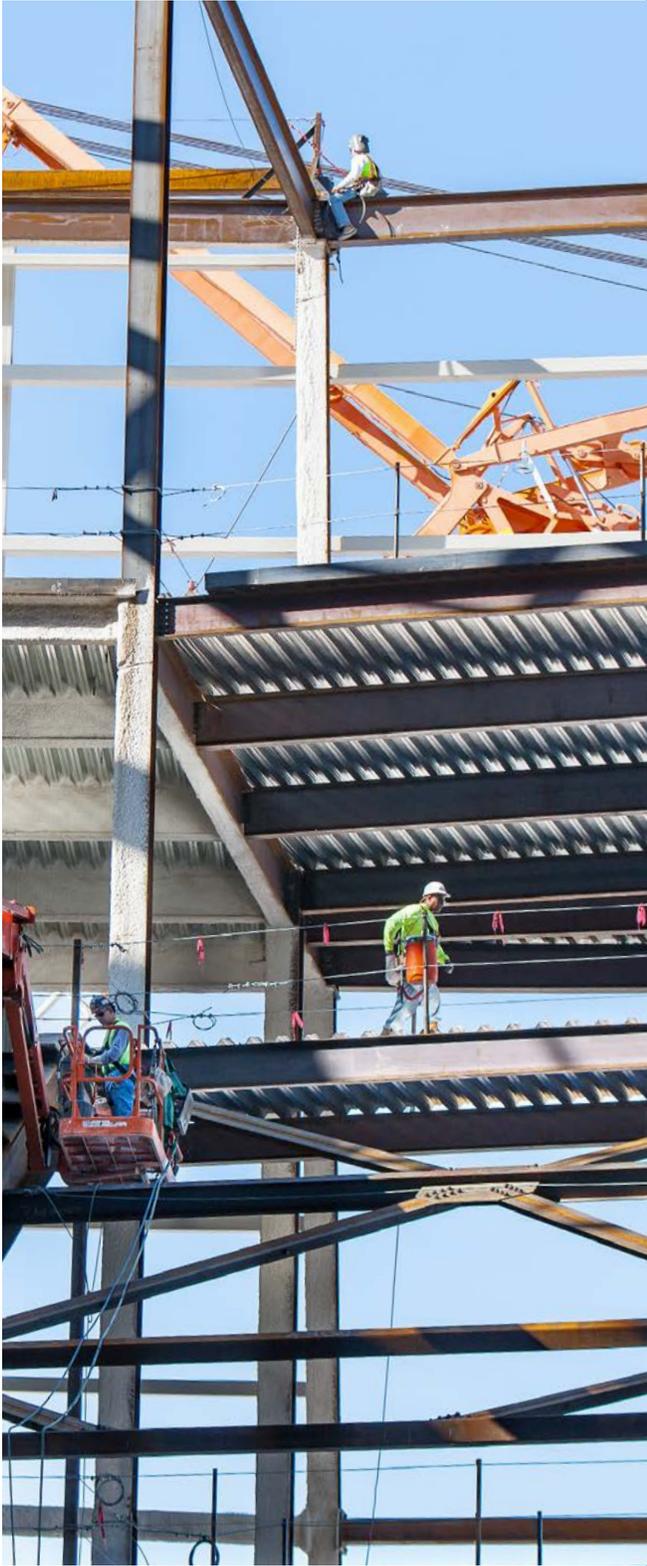
#### HIGH ANGLE ROPE RESCUE (HARR)

Commonly referred to as “rope rescue,” HARR is a specialized rescue service that’s commonly used in construction operations when significant heights are involved. Contractors must pre-plan for high angle rescue whenever working on high-rise buildings, or any operation involving the construction, repair, service, or maintenance of high-rise structures.

Any high-rise employee work area or platform, such as buildings, roofs, bridges, tanks, towers, signs, swing scaffolds, and power lines, require planning for specialized rescue services that most rescue teams aren’t equipped to handle.

Although there’s no clear definition or guideline on heights requiring high angle rescue, the National Fire Protection Association defines a “high-rise building” as:

**A building greater than 75 feet (25 m) in height where the building height is measured from the lowest level of fire department vehicle access to the floor of the highest potentially occupied story.**



### High angle rescue.

This is considered to be terrain that has a slope angle of 60 degrees and higher. In this type of rescue, rescuers are totally dependent upon the ropes for accessing and exiting the rescue. Since most of the rescuer's and victim's weight is handled by ropes, errors in setting up the rope system could be catastrophic or fatal. A high angle rescue involves hoisting victims from one level to another using ropes, pulleys, harnesses, belay devices, and various hauling equipment. Rescuers attach rigging systems, designed either to raise or lower accident victims to the optimum elevation, for safe extraction.

### Steep angle rescues.

Rescues at 35-60 degrees are considered steep angle rescues. In this situation, the weight of the rescuer and victim are distributed relatively evenly between the ground and ropes. Rescuers are also fully dependent on the rope system for upward travel because of how much higher the angle is compared to a low-angle rescue.

### Low angle rescues.

A rescue situation that involves angles of up to about 15-35 degrees are considered low angle. In these scenarios, most of the rescuer's weight is supported by the ground and rope is only used for balance or assistance with the rescue.

Contractors working on high-rise structures should preplan for high angle rescue, using either local EMS services or hired rescue companies, to ensure injured personnel can be reached and rescued in a timely manner. The selected rescue service should be invited to tour the construction site throughout the construction process in order to become familiar with the surroundings to ensure they have the capabilities to perform the rescue safely. In addition, contractors should schedule drills with the local EMS or hired rescue service to simulate a high-rise rescue.

## Methods and materials.

Rescue crews commonly use the following methods when retrieving an injured worker from an elevated work area or structure.

- **Elevating work platform rescue:** Using a portable elevating work platform (EWP) to reach the suspended worker, the rescue crew will attach the worker's lanyard to the anchor point on the EWP, and lower the worker to a safe location. If the victim isn't conscious, two rescuers will probably be needed to safely handle the weight of the fallen worker.
- **Ladder or lift rescue:** If the fallen worker is suspended from a lifeline, move the worker (if possible) to an area that rescuers can access safely with a ladder or lift. Rig separate lifelines for rescuers to use while carrying out the rescue from the ladder or lift. Other rescuers on the ground (or closest work surface) should lower the fallen worker while the rescuer on the ladder or lift guides the fallen worker to the ground (or work surface).
- **Rescue from work area or floor below:** If the fallen worker is suspended near a work area and can be safely reached from the floor below or the area from which they fell, attach a second line to the fallen worker's harness to help rescuers pull the fallen worker to a safe area.
- **Basket rescue:** Perform a basket rescue only when it isn't possible to use conventional equipment to rescue the fallen worker in a safe manner. The basket must be kept on-site at all times in an accessible location where it's clear of material or other equipment. Fit the rescue basket with appropriate rigging for quick hookup by the crane operator.

High-angle rescue crews should meet or exceed certification requirements for a *Rope Rescue Technician (RRT)* based on *NFPA 1006 Standard for Rescue Technician Professional Qualifications* and *NFPA 1670 Standard on Operations and Training for Technical Search and Rescue Incidents*.

## POST-FALL RESCUE

The updated standard for fall protection, [American National Standards Institute \(ANSI\) ANSI Z359.3](#) is a standard dedicated to the construction, use and training required for fall protection rescue equipment. This ANSI standard recognizes that an arrested fall is the first rescue that has taken place; the worker was prevented from impacting structures below him/her or the ground.

However, most users of fall protection equipment fail to adequately plan further than this first life/injury saving step. Many employers that require their employees to use fall protection pay minimal attention to the need for rescue from a fall, even though it's an OSHA requirement, as listed below.

29 CFR 1926.502(d)(20):

**“The employer shall provide for prompt rescue of employees in the event of a fall or shall assure that employees are able to rescue themselves.”**

Following a fall arrest, just how long a worker can remain suspended upright in a body harness, before suffering adverse health consequences, is a matter of debate. According to [OSHA Bulletin SHIB 03-24-2004](#), prolonged suspension from fall arrest systems can cause orthostatic intolerance, which, in turn, can result in serious physical injury, or potentially, death.





Research indicates that suspension in a fall arrest device can result in unconsciousness, followed by death, in less than 30 minutes.

### The dangers of orthostatic intolerance.

Orthostatic intolerance is defined in the OSHA Bulletin as:

**“The development of symptoms such as light-headedness, palpitations, tremulousness, poor concentration, fatigue, nausea, dizziness, headache, sweating, weakness and occasionally fainting during upright standing.”**

While in a sedentary position, blood can accumulate in the veins, which is commonly called “venous pooling,” and cause orthostatic intolerance.

Orthostatic intolerance may be experienced by workers using fall arrest systems. Following a fall, a worker may remain suspended in a harness. The sustained immobility may lead to a state of unconsciousness. Depending on the length of time the suspended worker is unconscious/immobile and the level of venous pooling, the resulting orthostatic intolerance may lead to death.

While not common, such fatalities often are referred to as “harness-induced pathology” or “suspension trauma.”

Venous pooling typically occurs in the legs due to the force of gravity and a lack of movement. Some venous pooling occurs naturally when a person is standing. In the veins, blood normally is moved back to the heart through one-way valves using the normal muscular action associated with limb movement. If the legs are immobile, then these “muscle pumps” don’t operate effectively, and blood can accumulate. Since veins can expand, a large volume of blood may accumulate in the veins.

An accumulation of blood in the legs reduces the amount of blood in circulation. The body reacts to this reduction by speeding up the heart rate in an attempt to maintain sufficient blood flow to the brain. If the blood supply is significantly reduced, this reaction will not be effective. The body will abruptly slow the heart rate and blood pressure will diminish in the arteries.

During severe venous pooling, the reduction in quantity and/or quality (oxygen content) of blood flowing to the brain causes fainting. This reduction also can have an effect on other vital organs, such as the kidneys. The kidneys are very sensitive to blood oxygen, and renal failure can occur with excessive venous pooling. If these conditions continue, they potentially may be fatal.





### Preventing prolonged suspension.

To reduce the risk associated with prolonged suspension in fall arrest systems, employers should implement plans to prevent prolonged suspension in fall protection devices. The plan should be incorporated or referenced in the EAP and include procedures for:

- Preventing prolonged suspension
- Identifying orthostatic intolerance signs and symptoms
- Performing rescue and treatment as quickly as possible

Access can be gained to a suspended employee by means of a ladder, scissor lift, or aerial lift. Self-rescue procedures include a block/tackle device or friction device, which slowly lowers an employee.

OSHA recommends the following general practices/considerations:

- Rescue suspended workers as quickly as possible
- Be aware that suspended workers are at risk of orthostatic intolerance and suspension trauma
- Be aware of signs and symptoms of orthostatic intolerance
- Be aware that orthostatic intolerance is potentially life threatening; suspended workers with head injuries or who are unconscious are particularly at risk
- Be aware of factors that can increase the risk of suspension trauma

### Training employees in the safe use of fall arrest systems.

OSHA requires employers to train workers to use fall arrest systems and other personal protective equipment correctly while performing their jobs, in accordance with 1926.503 (*Training Requirements for Fall Protection*).

Workers who wear fall arrest devices while working, and those who may perform rescue activities, should also be trained in:

- How to ascertain whether their personal protective equipment is properly fitted and worn, so that it performs as intended
- How orthostatic intolerance/suspension trauma may occur
- The factors that may increase a worker's risk
- How to recognize the signs and symptoms of orthostatic intolerance
- The appropriate rescue procedures and methods to diminish risk while suspended

## CRANE RESCUE

The justification for using a crane to move personnel, even for the purposes of rescue, is very limited. Both OSHA General Industry and Construction Standards limit the use of cranes to move personnel, and prescribe the proper safety measures for these operations.

OSHA prohibits hoisting personnel by crane or derrick except when no safe alternative is possible because it constitutes a significant hazard to employees. Therefore, the hoisting of personnel isn't permitted unless conventional means of transporting employees aren't feasible. See below.

### 1926.1431(a):

**“The use of equipment to hoist employees is prohibited except where the employer demonstrates that the erection, use, and dismantling of conventional means of reaching the work area, such as a personnel hoist, ladder, stairway, aerial lift, elevating work platform, or scaffold, would be more hazardous, or is not possible because of the project’s structural design or worksite conditions. This paragraph does not apply to work covered by subpart R (Steel Erection) of this part.”**

### Consult EMS pros before using a crane.

Contractors should consult with local EMS (fire, police and ambulance) prior to implementing a rescue plan that involves the use of cranes to move injured victims. The plan should be incorporated or referenced in the site EAP.



Whenever a tower crane is used on a site, you should develop a written plan to rescue an injured or ill tower crane operator or maintenance operator. Such plans should:

- Be site-specific
- Provide details, such as:
  - » The exact location(s) of the Stokes basket
  - » The testing, inspection and use of all personnel baskets

In addition to following the manufacturer’s operating instructions of the rescue basket, crews planning to conduct basket rescue should follow these general guidelines.

- Never exceed the maximum number of workers in the basket as indicated on the nameplate
- Ensure that a competent person inspects the crane and lifting equipment prior to lifting rescuers
- Always equip the crane with a fail-safe mechanism to prevent the boom from descending in the event of a power source or system failure
- Maintain an adequate means of communication between the rescuers in the basket and the crane operator at all times
- Ensure that workers in the rescue basket wear full-body safety harnesses attached to a lanyard and anchored to appropriate points in the basket at all times

## ADDITIONAL RESOURCES

- *Sample Emergency Action Plan*, The Hartford
- Technical Information Paper (TIPs) Series: *Confined Space Rescue*, The Hartford
- Technical Information Paper (TIPs) Series: *Business Continuity Management: Media Relations*, The Hartford
- Technical Information Paper (TIPs) Series: *Crisis Management Planning: Ten Practical Tips for the Small Business Owner*, The Hartford
- [eLCOSH: Emergency Response Apps from the National Response Team](#): Contractors, workers and safety professionals have access to an increasing number of free or relatively inexpensive applications for smartphones that can help to keep construction sites safer. This collection of apps was put together by the National Response Team’s Worker Safety and Health Subcommittee and focuses on emergency response. The NRT produced this listing for informational purposes only and indicates it isn’t a comprehensive list.
- [eLCOSH: Emergency Plan Good Practice](#): Every site should have an emergency plan that informs workers where to go in case of an emergency. A map is an easy way to communicate exit routes and assembly points.
- [eLCOSH: After the Fall: Will your rescue program leave workers hanging?](#): Describes the dangers of suspension trauma after a fall if rescue is not rapid, the importance of having a plan and standards that apply; June 2005.
- [eLCOSH: Fall Protection Rescue – Addressing the Issue in the Updated ANSI Standard](#): Describes the updated standard for fall protection, ANSI Z359, which will contain guidelines for rescue after a fall: March 2004.
- [Evacuation & Shelter-in-Place | Occupational Safety and Health Administration](#): This web page provides workers and employers guidance on planning for safe evacuations and shelter-in-place procedures during emergencies that may affect their workplace.
- [CDC - Business Emergency Management Planning - NIOSH Workplace Safety and Health Topic](#): A comprehensive plan for dealing with terrorism-related events should include specific instructions to building occupants, actions to be taken by facility management and first responder notification procedures. The links below should assist in the development of these plans.
- [National Fire Protection Association \(NFPA\) 1620, Standard for Pre-Incident Planning, NFPA, 2015](#): The NFPA 1620 standard provides criteria for developing pre-incident plans to help responders effectively manage emergencies so as to maximize protection for occupants, responding personnel, property, and the environment. It is a comprehensive guide covering the pre-incident planning process, physical and site considerations, occupant considerations, water supplies and fire protection systems, special hazards, emergency operations, and pre-incident plan testing and maintenance. Annexes contain case histories and information addressing special or unique characteristics of specific occupancy classifications, as well as sample forms for pre-incident planning.
- [Small Business Administration Prepare for Emergencies](#): Smart planning can help you keep your business running if disaster strikes. You’ll want to take the right steps to prevent and prepare for disaster, and know where to get aid if disaster strikes.
- [American Red Cross Get Started: Emergency Preparedness Checklist for Small Businesses](#): Having an emergency preparedness plan in place is as important to the survival of your small business as your business plan. Ask yourself the questions in this checklist to help you get back in business after a disaster.

- [National Fire Protection Association \(NFPA\) 1670, Standard on Operations and Training for Technical Search and Rescue Incidents](#): This standard was originally developed in 1994; the most recent version was approved and adopted in January 2004. This document identifies and establishes levels of functional capability for conducting operations safely and effectively while minimizing threats to rescuers.
- [National Fire Protection Association \(NFPA\) 1006, Standard for Rescue Technician Professional Qualifications](#): NFPA 1006 addresses standards for rescue technician professional qualifications. The 2017 edition updates the minimum job performance requirements to ensure that fire service and other emergency response personnel who perform such operations have the skills to work safely and effectively.
- [National Fire Protection Association \(NFPA\) 1983-Standard-on-Life-Safety-Rope-and-Equipment-for-Emergency-Services: NFPA 1983: Standard on Life Safety Rope and Equipment for Emergency Services](#) specifies current minimum requirements for the design, performance, testing, and certification of life safety rope and associated equipment used to support emergency services personnel and civilians during rescue, fire fighting, or other emergency operations, or during training evolutions.
- [ANSI/ASSE Z359 Fall Protection Code Package: Z359.3](#) is a standard dedicated to the construction, use and training required for fall protection rescue equipment.

## LEARN MORE.

For more information, contact your Risk Engineering consultant from The Hartford today or visit us at [thehartford.com/riskengineering](http://thehartford.com/riskengineering).

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