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Implementing Z359.1 Managed Fall Protection Program Standard: Newer, Better, Fall Protection

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Introduction

A worker is fifteen feet above the ground in a factory one afternoon, changing a filter on a machine. As there are no guardrails on the machine, and because his employer wants to be sure he is following OSHA's fall protection regulations, he wears fall protection equipment when working at heights. This employee is wearing a full-body harness and a lifeline. The harness and lifeline are made by two different equipment manufactures. While the worker regularly checks his harness, the lifeline is an older model he found hanging in the back of the equipment closet that hasn't been used in over a year, since a fellow employee slipped and fell, hanging briefly from it. Because of the angle of the machinery and its height, the anchorage is positioned on a beam between the machine being worked on and the wall. The anchorage was installed by one of the company technicians last year. As the worker hunches over the machine in question, he doesn't have very much foot space; part of his work boot hangs off the ledge. The anchorage is behind him and to his right. If he falls, do you think he's protected?

Falls remain the number one killer of workers in the construction industry and the number two killer of workers in private industry, according to the Bureau of Labor Statistics. This is the statistic that more and more safety personnel are being handed when told to go find a safety solution for the company's work-at-heights jobs. What OSHA requires is that any employee on a working or walking surface with an unprotected edge four feet or more above the lower level needs to be protected from falling by a guardrail system, safety net, or personal fall arrest system. What OSHA does not say is how to determine which system to select, how to train workers to use it, or the positive and negative attributes of each system. Fortunately, there is a new standard that does: ANSI Z359, the managed fall protection standard. It's newer, it's better, and it does what it says: it protects workers from falls.

Need for a new standard

What many employers at construction and general industry sites do not realize is that OSHA's regulations are neither comprehensive enough; as well, they certainly are not clear and leave room for much confusion. What OSHA provides is the bare minimum. A company can be following OSHA regulations and a worker could still fall to his death. For example, in the OSHA system steel workers are allowed to work at heights up to thirty feet without wearing fall protection. In the absence of any clear guidelines and standards, most companies opt for what appears to be the easiest and cheapest fall protection option: fall arrest equipment. It requires a

relatively small initial cost and very little redesign of the workplace or task. The long-term costs are substantial, however, as it requires continual maintenance, extensive training in order to install and use properly, and necessitates having a fool-proof rescue plan in place.

The biggest problem with fall arrest equipment, however, is that the worker still falls. No matter how much money is invested into harnesses, lifelines, and shock absorbers, no one can ever predict when or where a worker will fall, and most critically, how he or she will fall. While the assumption is that the worker will fall feet-first, the reality is that he or she could fall backwards, sideways, or head-first. Falling in any of these directions could do substantial damage to the back, neck and spine. The worker could hit something during his fall, especially if his lifeline is longer than the recommended length. Moreover, if the lifeline is not secured properly—if the anchorage is weak and/or uncertified, the line worn or weakened, if the parts aren't compatible—the entire fall protection system could actually fail and the worker fall to the ground. Depending on how far this distance is, the surface he's falling towards, any refuse or machinery on the ground, and the worker's health and age, death is a very likely possibility.

Even if the worker wasn't injured at all during the fall, which is rare, he does not magically float to the ground or back to his workplace after being caught in the fall. He is suspended, and frequently this is at a substantial height above the ground, or in a place where it is not easy to rescue him. Few people realize what a critical situation suspension can be. After five to ten minutes of inactive suspension, blood starts pooling in the legs, which begins to put the body in shock and causes breathing problems and eventually brain damage. Any injuries only exacerbate the damage cause by suspension trauma. When the worker is finally rescued, putting him in a horizontal position could kill him, as the pooled stagnant blood will be full of toxins that could overwhelm the heart.

All these possibilities for injury or death equate higher insurance premiums, workmen's compensation payouts, and lawsuits and settlements. These are not trifling expenses, and these alone nullify the perceived cheapness of fall protection equipment. Additionally, few buyers realize how much money the total bill is to buy enough compatible harnesses, lifelines, and components for the company. Installing anchorages adds another substantial expense as does training workers to correctly use the equipments. Without a worker falling there are already unseen expenses. If the worker falls, the company will have to rescue him quickly which either requires a well-trained dedicated high-angle ropes rescue team or scissor lifts, not to mention the cost of stopping work to perform the rescue. At some auto plants, the price per minute of lost work time could add up to thousands of dollars in just an hour, especially if the worker falls in such a way as to damage some of the machinery.

Fortunately, fall protection equipment is no longer the only way to keep a worker safe. ANSI Z359 (Proposed) standard for fall protection came about because people working in the construction and general industry sectors believed that there should be a better set of industry standards for fall protection. Z359 has a number of critically helpful points. First, the ANSI standard makes it very clear that *everyone* has a responsibility to fall protection; in order for fall protection to be effective, the entire company must be committed to upholding it. Secondly, there are 250 pages of new documents, including a definitions section that clearly spells out who does what in the managed fall protection program. As well, there is also a section devoted to equipment compatibility requirements.

Implementing Z359

Preplanning

The managed fall protection program is based on the idea of pre-planning, a concept sorely lacking in most fall protection programs. Pre-planning involves identifying the people who will perform certain tasks, the hazards that need remedied, and any issues particular to the workplace. With this in mind, the first step in implementing Z359 is to read the document. It seems like common sense, but before trying to enforce a set of standards, it is very important to know what it actually says. The best place to start reading this document is the definitions section, as it will demonstrate the components of the program and why training is so important to the managed fall protection program's success.

The next step in the process is to determine who will be on the fall protection team. Ideally, it is important to choose representatives from each area of your company, including finance, purchasing, management, engineering, construction, skilled trades, maintenance, safety, and plant engineering, to name a few. The ANSI standard stresses that the whole company is responsible for the effectiveness of a fall protection program, and as such, it is important that the whole company understands their role as well as why managed fall protection is so important.

Three key members of the fall protection team will be the program administrator, the competent person, and the qualified person. The program administrator should have a general safety background and be proficient at communicating well with both management and the workers. A particularly important task will be to help the financial team understand the value of good equipment over cheap equipment. The competent person will usually be a foreman or supervisor. It is of the utmost importance that this individual has good communication skills and openness to new ideas. A person who says, "We've never done it this way" will not be the right person for the job. Finally, the qualified person will be a structural or civil engineer who has advanced knowledge, training and experience with fall protection. One of his or her key roles will be the design, installation, and supervision of fall arrest systems, including horizontal lifelines. The qualified person will also be responsible for designing fall protection solutions that eliminate or reduce the risk of fall hazards. These three roles are crucial to the success of the managed fall protection program, and care must be taken to select the right people for each position.

After selecting the fall protection committee, the program administrator, competent person, qualified person, and consultant, the next step is assessing the company's fall protection safety. Since it is natural for humans to have a hard time accepting other people's advice and criticisms, the company and employees will have an easier time believing data about their sector. The fall protection committee needs to record fall injuries and fatalities as well as near-misses, worker safety behaviors and attitudes, machinery, any existing fall protection training programs, workplace obstacles, and the company budget figures, as well as the expectations for the company and workers. A consultant who is strong in the Managed Fall Protection Program, engineering, safety and training will be a definite asset to your program. They should advise your team how to layout the plan and how to assess the findings of the job hazard analysis. After collecting the data, the fall protection team needs to review and discuss the data.

Training

The fall protection team needs to be trained in fall safety as the next step will be hazard ranking, and in order to properly rank and assess hazards, the team will need to be able to recognize these dangers. Most fall safety professional recommend training all members of the fall protection team to a 40-plus hour competent person level. Following this, the fall protection committee, with the support of the company, needs to arrange a training program for the rest of the company employees. Special attention should be paid to training the Authorized Person (At-risk Workers).

A training program is one of the most valuable investments the company will make into its fall protection program, and has the potential to provide the most important means of changing workers' attitudes and behaviors towards their safety. This depends entirely on the approach the company takes toward the training program. If the training is merely a series of show-and-tell sessions (show the harness, tell how to put it on) and videos, the workers will be bored, and they will not be engaged, and will not care or remember the safety lessons they are being asked to apply. If, however, the workers are involved in putting on the harness, if they see a lanyard attached to a test weight drop and possibly break, and if they are asked to perform a simulated rescue, they will understand the dangers of fall protection as well as how to most effectively protect themselves.

Hazard Ranking

The next step in an effective fall protection program is a hazard ranking, often called the Job Safety Analysis (JSA) or Job Hazard Analysis (JHA). The fall protection committee will undertake this after they have successfully analyzed the safety data and completed their competent person training. In order to avoid being overwhelmed and to best observe the hazards, the committee needs to work in small areas of the facility and in groups.. Hazard rankings are generally most successful if one group member works in or is familiar with that section of the company, while the other two members work in different backgrounds. Two pairs of fresh eyes will provide a new perspective on the work area and reduce the possibility any hazards will be overlooked. As well, the newcomers may ask questions about why certain tasks are performed in particular ways. In many situations, certain job tasks are performed a certain way only because "we've always done it this way" and having someone question that method could be a helpful way of resolving a workplace hazard.

A fall hazard ranking system needs to be used while conducting the job hazard analysis. This should be accurate but simple. One of the most effective ways is to rank hazards according to three criteria: the probability that an injury or fatality will occur, the severity of the potential injury, and the frequency of the exposure to the hazard. For each factor, the hazard should be ranked from 0-10, with 10 being the most hazardous. Once the aspects of each hazard are ranked, the final score of each hazard is calculated by multiplying the probability times the severity times the frequency. So for example, if a certain task has a probability of 5, a severity of 9, and a frequency of 2, the product would be 5 x 9 x 2 = 90. A hazard with a ranking of 1000 is considered a worst-case scenario.

The fall hazard ranking helps the fall protection committee to prioritize hazards and determine which ones to resolve first. It may seem obvious, but it is very important to address the most dangerous hazards first. Often these are the most complicated problems to solve, which can make some employers reluctant to address them. However, in order to prove to the employees that management is serious about fall protection and worker safety, they need to act on the hazard ranking and resolve the problems as soon as possible.

It is important to note, however, that the hazard ranking is not complete in and of itself. Some particularly risky hazards may have a deceptively low ranking. For example, if the frequency of exposure to a hazard is low (once a year, perhaps) but the probability of death or injury is high and the severity of the injury is high, then this hazard needs to be prioritized along with those having higher numbers. In this situation, a fall protection consultant can be very helpful in conducting the JHA and determining the course of action.

Abating the hazards

Hierarchy of Fall Protection

At this point, much of the hard work of the fall protection program has been carried out. Rather than randomly throwing equipment and safety memos at the various sectors of the company, the fall protection team now knows where the hazards are and what makes them particularly hazardous. It may even be obvious at this point what needs to be done to solve the fall hazard problem. However, the most important work—protecting the workers from these hazards—has yet to be done.

When deciding how to abate fall hazards, the Hierarchy of Fall Protection (sometimes known as the Hierarchy of Controls) is an invaluable tool, primarily because it provides options that many safety administrators might not naturally think of applying. For the purposes of fall protection, there are three levels to the hierarchy, as listed below:

1 Elimination of hazard: gets rid of the danger
2 Engineering controls and fall restraint: keeps the danger at a distance
3 Fall arrest equipment: stops the worker during a fall

The Hierarchy of Fall Protection is often described as a pyramid, with the bottom level, elimination of the hazard, being the most cost efficient and low-maintenance while also providing the best fall protection. With each new level of the pyramid, the costs and maintenance goes up while the effectiveness goes down. If the fall protection committee is able to implement the bottom level of the pyramid, they should.

Eliminating a hazard may initially sound impossible but is often much easier to implement than one thinks. To do this, the fall protection committee needs to determine if the task, the process, or the machinery can be modified in such a way as to not require the worker being exposed to a potential fall. For example, is there a way of changing a light bulb from the ground? If it is time to invest in new machinery, is there a model available that has self-maintenance functions? Instead of building part of a structure at height, is it possible to build it on the ground and hoist it into place? More often than not, these options are possible. This is usually the most argued solution, and generally for no other reason than because humans are creatures of habit. Workers in general industry and construction notoriously dislike being told to change their behavior or process. The task itself is generally less of an obstacle than the “we’ve always done it this way” attitude. Once this mentality has been overcome, fall hazards are usually easily resolved.

When this isn’t an option, the next stage of the hierarchy of fall protection is the use of engineering controls. This is usually done by providing a work platform, guardrails, or both to a work area. In this situation aerial lifts, scissor lifts, and boatswain’s chairs can provide useful work surfaces. Sometimes these options still require fall protection equipment as a backup, but they provide a much safer work surface than fall protection equipment alone. Fall restraint is a form of engineering controls, as it utilizes equipment to prevent the worker from being exposed to the fall hazard. While the equipment used may resemble fall arrest equipment, the lifelines and harnesses used for fall restraint are only there to prevent a worker from coming within a certain distance of an unprotected edge. This equipment cannot be substituted for fall arrest equipment or vice versa.

Fall arrest equipment is the third fall abatement option, and the topmost of the pyramid of hierarchy of fall protection. Ironically, this is the least effective yet the most frequently utilized

method of abatement. In some circumstances, however, it is the only option available. Before investing in fall arrest equipment and training some important issues need to be addressed.

Key Issues for Fall Protection Systems

Before deciding what equipment to buy, a rescue plan must be developed; if it is impossible to develop a quick, safe way to rescue a worker from suspension, then there is no point in buying the fall arrest equipment. Typically, a rescue plan is considered to be an oxymoron; most facilities intend on calling 911 if an emergency occurs. This, however, is neglectful and a misunderstanding. Most rescue departments are not equipped to handle a high-angle rescue or the treatment of a victim with suspension trauma. What most manufacturing companies don't understand is that local fire departments will give priority to a house fire over an industrial emergency. In some cases, such as an industrial fire, they will not even come to the scene unless they've received specialized training.

In any rescue situation, communication of the incident is of the utmost importance, so a buddy system or radio equipment is advisable when working at heights. In some situations a rescue plan is as simple as having a stepladder or aerial lift available. For some work situations, a self-rescuing lanyard could be advantageous. If there is any chance of a difficult rescue, and the worker being suspended for more than five minutes, it is worth investing in lifelines and harnesses with a built-in leg loop, which will allow the worker to hang in a sitting position, thus reducing the chances of suspension trauma.

Fall protection systems often appear inexpensive when looking at individual pieces, and certainly seem less expensive than the cost of buying or renting a scissor or aerial lift to work from, or completely remodeling the factory. However, harnesses, lifelines, shock absorbers, and individual components need to be purchased for each worker, plus extras in case they get damaged during the job. Another overlooked aspect of fall arrest equipment is compatibility. A harness is not just a harness, nor a lanyard just a lanyard. Fall arrest harnesses and lifelines and lanyards are all designed for very specific purposes, and cannot be paired with components from other systems. All parts of the fall protection system, from harnesses to anchorages, need to be compatible. Likewise, they cannot be paired with components from other manufacturers—a cheap harness from Company A cannot simply be paired up with a lifeline from Company B unless they have been deemed compatible. Anchorages are particularly crucial; if they have not been certified as capable of bearing a load of 5,000 pounds, then there is a chance that they could fail during a fall arrest. Ideally, anchorages have been marked and installed during the building's blueprint phase. However, this seldom happens, and more often than not, anchorages have to be installed in an existing building, which is usually difficult and expensive.

Finally, if a fall protection committee decides to use fall arrest equipment, they must invest in appropriate training for the company's employees. Employees need to understand how to correctly maintain the equipment, put on the equipment, and work with the equipment on. It is crucial that the employees continually practice the rescue drills both during and after training. Every employee needs to be absolutely clear as to what to do after a fall. During training, special attention should be given to teaching the employees how to properly handle post-rescue victims. If victims have been suspended for more than a few minutes, they are most likely experiencing suspension trauma. Most emergency responders are not familiar with suspension trauma and can inadvertently harm a victim while treating them. The most important things to remember is that a suspension trauma victim should be kept in a seated, not horizontal, position for at least an hour, and should be sent to the hospital to be checked for kidney damage.

Conclusion

The decision to implement a new method or program is often easier than actually carrying out the program, and following through with the Managed Fall Protection Program can initially appear to be daunting. When faced with a list of several hundred workplace hazards, it is easy to become overwhelmed and to fall back on luck and older, more comfortable safety methods. Changing workplace habits, attitudes, and behaviors will be a challenge, as it will be to redesign work practices and areas. However, this initial investment of time and mental energy will pave the way for a safer, more effective work culture. In this millennium, workers' health and safety cannot be ignored, and the company with fewer worker turnovers, injuries, and downtime will be the company with a competitive edge.