Session No. 641

Fall Protection: Certified Vs. Non-Certified Anchorages

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While many new topics are addressed in the draft ANSI Z359 fall protection standard, one of the critical concepts presented is certified and non-certified anchorages for fall protection systems. Since the consequences of failure can be so dire, it is imperative that persons involved in the selection and design of anchorages understand the limitations and risks involved with using both certified and non-certified anchorages.

Regulations and Standards

The safety requirements set forth by OSHA represent the regulations that must be followed by law. Consensus standards, such as ANSI, represent the best practices in the industry and many times become the precursor for the direction in which the regulations are headed. For fall protection, OSHA requires that fall arrest anchorages be capable of supporting at least 5,000 lbs. per employee attached. Alternately it is stated that fall arrest anchorages be designed, installed and used under the supervision of a qualified person as part of a complete personal fall protection system which maintains a safety factor of at least two. But, who is a qualified person? According to OSHA 29 CFR 1926.32(m), " Qualified means one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work, or the project."

The ANSI standard for fall arrest equipment is Z359.1, which was originally released in 1992 and reaffirmed in 1999. The existing document references anchorages as needing to be capable of supporting at least 5,000 lbs. in the absence of certification or 3,600 lbs. with certification. In the original standard, part of the definition for certification (section 2.13) states it is "[a]n act or process resulting in the documentation that determines and attests to criteria that meet the requirements of this standard."

For the past several years, the ANSI Z359 committee has been working on a new draft family of standards to reflect the changes in the industry and provide a more comprehensive and informative document. Full understanding of certified and non-certified anchorages is best achieved within the context of the draft Z359.2-200X standard, Minimum Requirements for a Comprehensive Managed Fall Protection Program. The draft standard describes this comprehensive program and includes:

- Policies, Duties and Training
- Fall Protection Procedures
- Eliminating and Controlling Fall Hazards
- Rescue Procedures
- Incident Investigation
- Evaluating Program Effectiveness

Included in the fall protection procedures section is the need to first identify fall hazards within a facility. Once the hazards have been identified and prioritized, they can be systematically abated following the Hierarchy of Control. If a solution with anchorages and personal protective equipment is chosen, then one must understand the different types of anchorages, the issues associated with selecting anchorages, design loading and other important design considerations.

Types of Anchorages

When considering how to protect an employee from a fall, it is important to understand the differences in the types of anchorages. Five unique types of anchorages include:

- Fall Arrest
- Work Positioning
- Travel Restraint
- Horizontal Lifeline
- Rescue

The draft ANSI Z359 standard defines all of these anchorage types and provides distinct loading requirements for each. While they are relatively self-explanatory, clarifications are provided as follows. The fall arrest anchorage is used to support a worker wearing the proper personal protective equipment going through a free fall with a maximum arresting force of 1,800 lbs. to the body. A work positioning anchorage is used to assist a worker so that they may work "hands free." This anchorage will prevent the worker from falling more than 2 feet with the work positioning equipment, but may, in some cases, also require the use of a back-up fall arrest anchorage in the event of a fall. Travel restraint is sometimes referred to as a "dog leash" to prevent an employee from being exposed to the fall hazard. The travel restraint anchorage is located to keep the worker wearing the personal protective equipment from ever reaching the edge of the work surface where a fall could occur. The anchorage that supports a horizontal lifeline is very unique in that the loading that it receives is dependent on multiple factors including the sag of the horizontal lifeline, the number of spans, the number of workers attached, as well as the type and size of the material for the lifeline and more. The anchorage that is used in the event of a rescue is many times overlooked, which can be very dangerous in the time of a crisis requiring a rescue situation. As the design loads are reviewed for each of these, it should be made clear when anchorages can serve more than one purpose.

System Decision Making

While the strength of the anchorage is critical, there are multiple issues to consider when selecting the best system to address a given fall hazard. Included in the fall protection procedures section of the draft Z359.2 standard is the need to first identify fall hazards within a facility. Once the hazards have been identified and prioritized, they can be systematically abated. The Hierarchy of Control is described in the draft standard and assists in the evaluation of abatement solutions to determine the most effective and least "defeatable" means to protect workers. The Hierarchy of Control, which is shown in Exhibit 1, ranks the following abatement options:

- Elimination
- Passive Fall Protection
- Administrative Controls
- Fall Restraint
- Fall Arrest

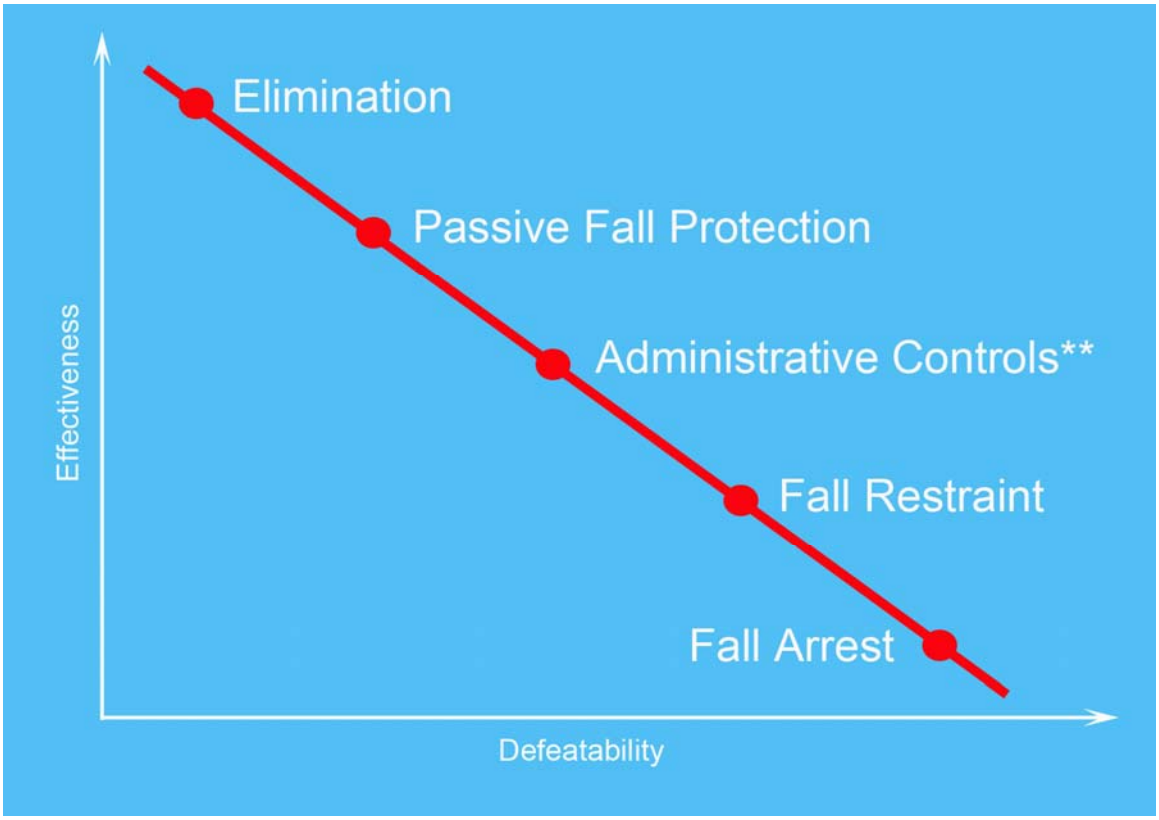

Exhibit 1: The Hierarchy of Control assists in the evaluation of abatement options.

**** Please note that in ANSI Z359.2, purely administrative controls are ranked lowest on the HOC. But, many in the industry place administrative controls above fall restraint and fall arrest, since the former, when properly followed, eliminates exposure to hazards.**

It should be noted that the frequency of the task should be considered when evaluating the best solution. The OSHA standard directive 1-1.13 states that when a worker is performing a task at least once every two weeks, or for a total of 4 man-hours or more during any sequential four-week period, a passive fall protection solution (engineering control) should be used. Other items to consider when selecting the best abatement solution for a fall hazard include productivity of workers, accessibility to the work area, short term and long term costs, and overall safety of the situation.

Another consideration when deciding the system to be used is the structural capacity of available overhead components that might be able to support an anchorage. Assuming an overhead structure does exist, the capacity of that structure may influence the type of anchorage that is used since the loading varies with anchorage types. Additional considerations are the number of workers that are being protected and the maximum arresting force associated with the equipment (can vary between manufacturers). Facility standards may also influence how pre-planned anchorages may be evaluated and labeled.

The equipment that is specified is extremely important in the system decision making. While most manufacturers have attempted to keep the maximum arresting forces relatively low (typically in the 900 lb. range), potential new issues are under consideration within the ANSI committee. For example, factors like increasing the maximum worker weight beyond 310 lb. and allowing free falls up to 12 feet (fall factor 2) may drive those maximum arresting forces higher in the near future. Two other considerations that effect system decision making are equipment compatibility and the total fall distance, which should be looked at closely.

Procedures and training associated with the system selected must also be carefully considered. As outlined in the draft standard, the procedures must be written, provide 100 percent protection, while also addressing inspection and rescue. Training should be system specific and should be addressed for all levels including authorized person, competent person and those associated with rescue.

If a solution with anchorages and personal protective equipment is chosen, it is critical to fully understand the requirements for and differences between certified and non-certified anchorages of all types.

Design Loads

The types of anchorages that can be a part of fall protection systems and the factors to consider when making system selections have been described above. The following are the design loads as specified in the draft ANSI Z359.2-200X standard:

- Fall Arrest
  - Non-Certified: 5,000 pounds
  - Certified: 2 x maximum arresting force
- Work Positioning
  - Non-Certified: 3,000 pounds
  - Certified: 2 x foreseeable force
- Travel Restraint

    - Non-Certified: 1,000 pounds
    - Certified: 2 x foreseeable force
- Horizontal Lifeline
    - Certified ONLY: 2 x maximum tension
- Rescue
    - Non-Certified: 3,000 pounds
    - Certified: 5 x applied load

The critical question to consider is: When and why would someone use a certified anchorage instead of a non-certified anchorage?

Certified vs. Non-certified anchorages

Many may wonder who would put their life in the hands of a "non-certified" anchorage, but we will focus on the draft standard's approach to these two types of anchorages and the associated design loading requirements. A certified anchorage is one where there is documentation that the system meets the requirements of the standard and where the anchorage is identified and the system designed by a qualified person.

In contrast, a non-certified anchorage is one that a competent person can judge to be capable of supporting the predetermined anchorage forces (outlined in the previous section) and incorporates an energy absorbing device.

Who is a competent person? A competent person is one that identifies existing, foreseeable and predictable hazards and has the authority to take prompt corrective measures to eliminate such hazards. Typical responsibilities of a competent person also include supervision of work at heights, inspection of equipment and training of authorized persons. With this definition of non-certified anchorages, we are now asking competent persons to take on this additional responsibility of "judging" what is capable of supporting specific loading criteria. This is an exception to the requirement that anchorages are designed, installed and used under the supervision of a qualified person. The draft ANSI standard refers to competent persons selecting anchorages consisting of "unquestionably" strong elements of a structure. It seems like this situation fits the 80/20 rule in life. That is, there may be 10% that are truly unquestionably strong in the case of a large bridge girder or other major structure. There is another 10% that we are sure will not hold any additional loading, such as conduit, sprinkler line or other smaller elements. But, then there is that 80% that will likely require more investigation than a visual judgment to determine if it can safely support the loading criteria. It should also be noted, that in many cases the addition or modification of the structure as part of the fall protection system loading will invoke the involvement of the building code for a local or state jurisdiction regarding the need for a professional engineer being involved in the change-in-use that are being made to the structure.

Design Considerations

When evaluating a structure for anchorage loading, there are multiple things to consider beyond the type of anchorage and whether you are using a certified or non-certified anchorage approach. In most cases, there are not only vertical loads imposed to the supporting structure but also a

horizontal loading component. Predetermined fixed loads, such as the dead load or self-weight of the structure and its components must also be considered in the load analysis. In addition, for variable loads such as wind load, snow load, and seismic loads, building codes guide the structural engineer on how to combine these loads to create a safe structure. Loading from anchorages can be added to these other loads directly to evaluate the capacity of the structure. Another approach to consider is the conditional use method. If needed, this allows the conditional use of the anchorage if it can be controlled that certain other loads are not present when the anchorage is being used. This approach does require strict control by the qualified person to be sure the proper procedures are being followed so that the structure is not overloaded.

When considering the use of certified versus non-certified anchorages there are a number of other things to consider. One must consider the "bad day" scenario of what would happen if my competent person did not select the non-certified anchorage that could support the required load? What is the mode of failure of the structure? Is it a steel structure that might show some yielding first before complete collapse? What might be hit in the path of the fall that could cause additional injury to the worker? What about a failure where there is the release of hazardous materials in the case of an attachment to a filled pipe? What kind of downtime would be involved to repair the structure and how would that effect production or deadlines? Whether it would result in an injury, or worse, there must be serious consideration of the training, tools and responsibilities given to the competent person in the use of a non-certified anchorage.

Conclusion

Fall protection is a complex subject. It involves multiple regulations and standards for both general industry and construction. When the abatement includes anchorages and personal protective equipment, a full understanding of the requirements is critical. These requirements are not only about structural capacity of the anchorages and their supports, but include other important issues such as total fall distance, equipment inspection and compatibility, training and procedures. While it may not be possible to have all anchorages certified by a qualified person, it is still important to enlist a qualified person to prepare documentation and provide guidance to competent persons. This will enhance the competent persons' ability to make informed decisions. When considering the draft ANSI standard, it is important to clearly understand the decision you are making when choosing to use the non-certified anchorage approach, as well as the requirements and responsibilities you are asking of your competent person.