

Fall Restraint Systems

ELIMINATING THE POSSIBILITY OF A FALL ESSENTIAL IN GRAIN BIN ENTRY

The Occupational Safety and Health Administration (OSHA) will tell you that falls are among the most common causes of serious injuries and deaths in the workplace.

“Free fall” means the act of falling before the personal fall arrest system begins to apply force to arrest the fall. A body in free fall can travel four feet in 0.5 seconds or 16 feet in one second.

However, there is a big distinction between *fall restraint* (or prevention) and *fall protection*. We need to understand this distinction, particularly when we discuss working inside a grain bin, as opposed to working on top of the bin.

Fall protection refers to the process of protecting workers at a height above four feet. Fall protection is required whenever employees are working four feet or more above a lower level.

Fall restraint refers to systems that eliminate the possibility of a fall. Fall restraint prevents the user from reaching a fall hazard. It involves the use of positioning lanyards, belay systems, and/or guardrails.

For years, OSHA has insisted that anyone walking on grain shall wear a harness and use a lifeline. However, OSHA has never offered to tell anyone what to do with the lifeline. To use a lifeline without securing it properly is akin to installing a seat belt in your car but failing to buckle up.

The fall restraint system aims to keep the workers from entering a zone where there is a risk of falling. It prevents the user from falling any distance or sinking into the grain beyond their waist. In either case, we want to hold onto the entrant walking on grain or help stabilize the situation, if he or she should encounter a problem.

System Components

Fall restraint systems for anyone walking on grain in a bin will include

the following components:

Anchorage point means a secure point of attachment for lifelines, lanyards, and/or deceleration devices, which are independent of the means of supporting or suspending an employee. Ideally, anchor points would be located directly above the user, if possible, to minimize swing factors.

Connectors secure the lifeline to the anchorage point. In most cases, these are carabiners, which must be double-acting and self-locking. Connectors must be compatible with the equipment being used.

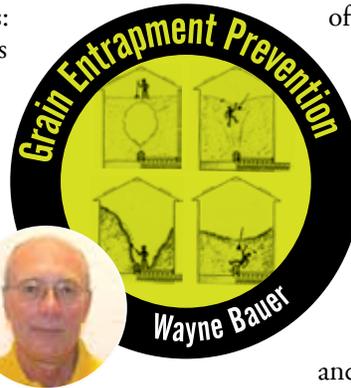
Lifeline is a rope, preferably half an inch thick, between the harness and the connectors to the anchorage point. Rope is used to connect a person to anchorage point. This component consists of a flexible line for connection to an anchorage point at one end, and serves as a means for connecting other components to the system.

Harnesses should be a good Class III rescue harness, with D-rings on the front and back of the harness. It is important that employees be instructed to inspect harnesses, lanyards, and other personal protective equipment prior to every use.

A **rescue plan** shall be available that identifies a response group that is trained and equipped to perform a rescue in a timely manner at your site.

Strength Requirements

The ANSI Z359.2 standard addresses strength requirements for fall restraint systems. Anchorage strength requirements should be capable of handling a 2:1 safety factor. Since it is possible to experience a 600-900-lb. load or jerk on the lifeline, the anchorage needs to be rated to be able to support a force



of 1,200 to 1,800 pounds.

ANSI Z359.2 notes loads for various systems such as:

- Restraint – 1,000 lbs.
- Work positioning – 3,000 lbs.
- Rescue – 3,000

lbs. or five times applied load for certified anchorage.

Paradigm Shift

When OSHA drafts regulations such as 29CFR 1910.272 or 29CFR 1910.146, it never conducts tests or goes into detail on system requirements. It relies on other groups to perform the testing and draft consensus standards such as UL, ANSI, ASABE, NIOSH, NFPA, and others. When OSHA adopts any of these consensus standards, they become part of the law.

We are proposing that a paradigm shift in this area needs to happen, as it relates to fall restraint systems.

People in the grain industry need to understand the difference between fall restraint and fall protection, and people building grain handling facilities in the future need to insist that the contractor and/or steel bin manufacturer offer some type of fall restraint system, should their

To use a lifeline without securing it properly is akin to installing a seat belt in your car but failing to buckle up.

employees be inclined to enter the grain bin and walk around on grain, with the potential for an entrapment. If the party



Grain handlers need to provide employees with kits that include harnesses, lifelines, connectors, and belay systems that can be used to rescue persons entrapped in a grain bin. Photos courtesy of Wayne Bauer.

involved is reluctant to provide this type of system, you need to identify another contractor to work with.

The steel bin manufacturers are studying new standards with the American Society of Agricultural and Biological Engineers (ASABE), whereby provisions would be made to design and install anchor points in future steel bins. The manufacturer would furnish a restraint or anchor point when erecting a bin. The grain handler would provide the restraint system including the harness, lifeline, and belay system.

The Grain Entrapment Prevention Initiative currently is working with the Steel Bin Manufacturing Council and ASABE to identify practical options and a consensus standard for addressing these issues that are practical and cost-effective.

Dr. Carol Jones at Oklahoma State University and Harmon Towne, retired from Brock Grain Systems, are working with the SE 20 Committee within the ASABE to define new standards to follow in this area, when anyone builds new grain handling facilities in the future. They are working with others in the industry including:

- Dan Wambeke with SCAFCO Grain Systems Co., current chair of the Steel Bin Manufacturing Council.
- Jeff Decker with The GSI Group.
- Bill Harp with the Safety and Technical Rescue Association (SATRA).

Future Hopes

In the future, our hopes are that when a new steel bin is erected:

1. The steel bin manufacturer will furnish a suitable anchor point in the bin that would be capable of handling a force of 1,000 to 1,800 pounds, before they leave the building site.

2. The grain handling company will provide employees with the proper harnesses, lifelines, connectors, and belay systems. They will instruct the employees how to use the equipment and inspect equipment before every use. Refresher training must be offered every year, and employees should be able to demonstrate that they can use the equipment involved to everyone's satisfaction.

3. A rescue plan shall identify a response group that is trained and equipped to perform a rescue in a timely manner at your site.

If everyone involved takes their responsibility seriously, we will continue to see the number of reported entrapments and fatalities continue to decline from where they were between 2008 and 2010 (see Table 1).

If we work together, hopefully we can continue to drive

There is a big distinction between fall restraint (or prevention) and fall protection.

those numbers down. We need to encourage everyone strongly to stay out of bins, if possible. However, if they do enter a bin with grain in it, they need to utilize a restraint system that will secure the lifeline properly.

We also have to insist that everyone offer real hands-on training with their employees on an annual basis. Consider sharing these training with:

- Local emergency response groups.
- Contractors and steel bin manufacturers.
- Local farm customers who have on-farm storage.
- Local FFA chapters.
- Local GEAPS chapters.

Wayne Bauer is safety and security director of Star of the West Milling Co., Frankenmuth, MI; 989-652-7026.



Steel beam provides a proper anchor point for a lifeline used in grain bin entry.

Table 1	2008	2009	2010	2011	Change between 2010 & 2011
# of Reported Entrapments >	34	38	51	27	decrease of 47%
Fatalities related to Entrapments >	15	16	26	8	decrease of 69%