

## Worker Entry into Grain Storage Bins

### Engulfment and Suffocation Hazards

Grain storage bin entry is very dangerous and exposes workers to serious suffocation hazards - a leading cause of fatalities in this industry. Suffocation can occur when workers are engulfed (buried or covered) by grain or when bins develop hazardous atmospheres or a lack of oxygen.

Engulfment can occur when a worker does the following:

- Stands on moving/flowing grain (see figure 1) – The moving grain acts like “quicksand” and buries the worker in seconds.
- Stands on or below a “bridging” condition (see figure 2) - “Bridging” occurs when grain clumps together, because of moisture or mold, creating an empty space beneath the grain as it is unloaded. If a worker stands on or below the “bridged” grain, it can collapse, either under the worker’s weight or unexpectedly, thus, burying the worker.
- Stands next to an accumulated pile of grain on the side of the bin (see figure 3) – The grain pile can collapse onto the worker unexpectedly or when the worker attempts to dislodge it.

The grain’s behavior and weight make it extremely difficult for a worker to get out of the grain without assistance. Tragically, incidents in grain bins often result in multiple fatalities because coworkers attempt rescue and fall victim as well. These fatalities are preventable if employers follow work practices and provide training and equipment as required by OSHA’s Inspection of Grain Handling Facilities standard, 29 CFR 1910.272.

### Where workers enter storage bins, employers must:

- De-energize (turn off) and disconnect, lockout and tag, or block off all mechanical, electrical, hydraulic and pneumatic equipment that



From the time the auger starts, you have **2-3 seconds** to react.  
In **4-5 seconds** you are trapped!  
After **22 seconds**, you are completely covered.

Figure 1. Flowing grain can bury a worker in seconds.



A dangerous situation created by a previous partial unloading of the bin.  
As unloading begins, bridged grain falls into the air space and the worker is instantly trapped.  
Before the grain flow can be stopped, the worker is covered. In seconds, suffocation occurs.

Figure 2. “Bridging” condition that results in engulfment.



Beware of a steep pile of grain...  
because it may tumble down...  
and result in suffocation.

Figure 3. Accumulation on bin side that results in engulfment.



The person on the inside of the bin is secured to the outside of the bin.  
The person on the roof can pass instructions and assist in lifting.  
The person on the ground can go for help or assist in pulling.

Figure 4. Illustration of successful rescue of worker during “bridging” condition.

# Workers Entry into Grain Storage Bins, *continued*

presents a danger, particularly grain-moving equipment. Grain must not be emptied or moved into or out of the bin while workers are inside because it creates a suction that can pull the worker into the grain in seconds.

- Prohibit walking down grain and similar practices where a worker walks on grain to make it flow.
- Prohibit entry onto or below a bridging condition, or where grain is built up on the side of the bin.
- Provide each worker entering a bin from a level at or above stored grain, or when a worker will walk or stand on stored grain with a body harness with a lifeline, or a boatswain's chair. Ensure that the lifeline is positioned and of sufficient length to prevent a worker from sinking further than waist-deep in grain.
- Provide workers with rescue equipment, such as winch systems that are specifically suited for rescue from the bin (see figure 4).
- Station an observer who is equipped to provide assistance and perform rescue operations outside the bin (see figure 4).
- Ensure that communications (visual, voice or signal line) are maintained between the observer and the workers who entered the bin.
- Test the air within a bin for oxygen content and the presence of hazardous gases before entry.
- Provide and continue ventilation until any unsafe atmospheric conditions are eliminated.
- If toxicity or oxygen deficiency cannot be eliminated, workers must wear appropriate respirators.
- Issue a permit each time a worker enters a bin, unless the employer is present during the entire entry operation. The permit must certify that the above precautions have been implemented before workers enter the bin.

© 2002, University of Kentucky Cooperative Extension Service.  
Images reproduced with permission.

*Safe work practices in grain handling facilities can save lives.*

For more complete information:

**OSHA**<sup>®</sup>  
Occupational  
Safety and Health  
Administration  
U.S. Department of Labor  
[www.osha.gov](http://www.osha.gov)  
(800) 321-OSHA

DEP 8/2010



## Additional Guidance

For additional information on safe work practices in grain handling facilities, please see:

- 29 CFR 1910.272, Grain Handling Facilities.
- OSHA's Grain Handling Safety and Health Topics Page: [www.osha.gov/SLTC/grainhandling/index.html](http://www.osha.gov/SLTC/grainhandling/index.html).
- For additional information on safe work practices in confined spaces, see 29 CFR 1910.146, Permit-Required Confined Spaces.
- For additional information on respirators, see 29 CFR 1910.134, Respiratory Protection.
- For additional information on preparing young workers to work safely, please visit:
  - [www.osha.gov/SLTC/teenworkers/index.html](http://www.osha.gov/SLTC/teenworkers/index.html), and
  - [www.osha.gov/SLTC/youth/agriculture/index.html](http://www.osha.gov/SLTC/youth/agriculture/index.html)

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.

*This bulletin has been prepared as an underwriting reference for members of Grinnell Mutual Reinsurance Company and does not signify approval or disapproval by the Company of any product or device. Please do not copy or reproduce any portion of this bulletin without the written permission of Grinnell Mutual Reinsurance Company.*