

Grain Bin Hazards and Safety Considerations

Flowing Grain Hazards

When a grain bin is unloaded, the grain flows downward from the top center creating a funnel effect where the conveyor transports the grain out of the bin. It takes less than 3 seconds for a person inside the bin to become helpless in flowing grain. The grain acts like quicksand and will pull a worker under the grain and cause suffocation. No one should enter a grain bin or gravity wagon when grain is present.

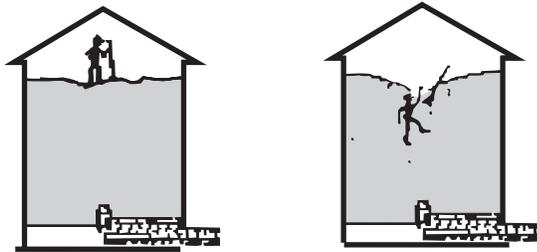


Figure 1

Entrapment can occur quickly as an unloading auger draws grain from the top center, forming a surface cone as the bin is emptied.

Safety Points

- Never enter a grain storage structure when it is being loaded or unloaded. All power conveying equipment, both automatic and manual, must be shut off, locked, and tagged to prevent unexpected operation.
- Always use a safety harness with a safety line and two observers during any grain bin entry.
- Install a permanent ladder on the inside of all grain bins for workers to use for emergency entry and exit.
- Secure all grain storage areas to prevent unauthorized entry.
- All external grain bin access ladders must be raised above the ground at a height that is inaccessible to children.
- Warn all workers, family members, and visitors about the dangers of flowing grain.
- Place warning decals on all bin entrances and gravity wagons.

Crusted Grain Hazards

Stored grain can cake and form a crust leaving a hollow area below the crust. It can appear stable enough to walk on, but will usually break and instantly bury the worker in the hollow cavity that formed below the crust.

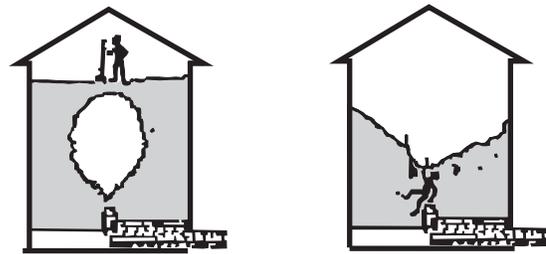


Figure 2

Grain can form a hard crust that appears to be firm enough to walk on; however, the crust can break and instantly bury a worker in the hollow cavity that formed underneath the bridge.

Grain can also form large vertical columns against the bin wall, forming a V-shaped cavity in the center of the bin. Workers that dislodge the grain using a stick or other device may suddenly cause the wall to collapse, burying the worker.

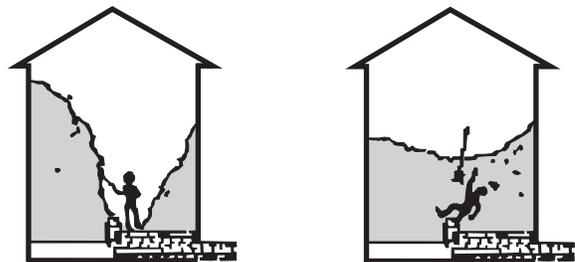


Figure 3

If broken up from below, a steep wall of grain can break free and cause an avalanche that could bury a worker inside the bin.

Safety Points

- Use a wooden pole or weighted line to break up surface crusts in the grain while remaining on the outside of the bin.
- Never walk onto a surface crust or enter a storage structure that has a crust.
- Carry a sturdy wooden pole when entering a grain bin to probe for cavities and use a harness and lifeline to stabilize the worker in case of grain flow.
- Manage grain to avoid conditions that cause spoilage and bridging.
- Use a body harness and safety rope, tied off securely, for workers that break vertical columns of grain sticking to the sides of grain bins.
- Work above the vertical grain wall and stay above the highest part of the wall.
- Be prepared for the entire grain wall to break free and fall at any time.
- A person buried up to his or her shoulders in grain will require a force equal to almost five times his or her weight to be removed. A 150-pound person will require 735 pounds of pull to be removed!
- Keep the worker using the harness close to the surface of the grain to prevent the need for extreme force during a possible grain entrapment.

Carbon Dioxide Poisoning

When grain begins to spoil, usually from high moisture conditions, it will give off carbon dioxide, which is odorless and heavier than air. If upon entering a grain bin, the worker feels drowsy, has difficulty breathing, or becomes disoriented, excessive carbon dioxide may be present. This can lead to unconsciousness and death. Before working in any grain bin, allow air to enter through any doors or manholes and turn on any ventilating fans to purge the bin of carbon dioxide.

Mold Spores and Grain Dust Hazards

Another by-product of grain spoilage is mold growth, which results in mold spores. Breathing mold spores can cause harmful health effects ranging from a skin rash to lung disease. Proper breathing protection is required to minimize mold spore inhalation. However, **this same device will not protect the worker from excessive carbon dioxide accumulation.**

Grain dust can also be harmful to human health, but it can be reduced by using the same breathing apparatus that is used as protection from mold spores. Dust is highly flammable and has caused grain bin fires. Never smoke inside or around a grain bin, and be sure there are no sparks from electrical devices. This hazard can be minimized by shutting down all electrical circuits before accessing any grain bin. Exhaust fans, along with all other electrical motors and switching devices used around grain bins, must be sparkproof. The lower the humidity, the more flammable the grain dust is, to the point of possible explosion.



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For more information, call your county Extension office. Look in your telephone directory under your county's name to find the number.

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