Information about Environmental Management

Concerns with Grain Bins and Silos Converted for Dry Grain Storage

Information for the Farm Safety Association and Farm Grain Association Members

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This spring, before you remove grain from your steel bins and concrete silos, it is important to do a visual inspection of your structures.

Grain storage structures carry very large loads. An engineer should be involved in the design of the structure. An engineer should also be on-site to be sure that it is constructed according to the manufacturer's or designer's requirements.

It is important to understand that grain behaves as a fluid. Often, wall pressures are very large, depending on the depth of the storage. Additional pressures can develop as grain is removed from the structure.

Before you empty a bin or silo, it is critical to survey your storage and to look for signs of stress. Safety is of prime importance. In any situation, when emptying a bin or silo, always provide an unrestricted escape route and be watchful of possible structural movement.

WHAT TO LOOK FOR

If your grain bin or silo is showing any signs of stress, before you empty it, you should contact a professional engineer who can follow up with further investigation.

The following is a partial listing of some of the more common signs of stress. Other signs of distress may be present, depending on your particular situation.

Steel bins:

1. Sealant on the vertical joints of the corrugated sidewall sheets show signs that the bolted joints have slipped, and the diameter of the bin may have expanded. This is most evident near the bottom of the bin.

2. Upper vertical stiffeners on the interior or on the exterior do not sit squarely on the stiffener section directly below it. Sometimes very high loading can cause the stiffener connections to slip sideways or to become deformed. In some cases the bolts may be broken or sheared.

3. The bin may be noticeably out of plumb

4. The sidewall stiffeners may appear curved when sighted vertically. Use a long straight edge as a guide.

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CONCRETE SILOS:

Concrete silos are commonly converted to use as dry grain storage. However, silos previously designed for whole plant silage or haylage have a limited capacity for dry grain unless additional reinforcing is provided. This is usually in the form of steel hoops at vertical intervals on the outside of the silo. You need an engineer to design this increased reinforcing.

Signs of distress: cracks in the concrete are one of the only signs to warn you of an impending failure. Scanning the entire outside of the silo is necessary to determine if new cracks have developed. You can sometimes use binoculars to do a cursory inspection.

The **consequences of a structural failure are very critical and can be life threatening.** Emptying a bin can cause a significant increase in the loads applied to the bin structure. If a failure is about to happen, unloading grain can cause an instantaneous structural failure. If you suspect that your grain bin or silo has structural problems, do not empty it before having a professional engineer on-site to evaluate the situation.

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