

To determine the vertical and lateral loads on a duct covered with soybeans to a depth of 15 feet, the load in pounds per square foot is determined by multiplying the grain depth in feet by the densities in pounds per cubic foot given in Table 4.

Vertical load on top of duct = 46.4 lbs per ft x 15 ft deep
(lbs per sq ft) = 696 lbs per sq ft

Lateral load on vertical surface = 16.1 lbs per ft x 15 ft deep
(lbs per sq ft) = 242 lbs per sq ft

The lateral load acts on a vertical surface, such as on walls or sides of ducts. The angle of repose is the angle measured from the horizontal which the granular material takes if allowed to pile or funnel.

FAN OPERATION

Aeration should begin when outside air temperature is approximately 10°F below the grain temperature. The grain temperature should be measured at several points with a thermometer encased in a pipe which is inserted into the grain. Measuring the temperature of exhaust air will give an indication of the average grain temperature. However, the exhaust air temperature will not detect "hot spots." For additional information on grain sampling and temperature monitoring, refer to Extension publication Circular 1046, *Grain Sampling*.

A grain temperature of 50°F is generally satisfactory, particularly if the grain is to be moved the following summer. For grain that is to be stored more than a year, lowering the temperature below 50°F will give better insect and mold control. If cold grain is removed from storage on a warm, humid day, condensation may occur. Therefore, it is desirable to operate the fan and warm the grain to within 15 to 20°F of the air temperature before removal.

It is best to aerate the grain with air that does not change the grain moisture content. Air flow is usually low enough to allow only gradual moisture changes. Continuous aeration with air flows of 1/20 to 1/50 cfm per bushel, even in rainy weather, will not appreciably change grain moisture content.

Crop drying fans, if used for aeration, have considerable air flow capacity and should not be operated when humidity is extremely high or low. The higher air flow cools the grain rapidly. It is desirable to aerate only when the humidity is below 60 percent and the grain 10 to 15°F warmer than outside air temperature. During warm periods, aerate when it is cooler, during evening or early morning. It is advisable to operate the fan continuously for a few days to remove harvest heat.

Table 4. Design data and storage pressures for grain.

Grain	Angle of repose (degrees)		Equivalent fluid weight per cubic foot (pounds per cubic foot)	Maximum weight per cubic foot (pounds per cubic foot)
	Emptying or Funneling	Filling or Piling		
Shelled Corn	27	16	18.0	48.0
Soybeans	29	16	16.1	46.4
Oats	32	18	10.8	35.2
Barley	28	16	15.6	43.2
Wheat	27	16	21.5	55.0
Rye	26	17	18.1	46.2
Flaxseed	25	14	17.5	43.2

*Fluid pressure method is not recommended for estimating lateral loads in bins deeper than their width on diameter.