AIR DISTRIBUTION METHODS

Perforated floors distribute air uniformly, are well suited for aeration, and are frequently used with various drying systems. It is often not feasible to install a perforated floor for aeration only. Ducts are less expensive and satisfactory for aeration. However, ducts above the floor make it impossible to use sweep augers. Vertical aerators, as shown in Figure 2, are effective in round storage bins and normally can be used with sweep augers for unloading the bins. Some vertical aerators are portable and can be installed after the bins are filled. One aerator can serve bins up to 18 feet in diameter if air flow is adequate.

Aeration ducts, as shown in Figure 3, can be used to distribute air for aeration. Short ducts (length over diameter less than 50) should have openings or perforations equally spaced over their surface area for air passage into the grain. For uniform air distribution in long ducts, the percentage of perforation in relation to the duct surface must be lowest at the fan end. The perforation in long ducts (length over diameter greater than 50) can be as low as one percent near the fan and as high as 20 percent at the farthest point.

Perforation distribution in long ducts needs to be calculated by an engineer. It is desirable for ducts to have enough perforated surface area to limit air velocity through the grain near the duct to 20 feet per minute (fpm) or less even though the velocity through the perforation may be 10 times this value.

Friction losses in ducts increase as air velocity increases. Ducts must be large enough to prevent

Table 1. Horsepower requirements and static pressure for aeration fan operation.

Depth of Grain (feet)	Horsepower per 1000 bushels at various air flow rates and grain depths			Static pressure (inches of water) at various air flow rates and grain depths		
	1/5 cfm/bu	1/10 cfm/bu	1/20 cfm/bu	1/5 cfm/bu	1/10 cfm/bu	1/20 cfm/bu
			Shelled Corn			
10-15	0.04	0.02	0.01	0.60	0.55	0.51
20	0.05	0.02	0.01	0.70	0.65	0.57
25	0.06	0.03	0.01	1.00	0.77	0.63
			Soybeans			
10-15	0.04	0.01	0.01	0.50	0.50	0.50
20	0.05	0.02	0.01	0.70	0.55	0.50
25	0.10	0.02	0.01	0.90	0.65	0.50
			Wheat			
10	0.05	0.03	0.02	1.05	1.00	0.95
15	0.08	0.04	0.02	1.45	1.25	1.05
20	0.10	0.05	0.02	2.00	1.60	1.20
25	0.15	0.07	0.03	2.70	2.05	1.45
			Oats			
10	0.05	0.03	0.01	0.90	0.80	0.70
15	0.07	0.03	0.02	1.25	0.95	0.80
20	0.09	0.04	0.02	1.70	1.20	0.92
25	0.15	0.05	0.02	2.50	1.50	1.07
			Grain Sorghum			
10	0.05	0.03	0.02	1.05	1.00	0.95
15	0.08	0.04	0.02	1.45	1.25	1.05
20	0.10	0.05	0.02	2.00	1.60	1.20
25	0.15	0.07	0.03	2.70	2.05	1.45