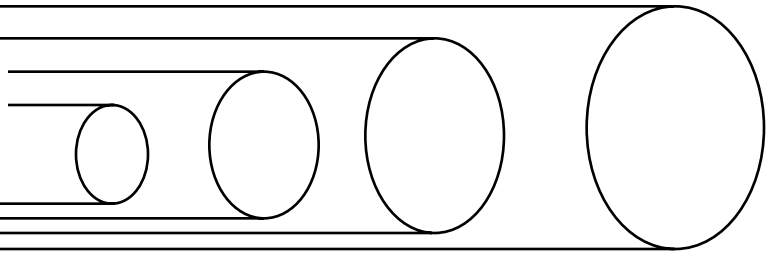
Rigid Plastic Tubes for Pit Ventilation



Pit ventilation in livestock buildings can be accomplished with the use of fans along the sides or ends of a pit, or by means of a duct system. More uniform pick-up of odors can be achieved with a duct than by using fans alone.

The designs in this publication are for maximum suggested airflow for each size duct (table 1). Such design permits approximately 1,000 cfm (cubic feet per minute) for each square foot of duct cross-section area. Greater airflows would increase the static pressure and result in higher fan operating costs.

Table 1. Suggested air flow per tube.

Tube diameter, (inches)	Air flow, cfm
6	190-210
8	350-400
10	550-600
12	750-850
15	1,200-1,400

A tube designed for exact pick-up of air throughout the pit would be more complicated to construct than is warranted. The procedure outlined in this publication is a compromise to simplify the drilling of holes in the tube. The net result is almost uniform ventilation from the pit.

Caution: The pit fan must be capable of moving air at the static pressure required to pull air through the tube, plus any additional pressure that exists in the building due to the operation of wall exhaust fans. Normal static pressure that exists in an exhaust fan system is about 0.16 inch. This must be added to the static pressure in the tube, which ranges from 0.10 to 0.16 for the capacities shown, to determine the static pressure needs of the pit fan. For example, a 15-inch fan, moving 1,250 cfm through an 80-foot tube, would need to work against .16 + .06 inch or .22 inch static pressure. When buying a fan, select one that has the capacity needed at this higher-than-normal static pressure.

Locate the section with holes farthest apart closest to the fan. The holes should be located in the lower one-fourth of the tube's circumference (figure 1). Drill several holes at the bottom of the tube so it can be drained when it becomes necessary to clean the tube.

Divide the tube into four sections, as shown in figure 2, with section 1 at the fan end. Each section will have an equal number of holes, one-fourth of the total number of holes needed.

To determine the total number of holes, first select a hole size from table 2.

Table 2. Air flow per hole.

Hole size (inches)	Cfm per hole
1	2.7
1¼	4.2
1½	6.1
2	11.0
2½	17.0
3	24.0

Example: A 12-inch pipe will be used for ventilating a pit 50 feet long. The pipe will handle 800 cfm. The hole size selected is 1¼ inches. From table 2, this hole can supply 4.2 cfm.

Divide the air flow in the tube by the cfm per hole to get the total number of holes needed in the tube. Divide this number by 4 to get the holes per section.

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Divide 800 cfm by 4.2 cfm to determine the number of holes.

800 ÷ 4.2 = 190 holes

That is a lot of drilling, so select a larger hole size. A 2-inch hole will require 800 ÷ 11 = 72.73 holes. Uses 72 holes.

Each section will require one-fourth of this number or 72 ÷ 4 = 18 holes.

Table 3. Division of tube into four sections.

	Section length (inches)			
Pipe length (feet)	1	2	3	4
20	89	62	48	41
30	133	94	72	61
40	178	125	96	81
50	222	156	120	102
60	266	187	144	123
70	311	218	168	143
80	355	250	192	151

The hole spacing in section 1 will be (divide length by number of holes) 222 ÷ 18 = 12 1/3 inches apart.

If two holes are placed at the same location on either side of the tube, they will be spaced 24 2/3 inches apart.

Section 2 spacing: 156 ÷ 18 = 8 2/3 inches or 17 1/3 inches apart if in sets of two.

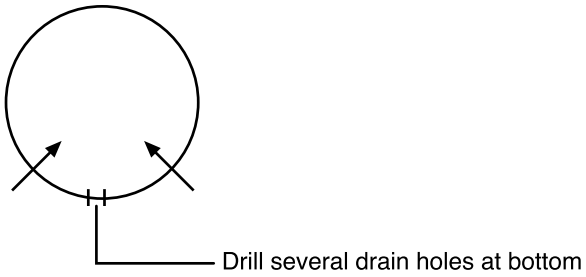

Figure 1. Drill holes in lower quarter of tube.

Section 3 spacing: 120 ÷ 18 = 6 2/3 inches apart or 13 1/3 inches apart if in sets of two.

Section 4 spacing: 102 ÷ 13 = 5 2/3 inches apart or 13 1/3 inches apart if in sets of two.

For nonstandard length tubes, use the following to calculate the lengths of the four sections.

	Percent of total length
Section 1	37
Section 2	26
Section 3	20
Section 4	17

Prepared by Vernon M. Meyer, former extension agricultural engineer. Reviewed by Jay Harmon, Department of Agricultural and Biosystems Engineering.

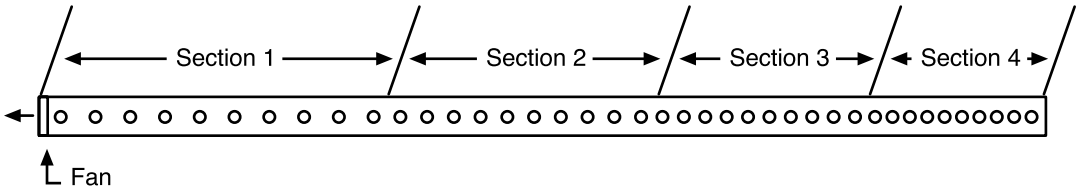

Figure 2. Pit ventilation tube hole layout.