

TABLE 1. RATES OF FLOW THROUGH BRANCH PIPES WOODWORKING MACHINES

PIPE DIAMETER, IN.	AIR VOLUME, CFM	PIPE DIAMETER, IN.	AIR VOLUME, CFM
3	200	6	800
4	350	7	1100
5	550	8	1400

TABLE 2. BRANCH PIPE SIZE FOR WOODWORKING MACHINE HOODS

TYPE OF MACHINE	SIZE, IN.		NO. OF BRANCHES	MINIMUM DIAMETER, IN.		
	Min.	Max.		BOTTOM BRANCH	TOP BRANCH	OTHERS
Self feed table saw			2	5	4	
Other single saws	18	18	1		4	
			1		5	
Saws with Dado Head			1		5	
Band saws	2	2	2	4	4	
	3	3	2	5	4	
		6	2	5	5	
Disc sanders	18	18	1	4		
	26	28	1	5		
	32	32	2	4	4	
	38	38	2	5	4	
		48	3	5	4	4
Triple drum sanders	30	30	1	7		
	36	36	1	8		
	42	42	1	9		
		48	1	10		
Single drum sanders: (area in sq in.)	350	350	1	4 ^a		
	700	700		5		
	1400	1400		6		
		2800		7		
Horizontal belt sanders	9	9	2	5	4	
		14	2	6	4	
Vertical belt sanders	6	6	1	4		
	9	9	1	5		
		14	1	6		
Jointers	8	8	1	4		
		20	1	5		
Single planers.	20	20	1	5		
	26	26	1	6		
		36	1	7		
Tenoner			2	5	5	

^aNot over 10 in. diameter.

TABLE 3. RATES OF FLOW THROUGH BRANCH PIPES GRINDING AND BUFFING WHEELS

PIPE DIAMETER, IN.	AIR VOLUME, CFM	PIPE DIAMETER, IN.	AIR VOLUME, CFM
3	225	6	900
4	400	7	1200
5	600		

hood so that the volume of air necessary to produce results is as small as possible. This will reduce the size of equipment, the power required by the system, and also the heating load requirements in winter.

Air Flow from Static Readings

The static suction at the throat of a hood is frequently used in practice as a measure of the effectiveness of control. Where the hood coefficient is known the volume of air flow through any hood may be determined from the equation:

$$Q = 4005 f A \sqrt{h_t} \quad (1)$$

where

Q = volume of air flow, cubic feet per minute.

A = area of connecting duct, square feet.

h_t = static suction measured 3 diameters from throat of hood, inches of water.

f = orifice or restriction coefficient which varies from 0.6 to 0.9 depending on the shape of the hood.

An average value of f is 0.71, although for a well-shaped opening a value of 0.8 may be used. The factor f is determined from the equation:

$$f = \sqrt{\frac{h_v}{h_t}} \quad (2)$$

where h_v is the velocity head in the connecting duct.

The *static suction* is not a good measure of the effectiveness of a hood unless the area of the opening and the location of the operation with respect to the hood are known. This is clearly indicated by Equation 3 which shows that the velocity at any point along the axis varies approximately inversely as the square of the distance. However, this formula coupled with Equation 1 should serve to indicate the velocity conditions to be expected when operations are conducted external to the hood opening.

Design Based on Total Air Flow

Where the foregoing factors are not known, the usual method of designing an exhaust system is to base the air flow through the system on rates of flow through each hood which have been found by experience to provide adequate control. For woodworking systems the rates of flow given in Table 1, calculated on the basis of a branch velocity of 4000 fpm, are adequate for control. Using these air flow rates, Table 2 gives the size of pipe connections to be used with the more common woodworking machines. Properly designed grinding and buffing wheel hoods have been found to be adequately controlled when the rates of air flow given in Table 3, calculated on the basis of a branch velocity of 4500 fpm, are used. Table 4 gives the minimum branch pipe sizes to be used on the more common sizes of grinding and buffing wheels.

In some states grinding, polishing and buffing wheels are subject to regulation by codes. (See Standards Chapter 48). The static suction requirements, which range from 1½ to 5 in. water displacement in a U-tube, must be followed in such states although in several instances they appear to be excessive. Frequently, in these operations, a large part of the wheel must be exposed and the dust-laden air within the hood is thrown outward by the centrifugal action of the wheel, thus counter-acting useful inward draft. This tendency may be diminished by locating the connecting duct so as to create an air flow of not less than 200 fpm past the lower edge of the wheel.