

SPS 323.02 (3)(b)2.

Air ducts providing make-up air for intermittent exhaust fans shall be sized to provide at least 40% of the total air that would be exhausted with all intermittent exhaust ventilation in the dwelling operating simultaneously.

Table 323.07 Duct Velocities

Minimum duct velocity for an outdoor intake is 500 fpm

Maximum duct velocity for an outdoor intake is 800 fpm

Duct Areas

4" Duct	12.56 in <sup>2</sup>	or	.0872 ft <sup>2</sup>
6" Duct	28.26 in <sup>2</sup>	or	.1963 ft <sup>2</sup>
8" Duct	50.24 in <sup>2</sup>	or	.3488 ft <sup>2</sup>
10" Duct	78.50 in <sup>2</sup>	or	.5451 ft <sup>2</sup>

Determine Size of Make-Up Air Duct

Range Hood	=	300 cfm	x	40%	=	120 cfm
Clothes Dryer	=	200 cfm	x	40%	=	80 cfm
Bath Exhaust 1	=	110 cfm	x	40%	=	44 cfm
Bath Exhaust 2	=	80 cfm	x	40%	=	32 cfm
Bath Exhaust 3	=	50 cfm	x	40%	=	20 cfm
Total		<b>740 cfm</b>	x	40%	=	<b>296 cfm</b>

Formula(s) for Duct Sizing

$$Q=VA \text{ Quantity(cfm) Velocity(fpm) Area (ft}^2\text{)}$$

Check for Minimum Duct Size & Maximum Velocity

$$A=Q/V$$

$$A = 296 \text{ cfm}/800 \text{ fpm} = .37 \text{ ft}^2 \text{ - convert to in}^2 \text{ .37ft}^2 \times 144 \text{ in}^2 = 53.28 \text{ in}^2$$

Try 8" duct 50.24 in<sup>2</sup> < 53.28 in<sup>2</sup> (8" is too small)

Try 10" duct 78.50 in<sup>2</sup> > 53.28 in<sup>2</sup> (10" is OK)

Check for Maximum Duct Size & Minimum Velocity

$$A = 296 \text{ cfm} / 500 \text{ fpm} = .99 \text{ ft}^2 \quad - \quad \text{convert to in}^2 \quad .99 \text{ ft}^2 \times 144 \text{ in}^2 = 142.56 \text{ in}^2$$

Try 10" duct  $78.50 \text{ in}^2 < 142.56 \text{ in}^2$  (10" is OK)

Duct Size	cfm	Minimum	Maximum
4"	Total	110 cfm	175 cfm
	40%	44 cfm	70 cfm
6"	Total	245 cfm	392 cfm
	40%	98 cfm	157 cfm
8"	Total	435 cfm	698 cfm
	40%	174 cfm	279 cfm
10"	Total	683 cfm	1090 cfm
	40%	273 cfm	436 cfm