

EXHAUST SYSTEMS, GENERAL & COMFORT VENTILATION

TABLE 28-P
HOOD FACE VELOCITY (FPM) TO MAINTAIN A CONTROL VELOCITY
OF 30 FPM AT RANGE

Side Ratio (W·L)	DISTANCE X FROM HOOD OPENING TO WORKING AREA					
	0.25W	0.5W	0.75W	W	1.25W	1.5W
1:1 Free hanging	40	120	300			
1:2 Shed type		40	77	120	170	240
1:2 Free hanging ..	24	60	120	215	355	
1:4 Shed type		24	40	60	90	120
1:8 Shed type		16	27	40	60	80

Reprinted with permission from J. M. DallaValle, *Exhaust Hoods*, 2nd ed New York City, The Industrial Press, 1952.

being of the canopy type, suffer from all their troubles. As has been mentioned previously, exhaust hoods cannot "reach out" more than a few inches and trap the air contaminant, and yet the kitchen hood is often four feet or more from the range surface. Cross drafts can easily disperse the smoke to the room before it comes under the influence of the hood

On the *plus* side, fortunately, range hoods, in large kitchens at least, are often extremely long for their width, covering a row of ranges, ovens, grills, deep fat fryers, etc. Frequently they can be set so the long side is against a wall (although the soundness of doing so is often overlooked), and the hood becomes a shed-roof type hood. The bad effect of un baffled ends is then diminished. Also, the temperature gradient set up by heat of the stoves aids in creating air movement into the hood. Finally, as DallaValle* has written, the control velocities needed at the surface of the range are low compared with those needed, for example, in dust control where particles must be transported into the duct

DallaValle recommends 30 fpm (Table 28-P) as the control velocity to be established at the range surface. For different shaped hoods, he has calculated the face velocity, that is, the velocity of air at the hood opening necessary to set up this 30 fpm control velocity. His dimensions are in terms of hood width, W. Hood shape is expressed as "side ratio." A side ratio of 1/4, for example, means a rectangular hood that is four times as long as it is wide.

Two examples will show the extra-

gance of a freely suspended hood

Assume a freely suspended hood, 4 ft. wide by 8 ft. long, is located 5 ft. above a range, and that a velocity of 30 fpm at the range will control the cooking vapors

$$\text{Ratio of sides (4 ft by 8 ft)} = 1.2$$

$$X = 5 = 1.25W$$

According to Table 28-P, the hood face velocity should be 355 fpm. Since the face is 32 sq ft in area, the air volume needed is 32×355 , or 11,360 cfm. This figure is actually too low, according to good design standards, for the hood edge should overhang the range edge. (See following paragraphs.)

Now assume the hood and range can be backed up against a wall, so the hood becomes a shed type. The face velocity needed will be 170 fpm. Since the face area is still 32 sq ft, the air volume will be 32×170 , or 5,440 cfm—less than half that needed for a freely suspended hood.

Again, suppose the hood is made larger, but kept against the wall at the same height above the range. Now it is 5×10 ft, and a shed type. The side ratio is still 1.2, $X=5=W$. From Table 28-P, the face velocity should be 120 fpm. The face area is 5×10 or 50 sq ft, and the air volume is 50×120 or 6,000 cfm—not much higher

*DallaValle, J. M. "Design of Kitchen Range Hoods" *Heating and Ventilating*, 95:100 (Aug 1953).