TABLE 29-C

RECOMMENDED MINIMUM DUCT VELOCITIES

Nature of Contaminant	*Examples*	*Duct Velocity (fpm)*
Vapors gases smokes fumes, and very light dusts	All vapors, gases, and smokes, zinc and aluminum oxide fumes, wood flour and cotton lint	2,000
Medium density dry dusts	Cotton, buffing and jute lint, wood, grain, rubber, and bakelite dust	3,000
Average industrial dust	Wool, wood, sand blast, grinding, and shoe dust, wood shavings, foundry dust	4,000
Heavy dusts	Lead, and heavy foundry dusts, metal turnings, jute butts	5,000
Large particles, of heavy moist materials	Moist lead and other heavy dusts	5,000 and over

Adapted from Allen D Brandt "A Summary of Design Data for Exhaust Systems' Heating and Ventilating *(May 1945)*

air flows? There are two solutions, the first is the better choice

- "Balance" can be restored—meaning each hood can be made to handle the amount of air it was supposed to—by sizing the ductwork and selecting fittings that will give equal pressure drops in the two branches when air flow through hood A and hood B is at the desired rates If one hood is exhausting more air than it should, smaller diameter piping will increase the resistance, air velocity will drop, and so air flowing into the hood will be reduced
- Air balance may be achieved by use of blast gates in each branch These are slide gates or dampers These can be set so they block partially the flow of air, lowering the amount of air entering the hood This is not the preferred method—for several reasons The chief advantage, however, is that much less talent is needed on the part of the designer

Advantages of the first method are (*a*) if velocities are initially chosen properly, ductwork will not plug, (*b*) workers cannot tamper with the system and "rob" another work station of air needed for contaminant control there, and (*c*) erosion will be less and there will be no buildup of dust or linty material caused by blast-gate obstruction This method is preferred where toxic materials are handled, and is mandatory where explosives, magnesium, and radioactive dusts are exhausted

The second method gives some leeway for correcting improperly estimated exhaust volumes, and provides some flexibility for future changes or additions However, a cardinal rule in local exhaust system design is that once a multihood layout is completed and balanced, additional hoods should *not* be added later They alter the air flows and can make some hoods entirely ineffective

Push-pull Whether a system operates under positive (blowing) or negative (suction) pressure makes no difference insofar as duct design features are concerned Usually, however, exhaust systems have high air velocities to keep dust in suspension in the duct Positive pressure systems, those that supply ventilating air to a given space, operate with relatively low duct velocities Table 29-C shows recommended minimum duct velocities for handling different types of contaminants Energy losses occur in ducts in the following ways

- Velocity pressure A definite pressure or suction must be created by the fan to get air moving at a certain velocity As seen in equation (5), this suction, known as velocity pres-