

TECH TALK

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Sizing of Flexible Duct

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Flexible duct has many advantages in the HVAC environment. Its ease of use and timesaving (money) speed of installation compared to hard duct is inviting. But using it as a direct size replacement for smooth, galvanized duct is not one of its advantages due to a difference in performance.

Because of flex duct's unique corrugated construction and flexibility, there is a higher airflow friction loss compared to the same size smooth-walled galvanized duct. Performance equivalent to hard duct requires a larger diameter flex duct.



Friction loss in straight duct is dependent on the relationships of duct diameter, air velocity in the duct, and duct roughness as major components, and to a much lesser degree on air density. As one can

imagine, flex duct with its helical corrugations is going to be much "rougher" or less smooth than galvanized duct. This is especially true if it is not stretched out to the extent possible during installation. Slack duct allows

the coils of reinforcing wire to relax, which bunches up the polyester and pushes it into the interior of the core, adding more resistance to airflow.

Sizing charts and calculators for duct sizing are available from many sources. Hart & Cooley has a Sheet Metal Duct Friction Loss Calculator on one side of a slide chart with a Flexible Duct Friction Loss Calculator on the other side that we make available. We also have an interactive flex duct calculator on our web site. Spending a few minutes with these aids can quickly demonstrate the differences between the friction losses for galvanized versus flexible duct. It is worth noting that for a fixed duct diameter, as the velocity in the duct increases, the friction loss increases twice as fast. So if the velocity were to double, the friction loss would be four times greater! A handy rule that is very effective and reliable is to increase the size of flex duct one diameter to neutralize the added friction loss compared to that of galvanized duct for the same CFM.

A further penalty in performance will occur if flexible duct is compressed from its round shape to an oval shape, say by squeezing it into a joist space. Just because it can doesn't mean it should. We do allow for up to approximately a 20% reduction in diameter only if it occurs in one spot, but not over any distance or repeatedly. The friction loss for flex squeezed into an elliptical shape over any distance is severe, and the loss of airflow will be significant.

Cubic feet per minute airflow rate still equals the air velocity times the area of the duct in which the air is flowing. Increasing the area of the duct will slow the velocity of the air and reduce pressure loss. Keep in mind that the long-term system performance will be affected by the up-front, one-time cost of the flex duct. Increasing flex duct one size to offset its higher pressure loss compared to smooth duct is prudent.



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