*Residential Ventilation Issues* *by Dara Bowser & Bob Allison*

# What about Charts that Show XX Airflow @ XX Feet of Duct?

Some Manufacturers have published fan performance charts which show airflow, static pressure and "feet of duct". These charts are usually not able to be used for a system design and are often misleading. To the un-informed, such a chart appears easy and straight forward to use. By way of example; if we use the chart, choosing 30 feet of duct, we see that it crosses the airflow line at about 100 cfm. We might then assume that if the duct was connected to 30 lineal feet of 4" diameter duct, the resulting airflow would be 100 cfm.

In fact, the length of duct shown on the chart is EFFECTIVE length, which is the sum of *actual length* and the *equivalent length* of the fittings. Some typical equivalent lengths are as follows:

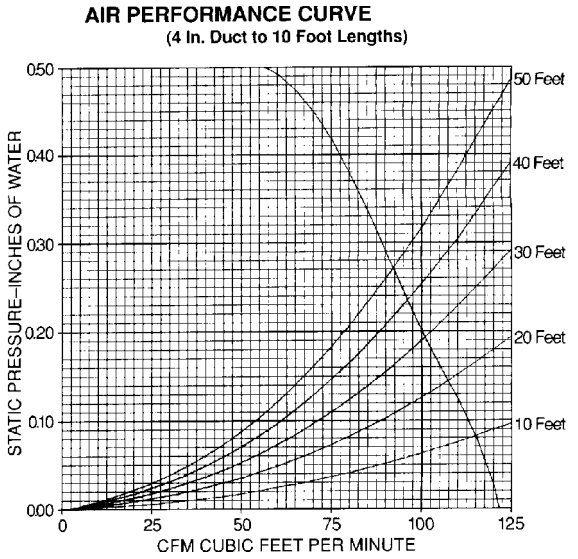
| | |
|---|---|
| Smooth 90° elbow | 10' |
| Flex 90° elbow | 20' |
| 1 foot smooth duct | 1' |
| 1 foot flex duct | 2' |
| Wall or roof cap | 60' |

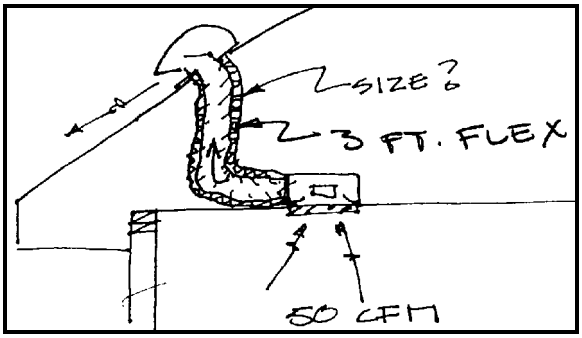
The duct system in the illustration was used as an example in the February '97 OBOA Journal and has an *effective length* calculated as follows:

| | |
|---|---|
| Wall Cap | 60' |
| 3 feet flex duct | 6' |
| 1 x 90° flex elbow | 20' |
| 1 x 45° flex elbow | 10' |
| **Total Effective Length** | **96'** |

This length is beyond that shown on the manufacturer's chart so the chart is not useable. Using a set of duct sizing charts such as are found in *the HRAI Ventilation Manual*, or the *OBOA Ventilation Manual*, we find that the static pressure for 100 cfm would be over 0.6" for a 4" duct. If we wanted to get 100 cfm for this fan, the duct size would be 6" diameter (100 cfm @ 0.2" w.g.). If 4" diameter duct is used, the airflow will be reduced to approximately 75 cfm (75 cfm @ 0.4" w.g.).

Unlike these manufacturer's charts, the simple duct sizing tables in the OBC Section 9.32 (**9.32.3.4.B, 9.32.3.5. & 9.32.3.7.B**) assume that every system will have a wall or roof cap with an equivalent length of 60'.




## CONCLUSION

Do not rely on duct sizing methods presented in Manufacturer's literature. The appropriate duct sizing methods are:

1) OBC Section 9.32 Tables
2) HRAI Ventilation Manual
3) OBOA Ventilation Manual
4) HRAI Digest
5) ASHRAE Handbooks (Fundamentals)

Anything other than 1) above is referred to as a "Part 6" design method. 2) and 3) are the most commonly used in the field and each is associated with a training course. The *HRAI Ventilation Installers Course* is a 3-day workshop that covers residential ventilation installation and design within the scope of Section 9.32. The *OBOA Ventilation Course* is a 2-day workshop designed expressly for Ontario Building Officials. The two courses are harmonized, that is to say they use the same basic syllabus, definitions, examples, forms, calculations etc, but are delivered to suit the needs of the different groups.

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