

McGill AirFlow's Current Awareness Service

PRODUCT ALERT

Product Alert: CAS-PDA1 2007

Leak Detective Smoke Delivery Systems

*This Special Segment Introduces
McGill AirFlow's Smoke Machines*

Smoke Delivery System

Recently, there has been an increase in the number of smoke tests of HVAC systems. This is because the smoke that is delivered into the duct system, while conducting the leakage test, will travel out of the system anywhere there is leakage. This allows for a complete visualization of the air leakage. Chemical-based smoke bombs have historically been the primary method of delivering smoke into a duct system but their use is becoming less common because of the following drawbacks.

- Smoke bombs produce foul-smelling fumes.
- Smoke bombs contain chemicals that may cause problems.
- Smoke bombs are rated in time increments making smoke dispersal uncontrollable for a period of time.
- Smoke bombs may not be allowed by local authorities.

Electric smoke generators have been around a long time for use in theatre productions, concerts, dance rooms, etc. Using them to deliver smoke into a duct system is relatively new. The smoke generator has an electronically heated element that vaporizes a non-toxic liquid. The smoke is relatively harmless and odorless and is an excellent substitute for smoke bombs. The smoke machines range from simple one-button models (Figure 1) that generate a predetermined smoke density with the push of the button, to models that have automatic smoke



Figure 1: Economy Smoke Machine Kit



Figure 2: Standard Smoke Machine Kit



Figure 3: LTK-SCA with Economy Smoke Machine

dispersal at timed intervals and user-controlled smoke density (Figure 2).

The most common method of delivering smoke into a duct system using the smoke machine is to feed the smoke through the fan inlet used to perform the duct leakage test. The smoke machine may be placed near the fan inlet, but care must be taken to keep the machine nozzle a sufficient distance so that the smoke does not excessively condense on the fan impeller. See Figure 3 for a self-contained smoke delivery system.

While the process of delivering smoke into the duct system is rather simple and harmless, the smoke delivery system should be used only for locating sources

of leakage when a duct system is leaking more than specified, and after other means of locating leakage sources have been tried, namely hearing and feeling air escaping from the duct system. This is due to two main reasons: the smoke can impair vision in the surrounding area, causing delays in construction; and the vapor residue can accumulate to the point that it must be wiped clean and dry so that duct sealers will adhere to the sheet metal.

Look for the primary sources of leakage, such as the following.

1. Rectangular joint connections and duct corners
2. Fire/smoke damper frames

3. In-duct coils
4. Filter/VAV boxes
5. Unsealed joints
6. Unsealed duct terminations

Take duct leakage seriously because controlling leakage controls energy costs. The greater the leakage the more time, energy, and money is required to overcome leakage. All duct system design engineers must specify where, when, and how leakage testing is accomplished and what leakage testing procedures are used. This will ensure that duct construction and leakage specifications are met. For more information regarding the benefits of round and flat oval systems, or for information regarding the use of smoke machines, contact McGill AirFlow.

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