ASPIRATING DETECTION

Aspirating smoke detectors are often used where early warning is required and higher than normal sensitivity is needed. They are also suitable for many other applications where there are problems using conventional forms of detection. This could be because:

- there is an access or maintenance problem
- the protected area is too high and/or may suffer from smoke stratification problems
- a discrete installation is required
- the environmental conditions are extreme (hot, cold, dirty, etc)

When specifying or designing an aspirating smoke detection system it is essential to define the performance required from the system. There are various specifications for performance tests given in BS 6266 and in the FIA Code of Practice and it is advisable to nominate one of these tests before the project is tendered. System sensitivity should be appropriate and realistic. High sensitivity and rapid response can be achieved from a single detector in a small computer room. Normal sensitivity and response would be more appropriate when protecting 2000m² of warehouse space where height and volume dissipate and dilute the smoke sample.

Pipe limits and design criteria are different for each type of aspirating system, but the following holds true for the most popular LPCB (Loss Prevention Certification Board) approved systems:

- maximum aggregate sampling pipe length 200m (e.g. 4 x 50m, 2 x 100m)
- maximum single sampling pipe length 100m (limited by transport time from end of pipe to detector of 120 seconds)
- maximum number of 4 sampling pipes.
- sampling pipe is normally red ABS which is extremely robust and clearly defines its use. Another material may be used provided it has a 20 - 22mm nominal bore and slow bends are used to keep air flow as laminar as possible.
- remote sampling points may be used, up to 6m long, in smaller bore flexible 'capillary' tube.
- pipe lengths should be continuous.

The total allowable number of sampling points varies for each manufacturer and it should be remembered that the sensitivity at each hole is a function of 'detector' sensitivity and the number of sampling holes. The more sensitive the detector, the more sampling holes can be drilled in the pipe network.

Aspirating smoke detection is a system that uses an aspirating fan to draw air from the protected area via a network of sampling pipes and sampling holes. The sampled air is then passed through a high sensitivity precision detector that analyses the air and generates warning signals when appropriate.

It is important to define appropriate requirements/expectations for an aspirating smoke detection system at an early stage.

The two main types of system are;

Primary Sampling System: the system is designed to work in conjunction with any air handling systems and will not provide optimum performance when these are inoperative. The major advantage is the detection of cool smoke from a minor problem that does not rise to the ceiling, which would be the 'conventional' location.

Secondary Sampling System: the system is designed with sampling holes in the same positions as normal point detectors to an appropriate standard e.g. BS 5839, BS 6266 etc.

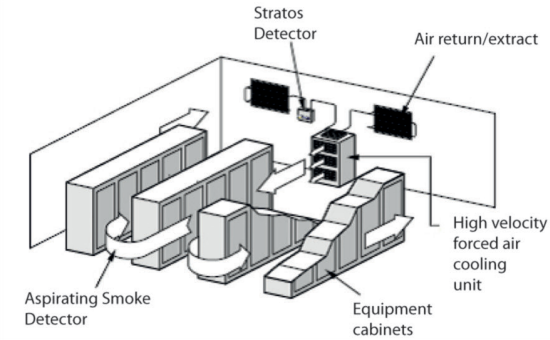
These sampling pipes may be designed and installed to achieve one of three levels of sensitivity:

Normal Sensitivity (class c): the same sensitivity as normal point detectors (typically @ 3% - 5% obscuration per metre).

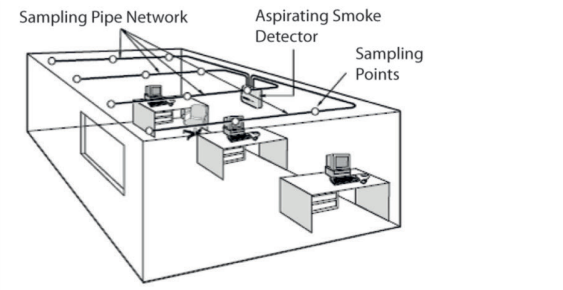
Enhanced Sensitivity (class b): responding to smoke at concentrations of between 2% and 0.8% obscuration per metre.

High Sensitivity (class a): responding to smoke at concentrations of less than 0.8% obscuration per metre.

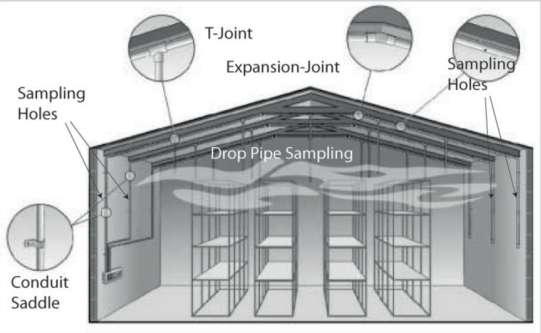
It is important to note that the detector sensitivity is shared over the network of sampling points associated with it. In other words, if a system having a detector registering a 'Fire' signal when the smoke density within it reached 0.05% obscuration per metre was connected to a pipe network with 20 sampling holes the mean system sensitivity at each hole would be 1.0% (0.05% x 20). This sensitivity is calculated on the basis smoke only enters one of the twenty holes. If the same density of smoke entered two holes the mean sensitivity would double. Normally, smoke will enter from the majority of sampling holes, in which case system sensitivity can be very high indeed.



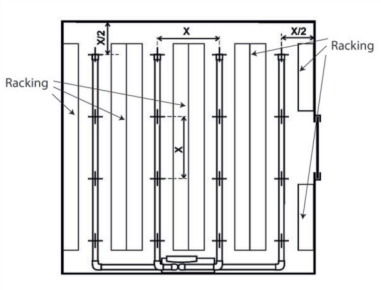
Primary sampling - via air handling System



Secondary sampling - layout for normal point detection



Pipework Configuration



Grid Layout for Sampling Holes Construction