BEAM DETECTION

It is important that the Optical Beam Smoke Detector is positioned correctly to minimise the detection time.

Experiments have shown that smoke from a fire does not rise directly upwards, but fans out as a plume due to dilution with cool air and heat layering effects.

The time to signal a fire condition depends on the location of the Optical Beam Smoke Detector within the premises, the volume and density of smoke produced, construction of the roof, ventilation arrangements and airflow within the detection area.

Smoke layering, where smoke does not reach the ceiling level due to layers of static hot air, is overcome by mounting the Optical Beam Smoke Detector / Reflector at the recommended height below the ceiling of between 0.3m and 0.6m. This brings the infrared light beam below the heat layer and into the smoke layer.

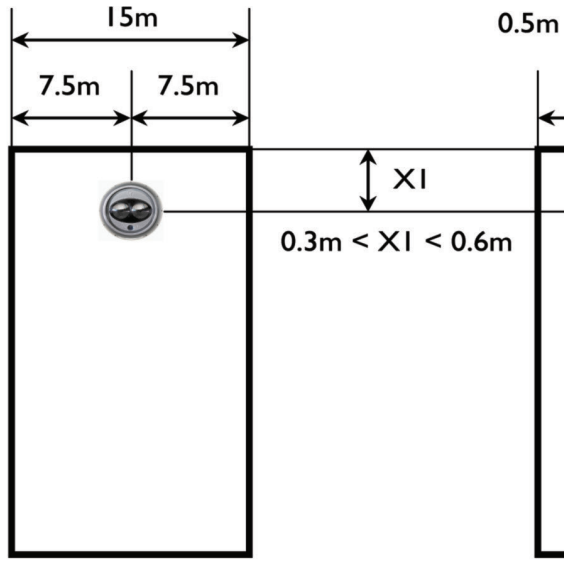
However, if there are objects below the ceiling that could obscure the beam path, the detector heads / Reflector positioning may need to be adjusted (this can be determined by smoke tests).

The effects of stratification should also be considered when locating Optical Beam Smoke Detectors.

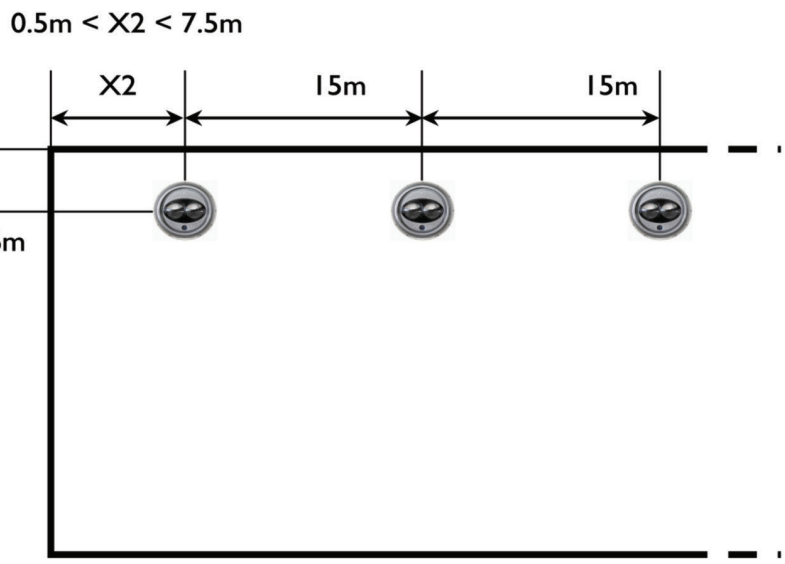
There are several models for positioning Optical Beam Smoke Detectors. The most common ones are described in the next two pages.

FLAT CEILING

Single Optical Beam Smoke Detector:

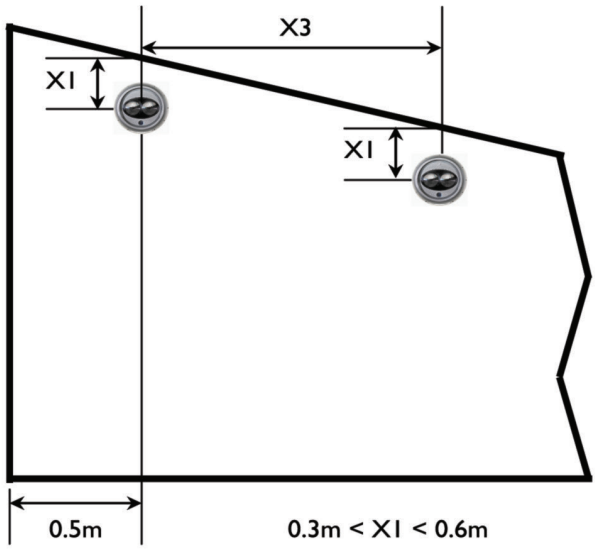


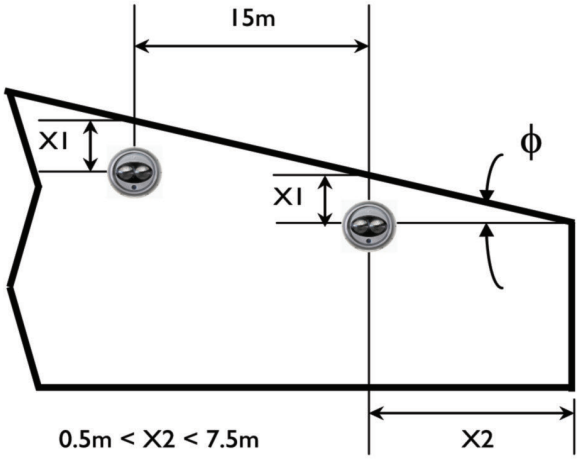
Multiple Optical Beam Smoke Detectors:



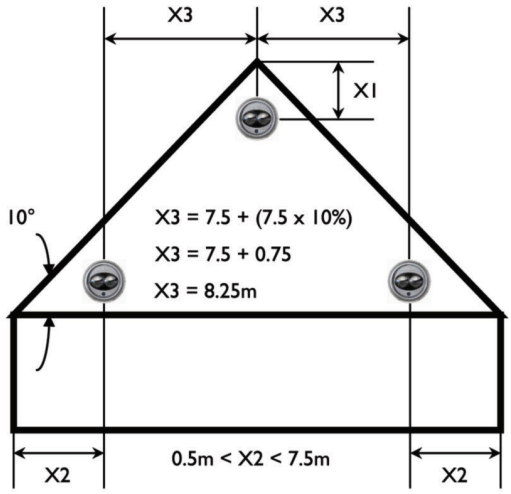
APEX CEILING - SHED TYPE

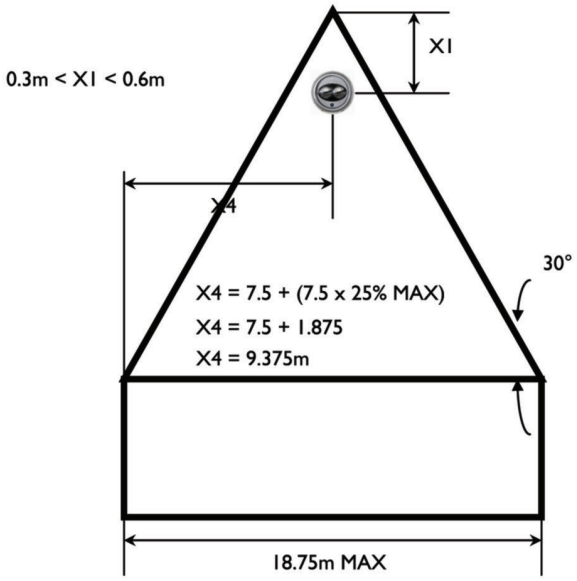
A ceiling or roof with a slope in excess of 4.5 degrees should be regarded as an APEX ceiling / roof.





APEX CEILING - PEAKED TYPE





A ceiling or roof with a slope in excess of 4.5 degrees should be regarded as an APEX ceiling / roof.

When Optical Beam Smoke Detectors are mounted in an APEX, the lateral coverage either side of the beam axis can be increased in relation to the angle (Φ) of the pitch, using the following formula:

X = 7.5 + (7.5 x Φ /100) metres

For example:
If the pitch angle (Φ) is 20˚, the lateral coverage can be increased from 7.5m either side of the infrared light beam axis to:
X = 7.5 + (7.5 x 20/100) metres
X = 7.5 + (1.5) metres
X = 9 metre

The lateral coverage can be increased to 9m either side of the infrared light beam axis.

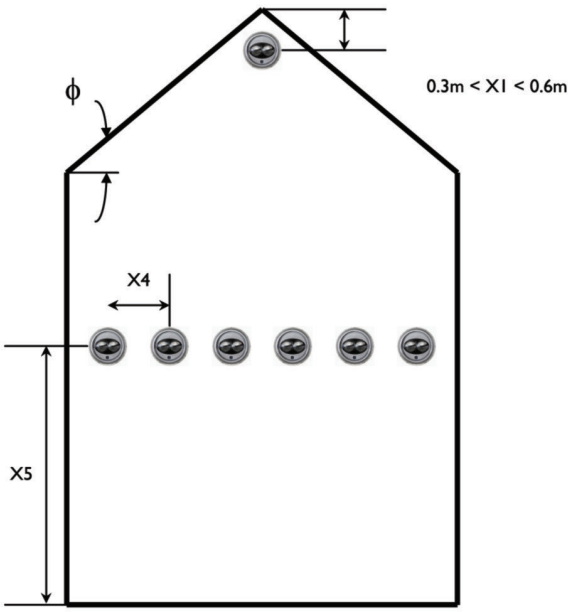
This only applies for:

- Optical Beam Smoke Detectors positioned in the APEX. For all other Optical Beam Smoke Detectors, the calculations remain the same;

- Pitch angles up to and including 25˚.
  Hence the maximum increase in lateral coverage can be:
  X = 7.5 + (7.5 x 25/100) metres
  X = 9.375 metres

Pitch angles over 25˚ must use the maximum lateral figure of 9.375m either side of the infrared light beam axis.

ATRIUM



The purpose of this approach is to detect the rising plume rather than the smoke layer. For this approach, supplementary detection using Optical Beam Smoke Detectors close enough to each other to assure intersection of the plume is installed at a level below the lowest expected stratification level.

The spacing (X4) between Optical Beam Smoke Detectors is based on the narrowest potential width of the plume at the level of detection (X5), typically X4 is 25% of X5.

If the Optical Beam Smoke Detector is to be placed in an Atrium, or near glass / polished surfaces, the Receiver / Reflector should be offset from the central line of sight, and angled back to the transmitter.

This can be either on the vertical or on the horizontal axis, or a combination of both.

In the instance of a Reflected Optical Beam Smoke Detector, the reflected infrared light beam from the Reflector will be returned to the Receiver in the normal way.