



System design questions

Before applying flame detectors you need to ask (yourself) a numbers of questions:

1 - Can the flame detector "see" the fire?

The detector choice depends on the kind of fuel at the application. A UV flame detector can detect virtually every fire, Hydrocarbon as well as non-Hydrocarbon based. An IR flame detector based on 4.4 micron radiation (CO₂ emission of a fire) can only detect Hydrocarbon fires such as burning Wood, Paper, Petrol or Natural Gas. Non-Hydrocarbons such as Hydrogen, Magnesium or Sulfur burn without CO₂ emissions and cannot be detected with a traditional IR or UV/IR (AND) detector. **See the properties table!**

2 - How big are the flames?

The distance between the flame detector and a fire and the surface of that fire are related by the square law. It means that when the distance from the detector to the fire is doubled the fires needs to be four times larger. E.g. a detector detects a 0.09 m² (1 sqft) gasoline fire at 15 meters (45 ft). In order to see the fire at 30 meters (90 ft) the size of the fire needs to be at least 0.36 m² (4 sqft). **See the chapter: square law. Double distance = 4 times larger fire**

3 - Are there any inhibitors?

It is important to know if there are inhibitors present or emerge from the fire. An inhibitors is a substance that blinds the flame detector. E.g., a UV detector will be blinded by oil or grease on the lens, Hydrocarbon vapors such as Xylene en Toluene, Chloride vapors etc. An IR flame detector will be blinded by fog, water and ice or a salt layer on the lens (salt takes up water). A multi IR flame detector can be blinded or masked by blackbody radiation from hot machinery or direct sunlight. **See the properties table!**

4 - What false alarm sources are present at the application?

A false alarm is the worst that can happen besides non-detection of course. The user looses faith and maybe a real fire alarm is discarded out of disbelief. A UV flame detector false alarms to the radiation of Arc Welding, Halogen lamps or high pressure mercury lamps (without the protective glass), corona and static arcs. An IR flame detector may false alarm to chopped black body radiation and in some cases direct chopped sunlight. Multi IR sensor detectors are less susceptible to blackbody radiation or chopped sunlight but get insensitive. **See the properties table!**

5 - How fast is the detector?

In order to detect a munitions fire you need an extremely fast detector. A UV flame detector is able to detect (under ideal conditions) a fire within 10 msec. Usually such speed of response is not required and a time delay of 3 seconds is used. An IR flame detector responds in 3 to 10 seconds to a fire. **See the properties table!**

6 - How do you mount the flame detector?

Mount the detector in such a way that it covers the object that needs protection. **Try to see" from the detectors point of view see the chapter shado effects.** Avoid shadows by e.g. putting another detector in the opposite corner. Most flame detectors have a cone of vision of 90 degrees, so 45 degrees from the central axe. Place the detector under an angel of 45 degrees downwards. This way the detector sees straight down and straight forward and so catches the least amount of dirt. Avoid having potential false alarm sources such as flares in the cone of vision.