4.9. Flame Detection System (Radiant Energy-Sensing Fire Detection)

4.9.1. The Design, Installation and Spacing of Flame Detection and Alarm System (Radiant Energy-Sensing Detection) shall comply with **Table 8.9.,** and the relevant General Requirements for Fire Detection and Alarm System as per **Table 8.1.**

Table 8.9.: Design, Installation and Spacing of Flame Detection Systems

ITEMS	REQUIREMENTS
1. DESIGN, INSTALLATION AND SPACING OF FLAME/ RADIANT ENERGY SENSING DETECTORS	i. The type and quantity of radiant energy–sensing fire detectors shall be determined on the basis of the performance characteristics of the detector and an analysis of the hazard, including the burning characteristics of the fuel, the fire growth rate, the environment, the ambient conditions, and the capabilities of the extinguishing media and equipment. ii. The selection of the radiant energy–sensing detectors shall be based on the following: a. Matching of the spectral response of the detector to the spectral emissions of the fire or fires to be detected. b. Minimizing the possibility of spurious nuisance alarms from non-fire sources inherent to the hazard area.
2. WORKING PRINCIPLES	i. Ultraviolet flame detectors typically use a vacuum photodiode Geiger–Muller tube to detect the ultraviolet radiation that is produced by a flame. The photodiode allows a burst of current to flow for each ultraviolet photon that hits the active area of the tube. When the number of current bursts per unit time reaches a predetermined level, the detector initiates an alarm. ii. A spark/ember-sensing detector usually uses a solid state photodiode or phototransistor to sense the radiant energy emitted by embers, typically between 0.5 microns and 2.0 microns in normally dark environments. These detectors can be made extremely sensitive (microwatts), and their response times can be made very short (microseconds). iii. The greater the angular displacement of the fire from the optical axis of the detector, the larger the fire must become before it is detected. This phenomenon establishes the field of view of the detector. **Figure 8.16.** shows example of the effective sensitivity versus angular displacement of a flame detector.

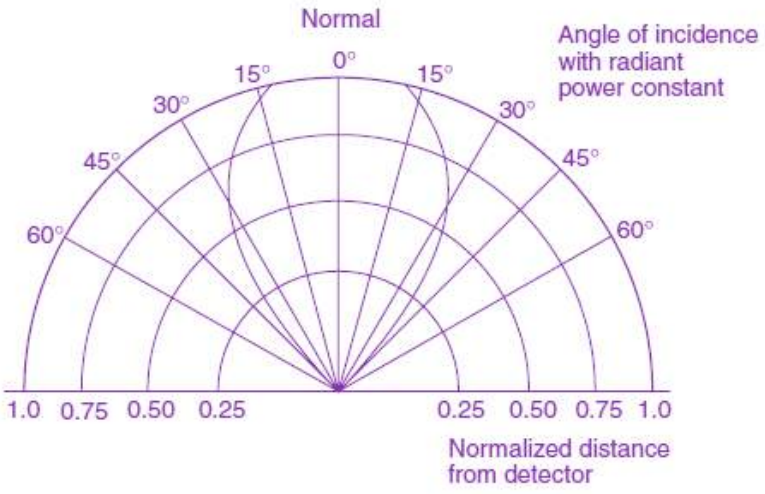

Figure 8.23.: Normalized Sensitivity vs. Angular Displacement.