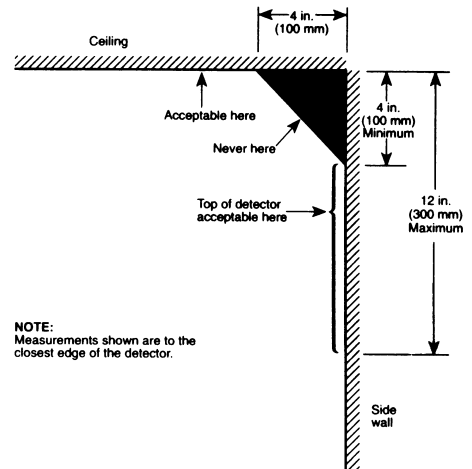


## GENERAL GUIDELINES FOR PROPER DETECTOR PLACEMENT

The following are some general rules for the installation of smoke detectors in residential and commercial applications. The information contained in this document has been adapted from publications by the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269. They are NFPA 74, "Standard for the Installation, Maintenance, and Use of Household Fire Warning Equipment" and NFPA 72E, "Standard on Automatic Fire Detectors."

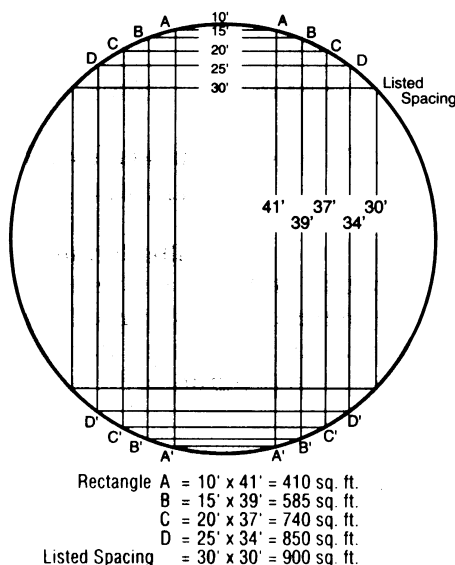
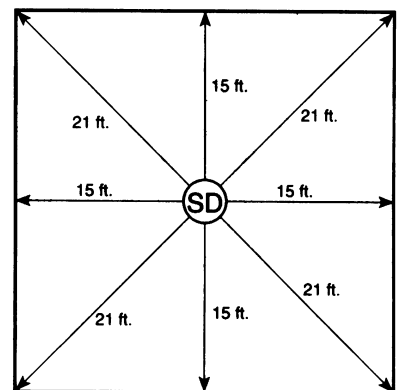
In general, smoke detectors should be installed outside of each sleeping area in the immediate vicinity of the bedrooms and on each additional story of the family unit including basements but excluding crawl spaces and unfinished attics. Placement of the detector in the center of the ceiling will provide the maximum speed of fire detection. If a center location is not possible, any off-center location may be used on the ceiling which is not closer than 4 in. from the wall. A wall mounted detector should have the top of the detector between 4 and 12 in. from the ceiling. The basement smoke detector should be installed in close proximity to the floor above.



The location of the minimum required smoke detectors does not provide adequate protection if a fire starts within a bedroom or for areas separated by doors from the areas protected by smoke detectors. Therefore, it may be desirable to install additional smoke detectors in such areas as bedrooms, dining room, utility room and unprotected hallways not required to have smoke detectors.

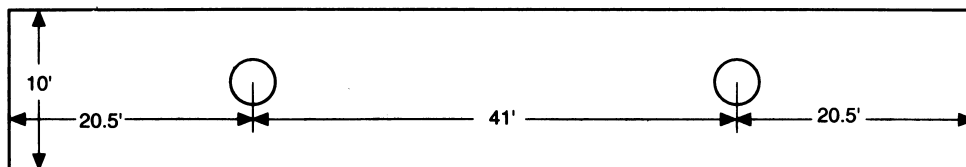
### DETECTOR SPACING:

When the maximum linear spacing is stated for a detector, it assumes an unobstructed smooth ceiling at a specific ceiling height. The spacing also assumes the detectors will be placed in a pattern of one or more squares with each side of the square equaling the maximum spacing. If the detector is placed at the center of the square, the middle of each wall will be 15 feet from the detector. However, each corner of the square will be approximately 21 feet from the detector. Therefore no location in the covered area should be farther than 21 ft. from any smoke detector when using smoke detectors rated at a 30 ft. spacing. In many installations, areas to be covered are rectangular in shape. The rectangular area can be covered by a single detector if it can fit within a circle with a radius of 21 ft. Refer to the figure to the left. The following conclusions can be drawn about detector spacing from this illustration.



1. As the smaller dimension decreases, the longer dimension can be increased beyond the linear maximum spacing of the detector with no loss of detection efficiency.
2. A single detector will cover any area that will fit within the circle when centrally located and if the diagonal of the rectangle does not exceed the diameter of the circle.
3. Relative detector efficiency will increase because the area covered in square feet is always less than 900 sq. ft. permissible if the full 30 ft. by 30 ft. square were to be utilized.

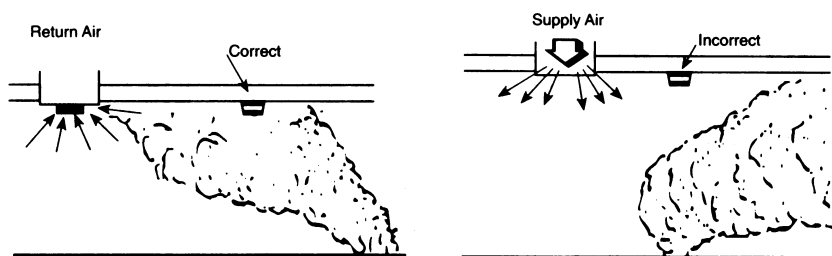
Rectangular areas which cannot fit within the circle (21 ft. radius) require additional detectors. Detector coverage may still be maximized by breaking the area into smaller rectangles. For example, a corridor 10 ft. wide by 82 ft. long can be covered with two 30 ft. detectors.



### LOCATIONS TO AVOID:

Nuisance alarms are caused by placing alarms where they will not operate properly. To avoid nuisance alarms, do not place alarms in the following locations:

- In or near areas where combustion particles are normally present such as kitchens; in garages where there are particles of combustion in vehicle exhausts; near furnaces, hot water heaters or gas space heaters. Install detectors at least 20 feet away from kitchens and other areas where combustion particles are normally present.
- In damp or very humid areas or next to bathrooms with showers. The moisture in humid air can enter the sensing chamber as water vapor then cool and condense into droplets that cause a nuisance alarm. Install detector at least 10 feet away from bathrooms.
- In very cold or very hot environments or in unheated buildings or outdoor rooms where the temperature can go below or above the operation range of the detector. Temperature limits for proper operation are 40° to 100°F.
- In very dusty or dirty areas. Dust and dirt can build up on the alarm's sensing chamber and can make it overly sensitive or block openings to the sensing chamber and keep the alarm from sensing smoke.
- Near fresh air inlets or returns or excessively drafty areas. Air conditioners, heaters, fans and fresh air intakes and returns can drive smoke away from smoke detectors making the detectors less effective.
- In dead air spaces at the top of a peaked roof or in the corners between ceilings and walls. Dead air may prevent smoke from reaching an alarm.
- In insect-infested areas. If insects enter a detector's sensing chamber, they may cause a nuisance alarm. Eliminate the bugs before installing detectors where bugs are a problem.
- In air streams passing by kitchens.
- No closer than 3 feet from a supply diffuser. Placement of smoke detectors near incoming or outgoing air vents can cause excessive accumulation of dust and dirt on the detectors which may lead to nuisance alarms. However, the detector should be placed in the path of the air flow toward the return duct. Refer to the figure at right.



### IS YOUR SMOKE DETECTOR COMPATIBLE WITH YOUR CONTROL PANEL?

The following is an excerpt from the UL Fire Protection Equipment Directory:

"Smoke detectors listed for open area protection are intended to be connected to the initiating device circuit of fire alarm system control unit.

Multiple wire detectors, employing power supply terminals or leads that do not obtain power from the initiating device circuit of a system control unit, are compatible with any listed system control unit if a failure of the power to the detector is supervised at the control unit.

Two wire detectors, whose power supply terminals or leads are the same as the signaling terminals, and obtain power from the initiating device circuit of a system control unit, are evaluated for compatibility either by test or a review of the circuit parameters of both the detector and control unit. Listing is restricted only to those control units with which such an evaluation was made. Interconnection limitation and compatible models are indicated on the installation wiring diagram of the control unit and/or detectors."

The purpose of this document is only to serve as an aid in the design of a fire alarm installation. There are many factors which have not been discussed such as stratification, beamed or joisted ceilings, peaked or sloped ceilings. The appropriate NFPA Standard should be consulted when in the process of designing a fire detection system. The manufacturer should also be consulted if there are any questions.