

Detection

- Identify the spacing requirements of detectors
- Determine the appropriate number of detectors in a given situation
- Explain the rules related to detector spacing

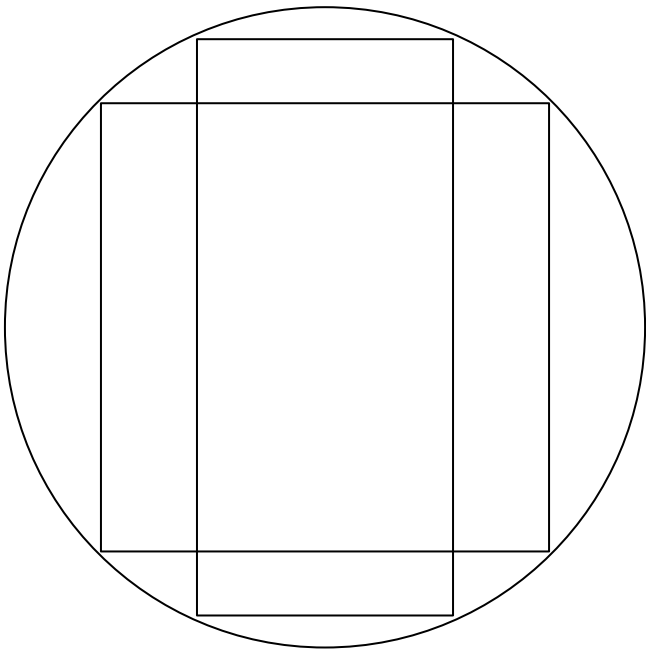


Detector Spacing

- Basic rules assume smooth, flat ceiling
- Spacing (S)
 - Maximum distance between detectors
 - Maximum $S/2$ to walls
 - $0.7 \cdot S$ from corner
 - Minimum 4" from wall, ceiling, obstruction
 - Maximum 12" below ceiling
 - Space uniformly



Spacing in Corridors



Option	Width	Length
1	10	41
2	15	39
3	20	37
4	25	34
5	30	30

$$L=(2*S^2-w^2)^{0.5}$$



Joists (Heat Detectors)

- Solid projection
 - More than 4" down from ceiling
 - 3' or less apart (center to center)
- Space at S/2 perpendicular to joists
- Mount detectors on bottom of joists



Beams (Heat Detectors)

- Solid projection
 - More than 4" down from ceiling
 - More than 3' apart (center to center)
- Space at $\frac{2}{3}$ S perpendicular to beam if $>4"$
 - May mount detectors on bottom of beam if $<12"$
- If $>18"$ and $>8\text{ft}$ on center – treat each beam pocket as a separate area



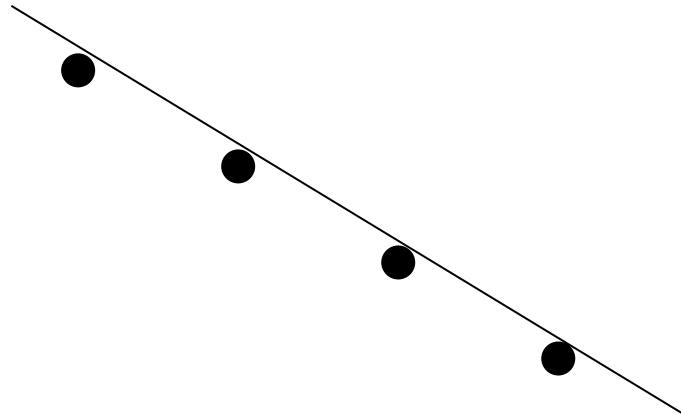
High Ceilings

Ceiling Height (ft)	Multiplication Factor
10	1.00
12	0.91
14	0.84
16	0.77
18	0.71
20	0.64
22	0.58
24	0.52
26	0.46
28	0.40
30	0.34



Peaked and Shed Ceilings

- Detector within 3' of highest point (peak)
- Spacing is measured by projection of the position on the floor



Beam Construction (Smoke Detectors)

- If beam depth $< 10\%$ building height
 - Place smoke detectors either in beam pocket or on bottom of beams
- If beam depth $\geq 10\%$ building height
 - If beam spacing $\geq 40\%$ building height
 - Each pocket
 - If beam spacing $< 40\%$ building height
 - S/2 distance perpendicular to direction of beams
 - S along beams



Sloped ceilings (Smoke Detectors)

- Beams running up the slope:
 - Use spacing for level beamed ceiling
 - Use average ceiling height
 - Spacing measured on horizontal projection of ceiling
- Beams running across the slope:
 - Use spacing for level beamed ceiling
 - Use average ceiling height between beams



Air vents

- Not directly in air stream from a wall mounted supply diffuser
- At least 3' from ceiling mounted supply diffuser
- Should be mounted to detect smoke drawn to return air diffuser



Partition Walls

- If gap at top $< 18''$ consider it a full wall
- If gap $18''$ or greater, no effect on ceiling air flow



Alternative Designs

- An example in NFPA 72 Annex B

