NFPA 72 Smoke Detector Spacing Requirements

Robert P. Schifiliti, P.E.
Fax +1 781.944.9300
Voice +1 781.942.7500
email rps@rpsa-fire.com

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Smoke Detectors: Solid Joist and Beam Construction

- *Prior to the 1996 edition*
  - 33.3% reduction in spacing perpendicular to solid joisted ceilings
  - Reduction in spacing perpendicular to solid beamed ceilings is required but not specified

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Smoke Detectors: Solid Joist and Beam Construction

- *Joists and beams have non-structural definitions*
  - Depth of the obstruction at the ceiling
  - Spacing between the obstructions.
- *Some combinations of d and W require detectors in each bay or pocket.*

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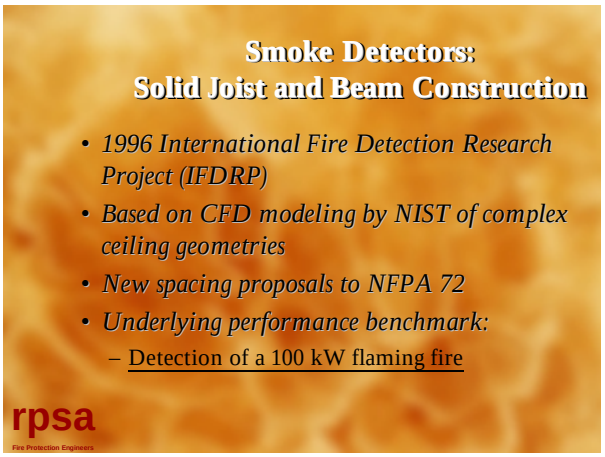
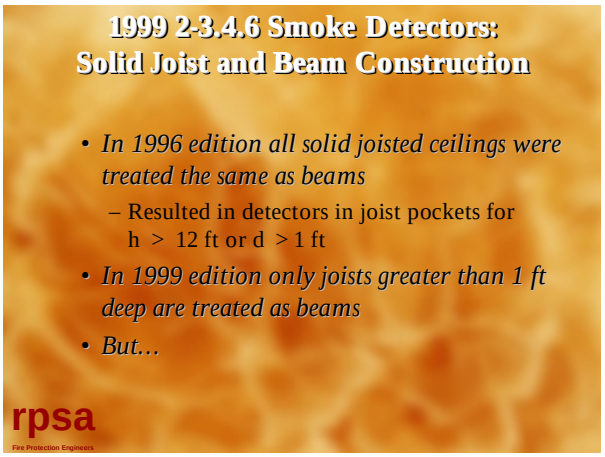
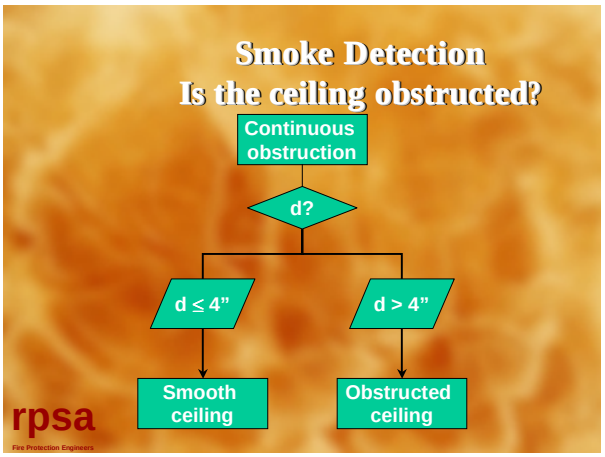


Results in many more detectors being required on common ceiling configurations, such as waffle pan ceilings and in mill type construction.



Task group worked to try and change the requirements, reducing numbers for solid joisted ceilings.

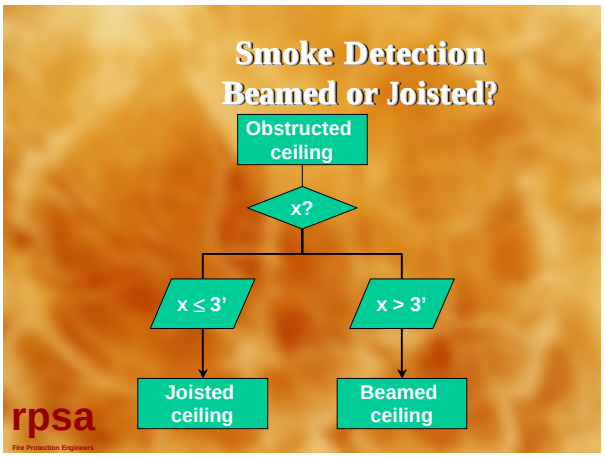
But the proposal left joisted ceilings with depths 1 ft or less and ceilings greater than 12 ft unaddressed.



The paragraphs mix requirements for placement (on the joist or beam or in the pocket) with requirements for spacing.

Analyze spacing or number required separately from location.

Looking at spacing, or number of detectors required…


Smoke Detection
Beamed or Joisted?
Obstructed ceiling
x?
x ≤ 3'
x > 3'
Joisted ceiling
Beamed ceiling
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Smoke Detection
Joisted Ceilings

- *In the 1996 edition*
  Joisted = Beamed
- *In the 1999 edition*
  - Section 2-3.4.6
    Joisted = Beamed only if d > 1 foot

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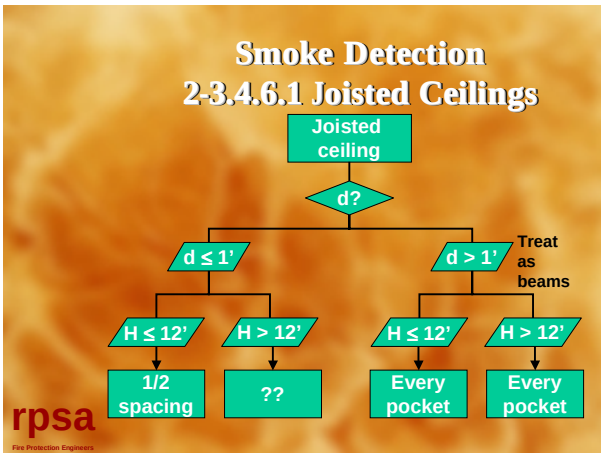
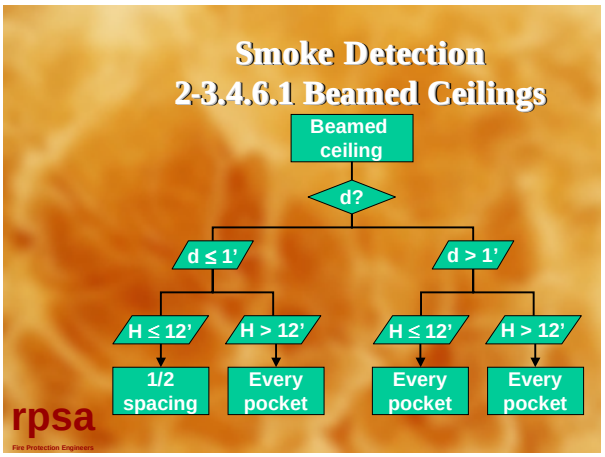


So, lets say that by the definitions in 1-4 you have a joisted ceiling (more than 4" deep and 3 ft or less apart).

Should the joists be treated as joists or as beams as far as smoke detection spacing is concerned?

Until and unless there is a TIA, use 1996 edition and treat as beams.


Smoke Detection
2-3.4.6.1 Beamed Ceilings
Beamed ceiling
d?
d ≤ 1'
d > 1'
H ≤ 12'
H > 12'
H ≤ 12'
H > 12'
1/2 spacing
Every pocket
Every pocket
Every pocket
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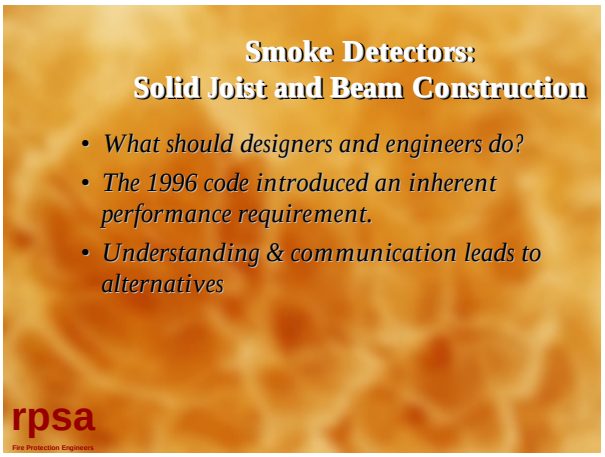

Is it reasonable to follow the code and design a system to respond to a 100 kW fire?

Remember, there is no “credit” for smoke produced prior to open flaming.

?Making the ceiling smooth may be less expensive.

Long term life cycle costs.