

Chapter 9 Fire Protection Systems

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General Requirements

- ◆ References CFC
- ◆ Partial Systems Allowed*
- ◆ AFS NFPA 72 Monitoring Required
 - >19 heads
 - Other than 1 or 2 family dwelling
- ◆ Fire Alarm Monitoring Required
 - Not for single or multiple smoke alarms in “R” occupancies
 - Not required in every I-3 occupancy

* Cannot be used to reduce or replace code requirements

901.7 - Fire Areas

Area within a building that is surrounded by Fire Walls or Fire Barriers.

901.7 Fire areas. Where buildings, or portions thereof, are divided into fire areas so as not to exceed the limits established for requiring a fire protection system in accordance with this chapter, such fire areas shall be separated by fire barriers having a fire-resistance rating of not less than that determined in accordance with Section 706.3.9.

May want to add a reference to 705.1.2 & 907.1.3

903 - Automatic Fire Sprinkler (AFS) Systems

Tells us when an AFS system is required:

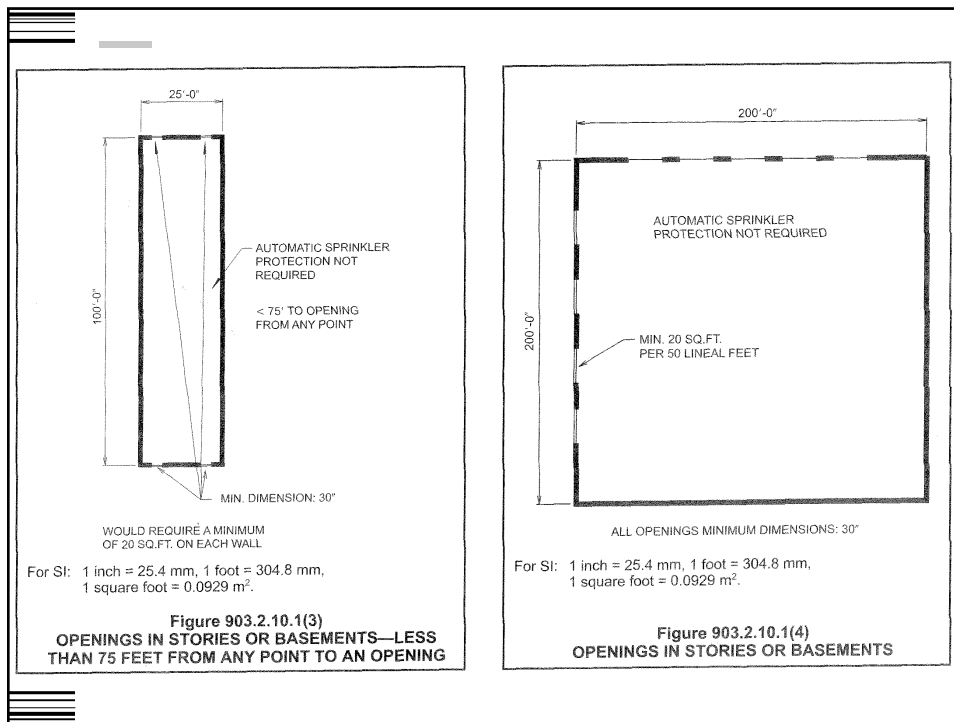
- ◆ By occupancy and fire area size
- ◆ “Windowless Stories”
- ◆ By hazard
 - Commercial cooking
 - Product conveying ducts
 - Studio stages
- ◆ Existing High-Rises
- ◆ Fixed Guideways Transportation systems

[F] TABLE 903.2.13
 ADDITIONAL REQUIRED SUPPRESSION SYSTEMS

SECTION	SUBJECT
402.8	Covered malls
403.2, 403.3	High-rise buildings
404.3	Atriums
405.3	Underground structures
407.5	Group I-2
410.6	Stages
411.4	Special amusement buildings
412.2.5, 412.2.6	Aircraft hangars
415.6.2.4	Group H-2
416.4	Flammable finishes
417.4	Drying rooms
507	Unlimited area buildings
508.2	Incidental use areas
1025.6.2.3	Smoke-protected assembly seating
430	<i>Horse-racing stables</i>
431	<i>Pet kennels</i>
439	<i>Public libraries</i>
CFC	Sprinkler system requirements as set forth in Section 903.2.13 of the <i>California Fire Code</i>

903.2.10 - Windowless Stories

- ◆ >1500 sq ft floor area, and
- ◆ No 30” (min.) openings on at least one side, below grade, <50’ apart and served by a legal exterior ramp or stair, or
- ◆ No <20 sq ft total of 30” (min.) opening in every 50 lineal feet, on at least one side, or
- ◆ If openings are on one side only and opposite wall is >75’ away, or
- ◆ When any portion of a basement is >75’ to a required opening



903.3 - AFS Installation Requirements

Applicable standards

- ◆ NFPA 13
- ◆ NFPA 13R (Multi-Family Residential)
- ◆ NFPA 13D (1 and 2 Family Dwelling)



More AFS Installation Details

- ◆ Quick response & residential sprinkler heads
- ◆ Obstructions
- ◆ Actuation
- ◆ Water supplies
- ◆ Monitoring & alarm indication
- ◆ Testing & maintenance



904 - Alternate AFS Systems

Alternate AFS systems cannot be substituted for NFPA 13 AFS systems

- ◆ Commercial kitchen hood & duct
- ◆ Wet-chemical
- ◆ Dry-chemical
- ◆ Foam
- ◆ CO₂
- ◆ Halon
- ◆ Clean-agent

(See 904.11 or 2007 CMC 513.2.2 for UL 300 retrofit requirements)

905 - Standpipes

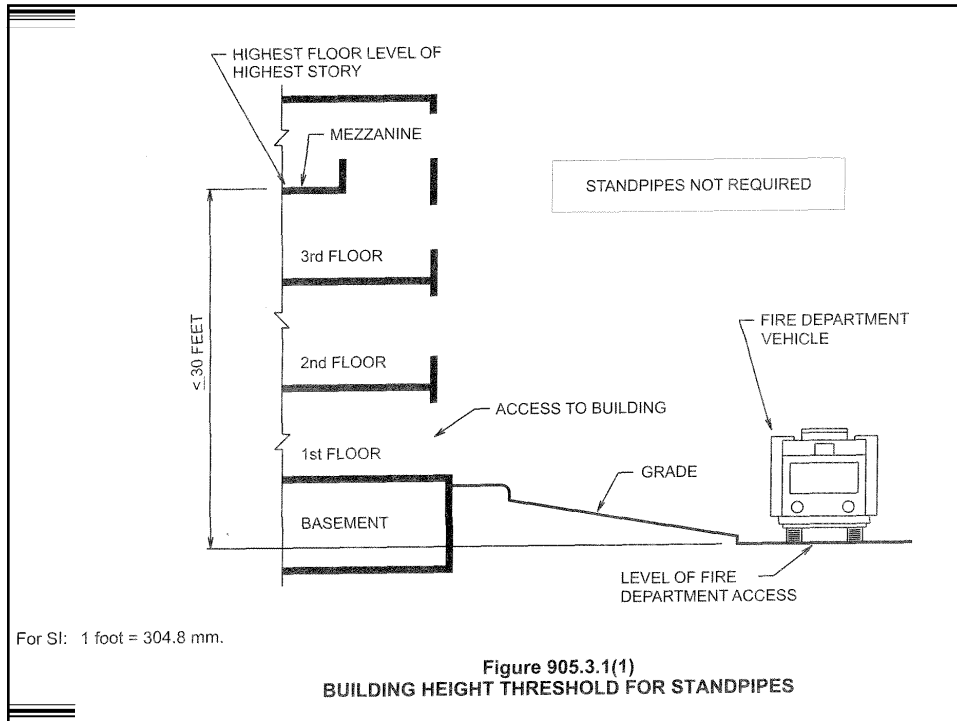
Classes defined

- ◆ Class I 2 ½" Fire Department connections
- ◆ Class II 1 ½" Building occupant use
- ◆ Class III 2 ½" & 1 ½" Connections for both users

Standpipe Triggers

- ◆ Floor level >30' above Fire Dept. access
- ◆ A occupancy >1000 occupants*
- ◆ Covered mall buildings
- ◆ Stages >1000 sq ft*
- ◆ Underground buildings
- ◆ Helistops/pads
- ◆ Marinas & boat yards
- ◆ Certain smoke proof enclosures
- ◆ Fixed guideway transit systems

* See exceptions



905.4 to 905.10 Standpipe Details

- ◆ Location
- ◆ Standpipe cabinets & equipment
- ◆ Prohibition of dry standpipes
- ◆ Supervision or standpipe valves
- ◆ Standpipes during construction



906 - Portable Fire Extinguishers

REFERS TO 2007 CALIFORNIA FIRE CODE



907 – Fire Alarm Systems

- ◆ Defines construction submittal documents
- ◆ Requires SFM approval of components and systems
- ◆ Fire walls and fire barrier walls do not create a separate building

907.2 – Fire Alarm System Triggers

There are 28 subsections that include:

- ◆ By occupancy & occupant load
- ◆ Amusement buildings
- ◆ High-rise
- ◆ Atria

907 – More Alarm System Details

- ◆ Alarm zones
- ◆ Pull Station types and locations
- ◆ Power systems (and backup)
- ◆ Alarm annunciation
- ◆ Visible alarm indication
- ◆ Etc.

908 – H Occupancy Emergency Alarms

- ◆ Refers to Chapter 4 for alarm system applicability
- ◆ Provides system details such as:
 - Required alarms
 - Hazardous material system shut-offs
 - Hazardous materials valve closure
 - Chemical detection systems integration

909 – Smoke Control

Required in order to maintain a tenable environment for egress and fire fighting

System Categories:

- ◆ Passive (stack effect alone)
- ◆ Active (mechanically forced air)

General Requirements:

- ◆ Not subject to Chapter 5 of CMC
- ◆ Special inspection & performance testing required

909.4 – Smoke Control System Analysis

Every system submittal must address:

- ◆ Stack effect
- ◆ Temperature effect
- ◆ Wind effect
- ◆ HVAC systems integration
- ◆ Climate (indoors and out)
- ◆ Estimated duration of system operation

905 – Smoke Barriers

Smoke control systems rely on defined boundaries where smoke is contained and managed by:

- ◆ Leakage of assemblies
- ◆ Opening protectives performance
- ◆ Duct sealant performance



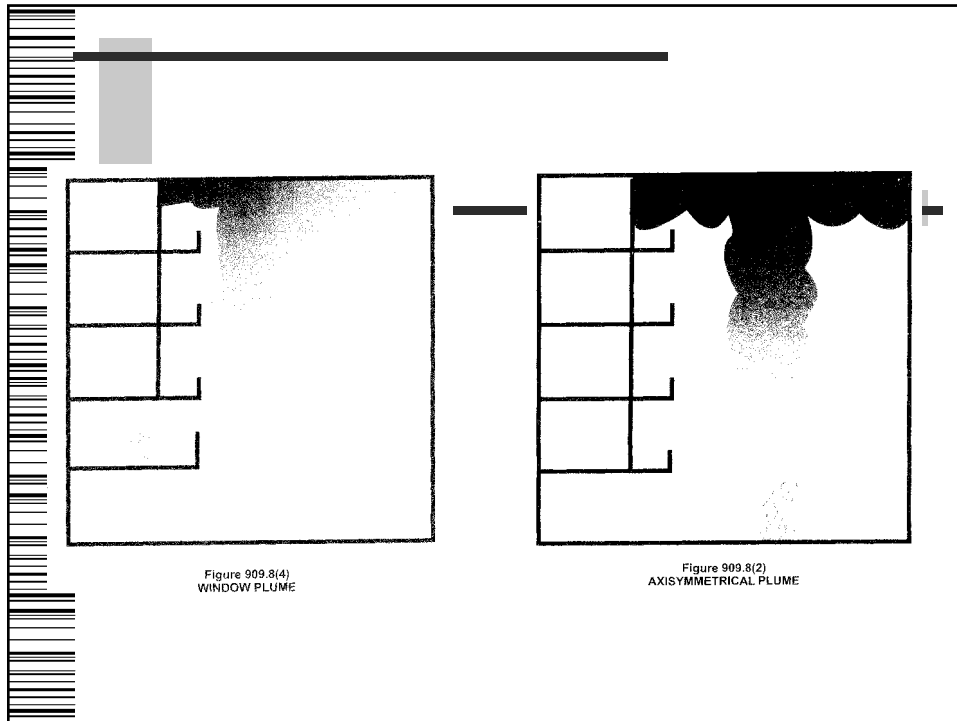
Factors Considered in Smoke Control System Design

- ◆ Confirmation of smoke barrier continuity
- ◆ Pressurization of air
- ◆ Airflow & exhaust
- ◆ Design fire & assumed Fire Department response time
- ◆ Selection of available equipment
- ◆ Power systems available



... more Factors to Consider

- ◆ Detection systems
- ◆ Systems controls
- ◆ System identification limitations
- ◆ Fire-fighter control access
- ◆ Anticipated mobility of occupants during egress



910 – Smoke & Heat Vents

Application

- ◆ F1 and S1 occupancies
- ◆ High piled combustible storage

Types of vent systems

- ◆ 500 degree gravity drop-out
- ◆ AFS Automatic
- ◆ 100-220 degree heat-responsive

[F] TABLE 910.3
REQUIREMENTS FOR DRAFT CURTAINS AND SMOKE AND HEAT VENTS*

OCCUPANCY GROUP AND COMMODITY CLASSIFICATION	DESIGNATED STORAGE HEIGHT (feet)	MINIMUM DRAFT CURTAIN DEPTH (feet)	MAXIMUM AREA FORMED BY DRAFT CURTAINS (square feet)	VENT-AREA-TO-FLOOR-AREA RATIO ^c	MAXIMUM SPACING OF VENT CENTERS (feet)	MAXIMUM DISTANCE TO VENTS FROM WALL OR DRAFT CURTAINS ^b (feet)
Group F-1 and S-1	—	$0.2 \times H^d$ but ≥ 4	50,000	1:100	120	60
High-piled Storage (see Section 910.2.2) I-IV (Option 1)	≤ 20	6	10,000	1:100	100	60
	$> 20 \leq 40$	6	8,000	1:75	100	55
High-piled Storage (see Section 910.2.2) I-IV (Option 2)	≤ 20	4	3,000	1:75	100	55
	$> 20 \leq 40$	4	3,000	1:50	100	50
High-piled Storage (see Section 910.2.2) High hazard (Option 1)	≤ 20	6	6,000	1:50	100	50
	$> 20 \leq 30$	6	6,000	1:40	90	45
High-piled Storage (see Section 910.2.2) High hazard (Option 2)	≤ 20	4	4,000	1:50	100	50
	$> 20 \leq 30$	4	2,000	1:30	75	40

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m².

- Requirements for rack storage heights in excess of those indicated shall be in accordance with Chapter 23 of the *California Fire Code*. For solid-piled storage heights in excess of those indicated, an approved engineered design shall be used.
- The distance specified is the maximum distance from any vent in a particular draft curtained area to walls or draft curtains which form the perimeter of the draft curtained area.
- Where draft curtains are not required, the vent-area-to-floor-area ratio shall be calculated based on a minimum draft curtain depth of 6 feet (Option 1).
- "H" is the height of the vent, in feet, above the floor.

Locating & Sizing Vents

- ◆ $\geq 20'$ to property lines or fire walls
- ◆ $\geq 10'$ to fire barrier walls
- ◆ Uniformly located considering the following:
 - High piled combustible locations
 - Roof pitch
 - Draft curtain locations
 - AFS system location
 - Structural member locations

Mechanical Exhaust From Vents

Not a “Smoke Control System”

Requirements

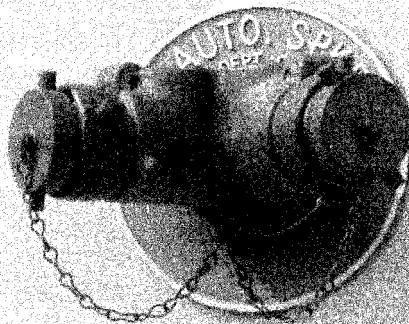
- ◆ Fans uniformly distributed w/in draft curtain areas
- ◆ $\geq 30,000$ cfm / fan unit
- ◆ Activation by AFS or smoke detection
- ◆ Manual controls required
- ◆ Supply air at floor level by uniform vents
- ◆ Interlock with HVAC system

911 – Fire Command Center

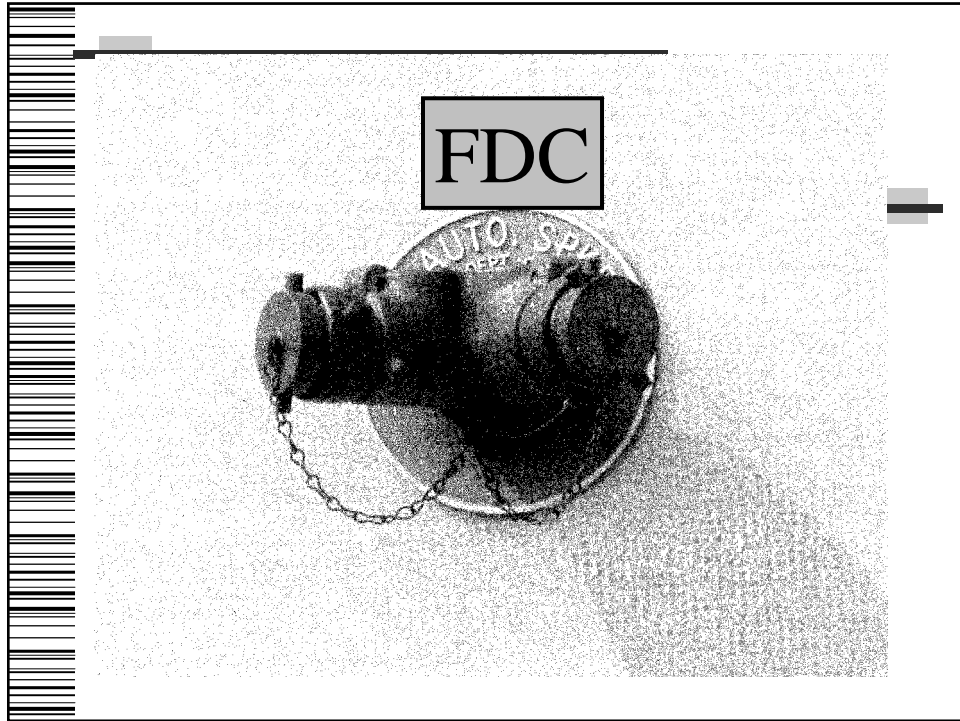
- ◆ Primarily required in high-rises.
- ◆ General requirements
 - 1-hour fire barrier separation
 - Min. 96 sq ft & 8' wide floor areas
 - Fire Department approval
 - Sole use as Fire Command Center

912 – Fire Department Connections

- ◆ Readily visible & accessible from street
- ◆ Labeled “FDC” in 6” min. letters
- ◆ Min. 3’ clearance around connection points
- ◆ Backflow protection to potable water system



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