

Computer & Communications Room Design

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IHS OEHE Division of Engineering Services



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Conference

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Goal

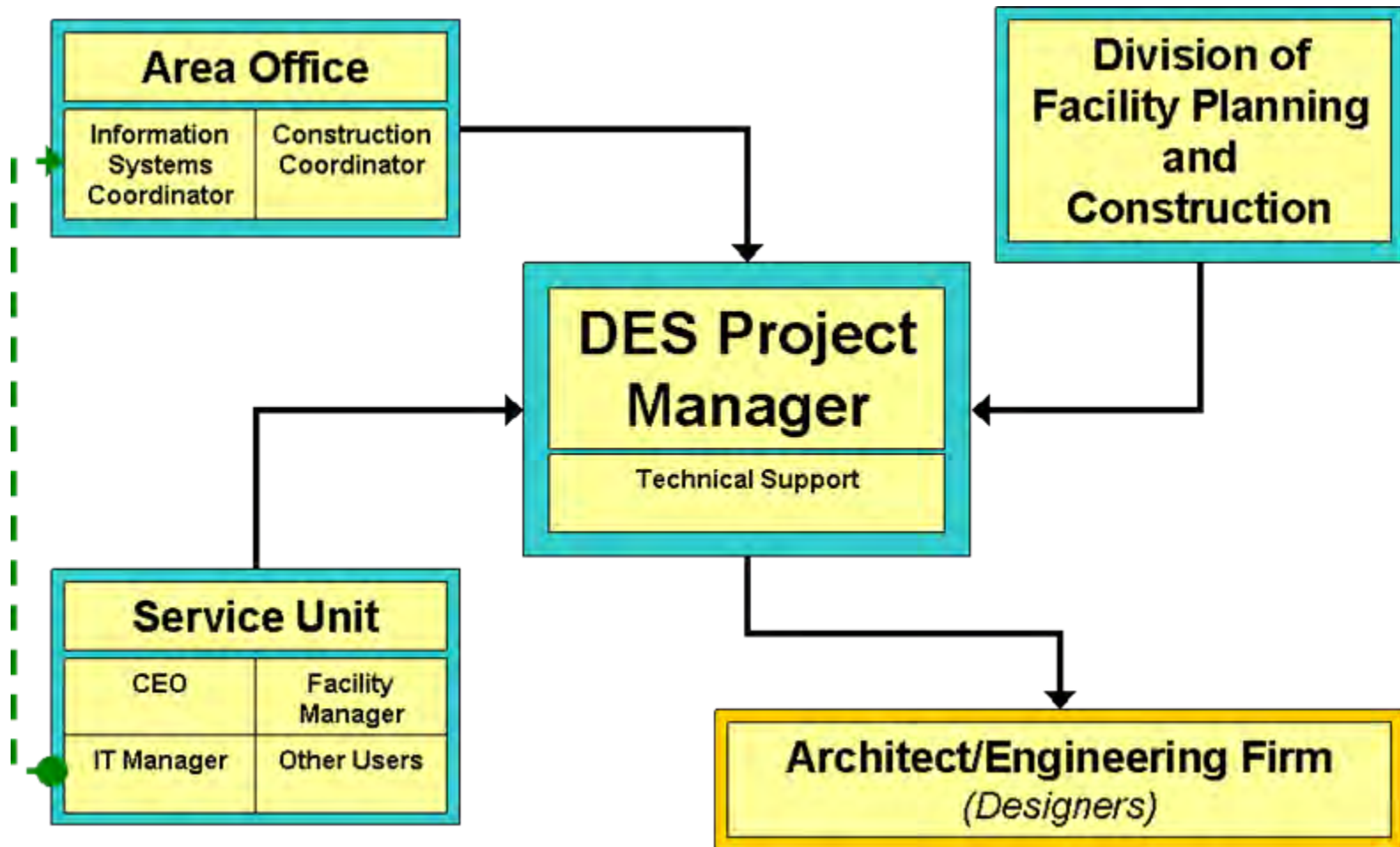
Provide an overview of issues to be considered and addressed during the design of IT and Server Rooms.

Topics

- Design Process
- Physical & Environmental Security
- Room Layout
- Heating Ventilation and Air Conditioning (HVAC)
- Power
- Fire Protection Systems

Design Process

(New Direct Federal Construction)



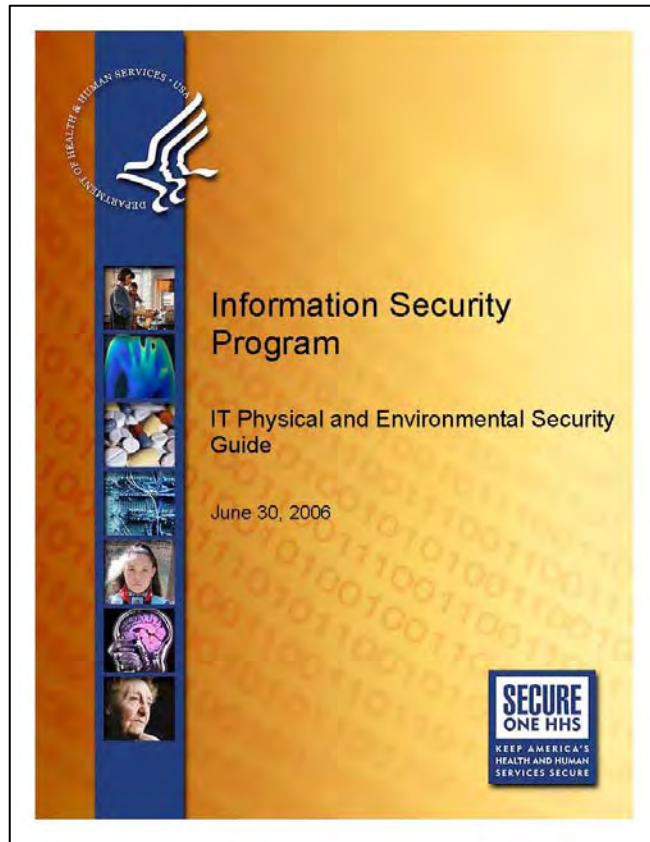
Physical & Environmental Security

HHS IRM Information Security Program Policy

December 15, 2004

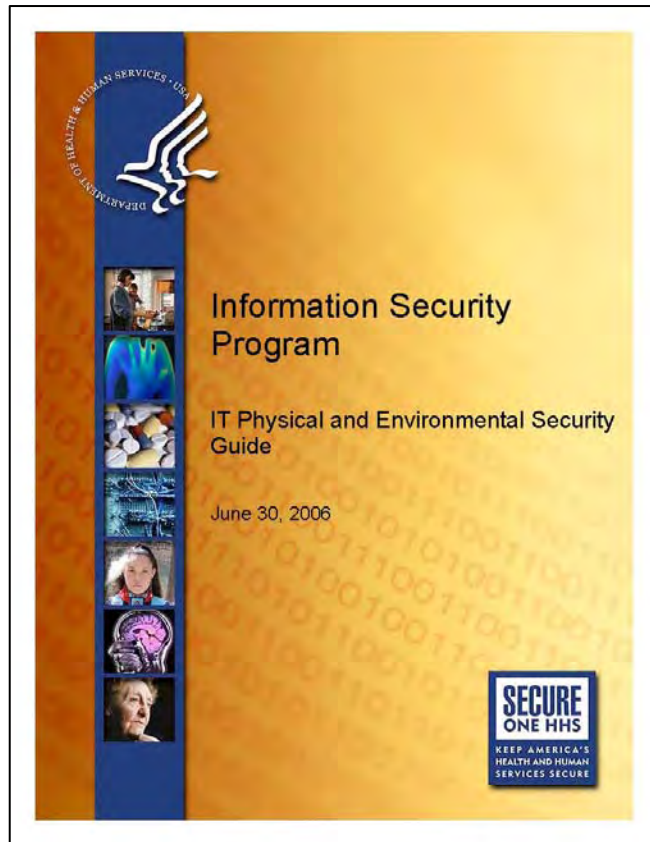
- Limit IT Room access to authorized personnel.
- Controls must be commensurate with the level of risk.
- Protect IT resources against possible loss, theft, destruction, accidental damage, hazardous conditions, fire, malicious actions, and natural disasters.
- Install and ensure operability of fire extinguishers, sprinkler systems, and detection devices.
- Install and ensure operability of HVAC and humidity controls.
- Meet federal and local building codes.

Physical & Environmental Security



HHS IT Physical and Environmental Security Guide

Physical & Environmental Security



Room Location

- Locate IT rooms away from exterior walls
- Minimal Signage

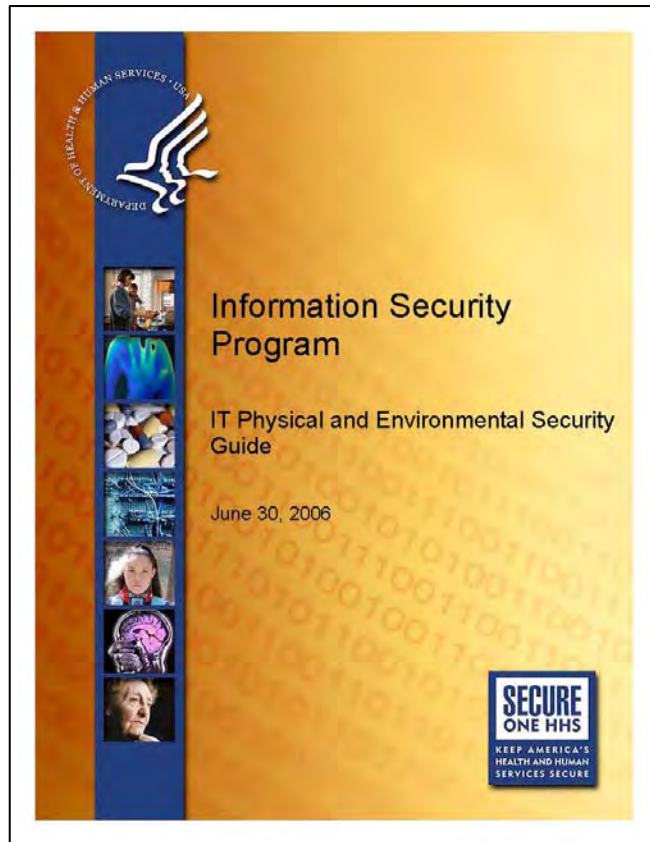
Room Enclosure

- Deck to deck walls
- No carpets (or static free)
- Plastic Sheeting

Access Control

- Key Cards

Physical & Environmental Security



Fire Suppression

- System Protection

Environmental Controls

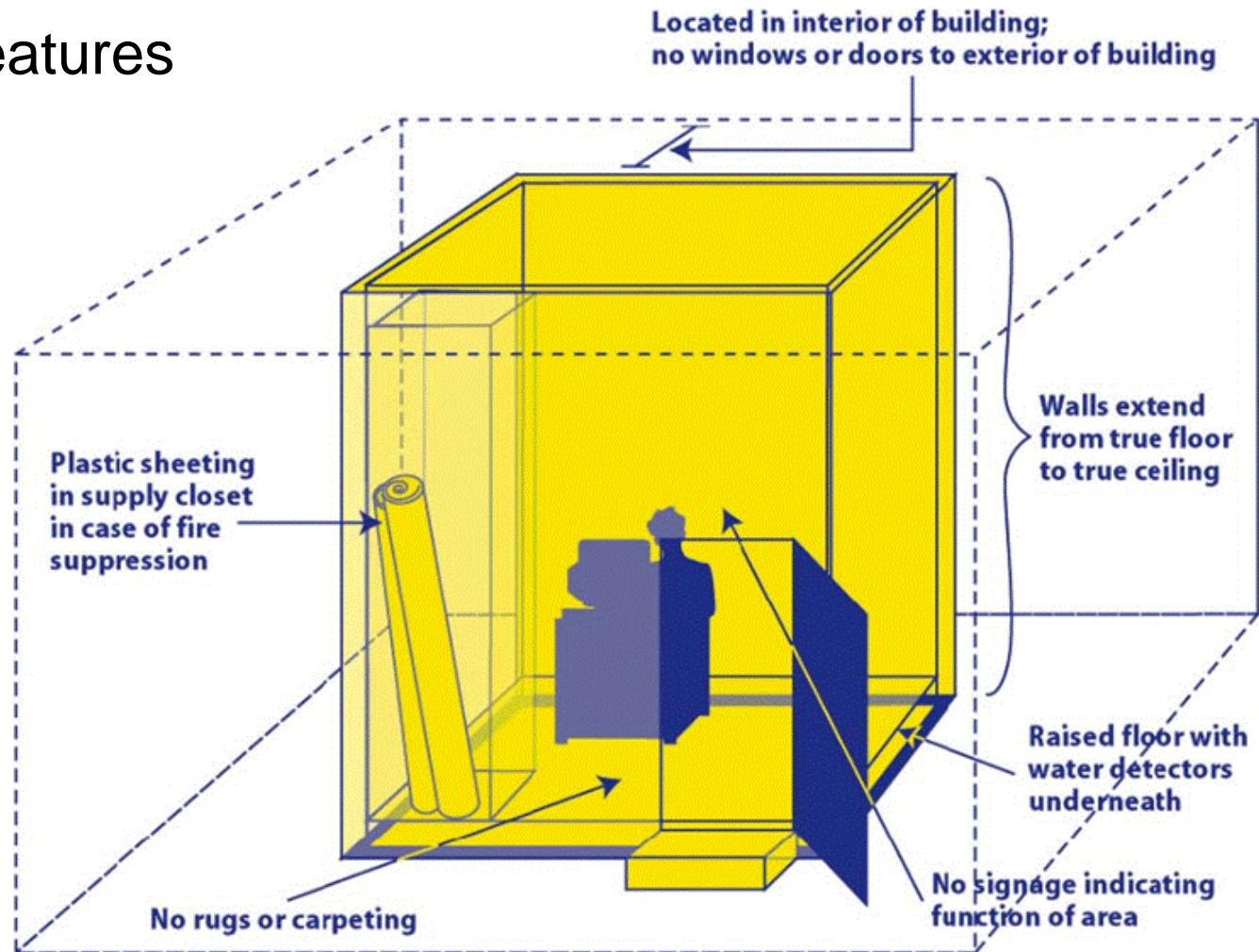
- HVAC
- Humidity

Power

- Uninterruptible Power Supply (UPS)
- includes surge protection
- Backup Access for Security Systems

Physical & Environmental Security

Room Features



Room Layout

- **Room Size** (programmed via HSP)
 - Health Systems Planning (HSP) software allows 12% of GSF for mechanical/electrical spaces.
 - Allow 35 SF per server rack.
- **Cable Management**
 - Single Vertical Drop
 - Punch Down Panel Location w 360° access.

Room Layout

- **Raised Floors vs. Overhead Cable Trays**
 - Raised floor requires accessible ramps (therefore more space)
 - RF require sprinkling beneath
 - More expensive (versus cable tray)
- **Racks**
 - Allow 36" access in front and in back
 - Quantity based upon requirements

HVAC

- **24/7 Operation**
(often independent from primary system)
- **Provision for condensate drainage**
- **Operating Temperature Range**
(per manufacturer's recommendation)
typically 68°-72°
- **Humidity Range**
(per manufacturer's recommendation)
typically 30-60% RH
- **Ventilation: ASHRAE 62.1 compliant**
(for human comfort)

HVAC

- Size Equipment appropriately for heat and cooling load
- Take future equipment expansion into consideration (but don't oversize unnecessarily)
- Thermostat Location

Power

- How much power is necessary?
 - Plan for 2,000 watts per rack
- Electrical Sub-Panel
 - Located in room
 - Sized based upon actual equipment load
 - Consider future equipment expansion

Power

- Uninterruptible Power Supply (UPS)
 - Integrated into building electrical system
 - Individual units
- Dedicated Circuits
 - For each server rack or stand alone server
- Dedicated Ground Run
 - For racks, cable trays, etc.

Fire Protection Systems

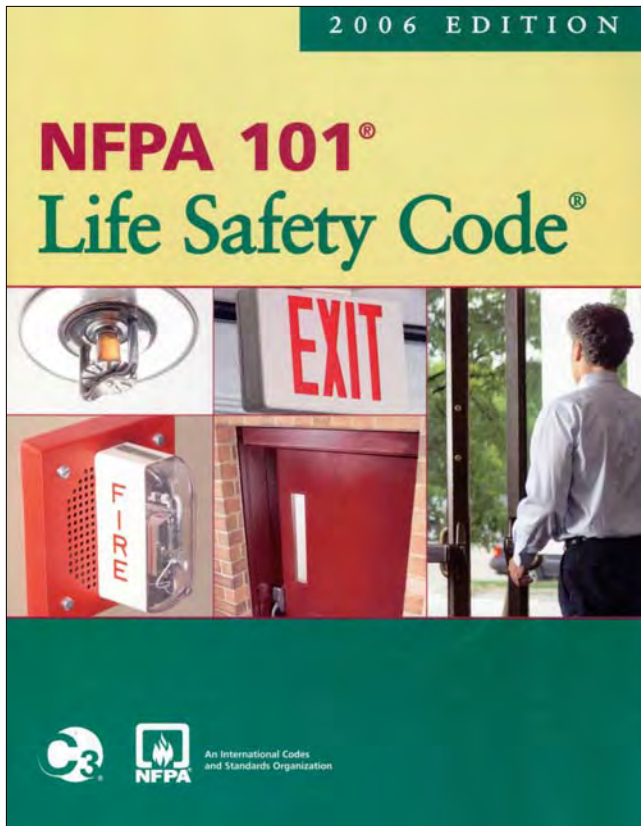


National Fire
Protection Association

Fire sprinklers are required by:

- NFPA 101 – Life Safety Code
- NFPA 13 – Standard for Installation of Sprinkler Systems
- NFPA 75 – Standard for the Protection of IT Equipment
- IHS Policy – OEHE Technical Handbook

Fire Sprinkler Systems



NFPA 101 Life Safety Code

Chapter 18 New Health Care Occupancies

Requires all New Health Care Occupancies to be protected throughout by an approved sprinkler system (see 18.3.5.1).

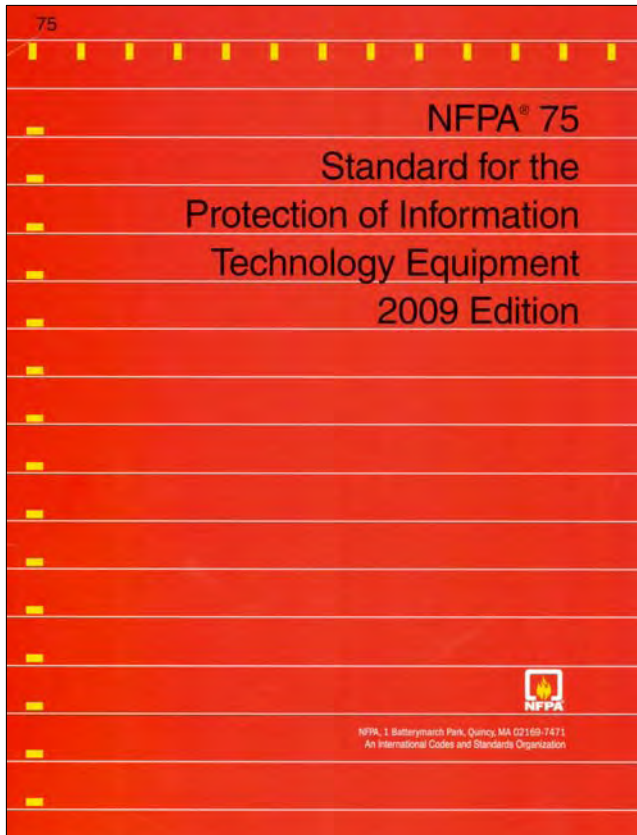
Chapter 38 New Business Occupancies

Sprinklers not required, but other requirements are relaxed when sprinklers provided.

Fire Sprinkler Systems

NFPA 75 - Protection of IT Equipment

- Requires that information technology equipment rooms and areas be housed in fully sprinklered buildings (see 5.1.1).
- Requires information technology equipment rooms and areas to be provided with sprinklers (see 8.1.1).

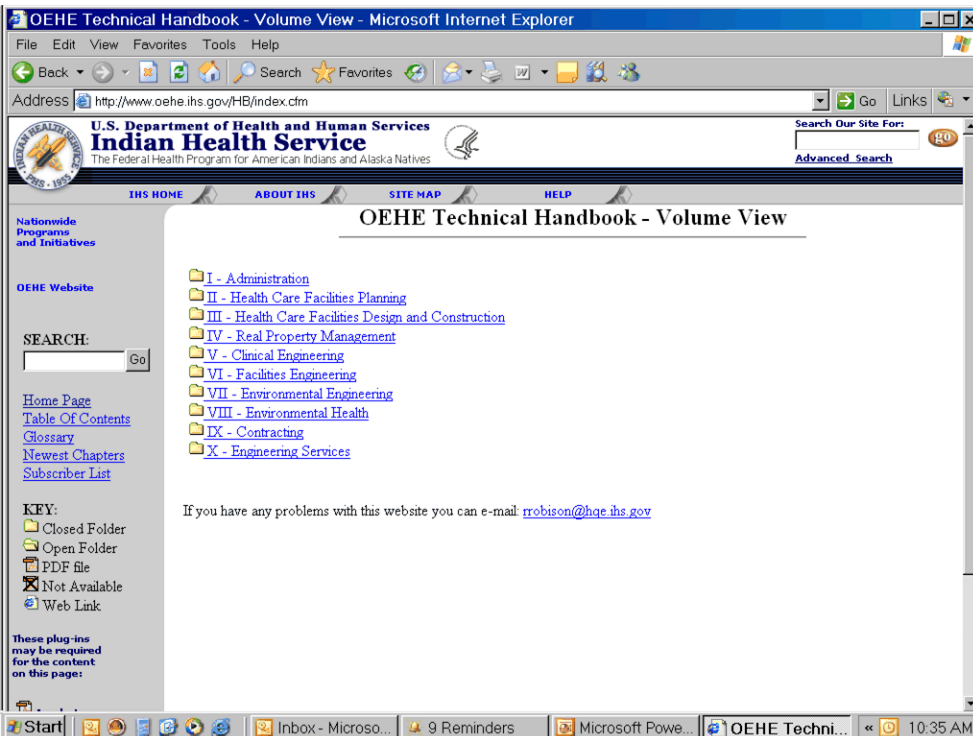


Fire Sprinkler Systems

IHS Policy

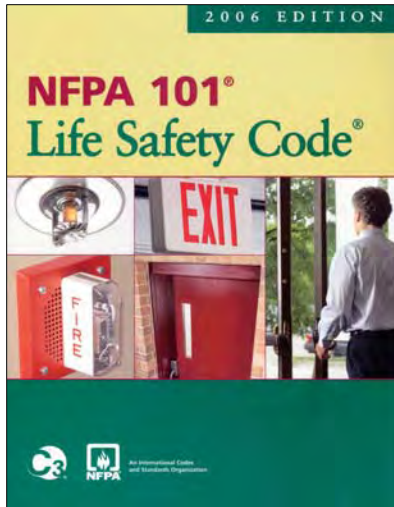
OEHE Technical Handbook Volume III – Chapter 24-11

- Requires all new health care **and** business occupancies **and** staff quarters to be fully sprinklered regardless of Code requirements.
- Requires all existing buildings to be fully sprinklered when practical (based upon availability of funding).



<http://www.oehe.ihs.gov/HB/index.cfm>

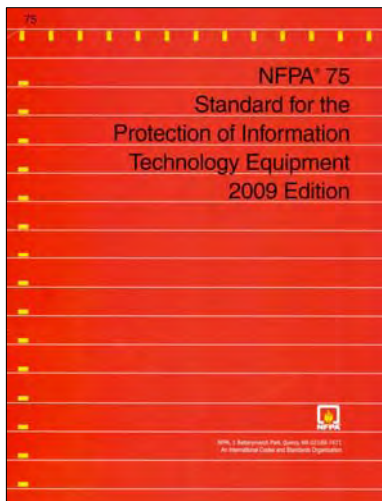
Fire Sprinkler Systems



NFPA 101 – Life Safety Code

9.7.1.1 Each automatic sprinkler system required by another section of this Code shall be in accordance with one of the following:

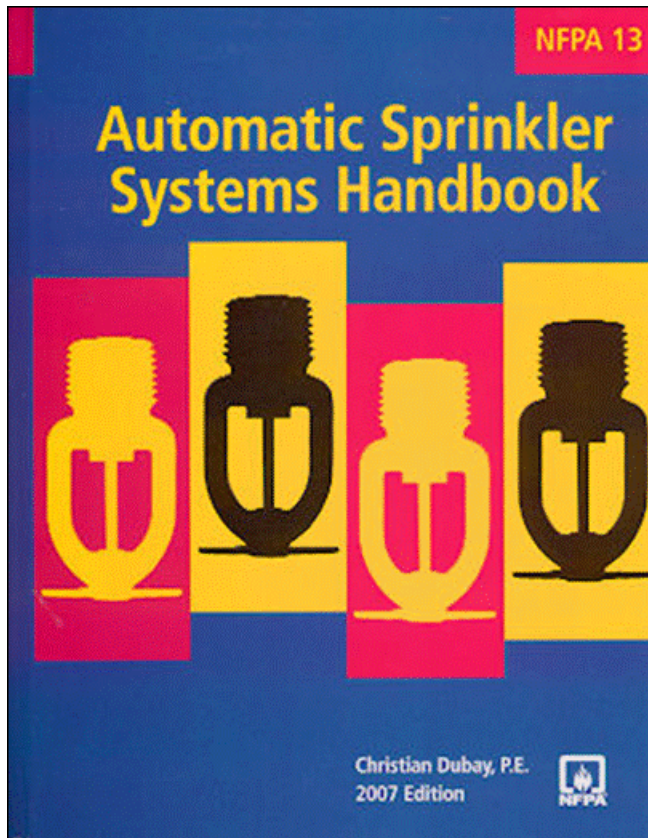
(1) NFPA 13, *Standard for the Installation of Sprinkler Systems*



NFPA 75 – Protection of IT Equipment

8.1.2 Automatic sprinkler systems protecting IT equipment rooms shall be installed in accordance with NFPA 13.

Fire Sprinkler Systems



NFPA 13 - Automatic Sprinkler Systems

- Defines different types of sprinkler systems (wet pipe, dry pipe, preaction, etc.)
- Provides installation requirements (location, spacing, etc.)
- Provides design criteria (water flow calculations, etc.)

Fire Sprinkler Systems

Concerns

- Wetted equipment after discharge during fire event
- Accidental discharge

Fire Sprinkler Systems

Concerns - Wetted Equipment

- Data backups
- Wet equipment can usually be dried out
- Alternative may be fire-damaged equipment



Fire Sprinkler Systems

Concerns - Accidental Discharge

- Very rare in sprinkler systems: 1 in 16 million
- Components tested for 5x max water pressure
- Installed systems tested at 200 psi for 2 hours
- Discharge requires temperatures of 135° to 170°

Fire Sprinkler Systems

Concerns - Accidental Discharge

- Most likely cause is inadvertently knocking the sprinkler head with another object such as a broom handle.

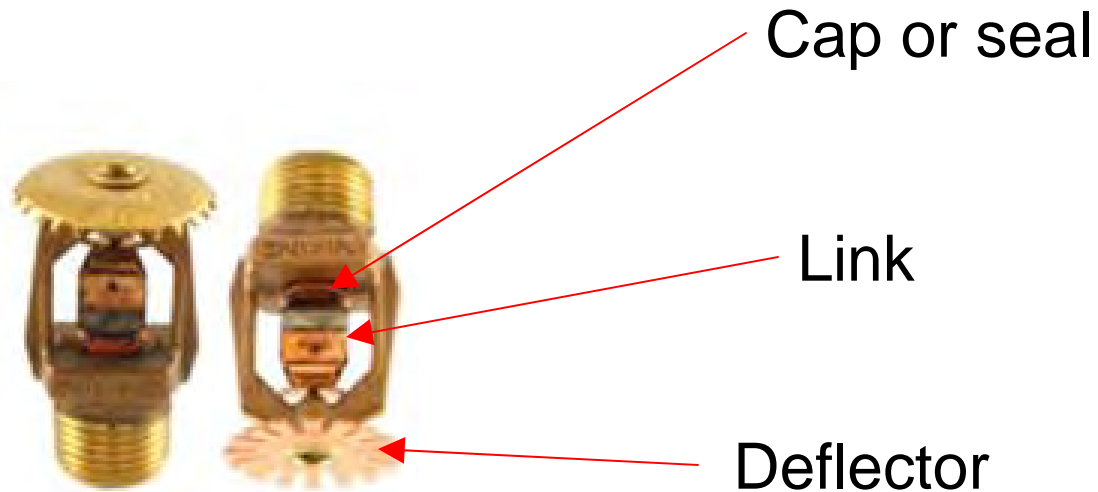
Fire Sprinkler Systems

Solutions for Accidental Discharge Concerns:

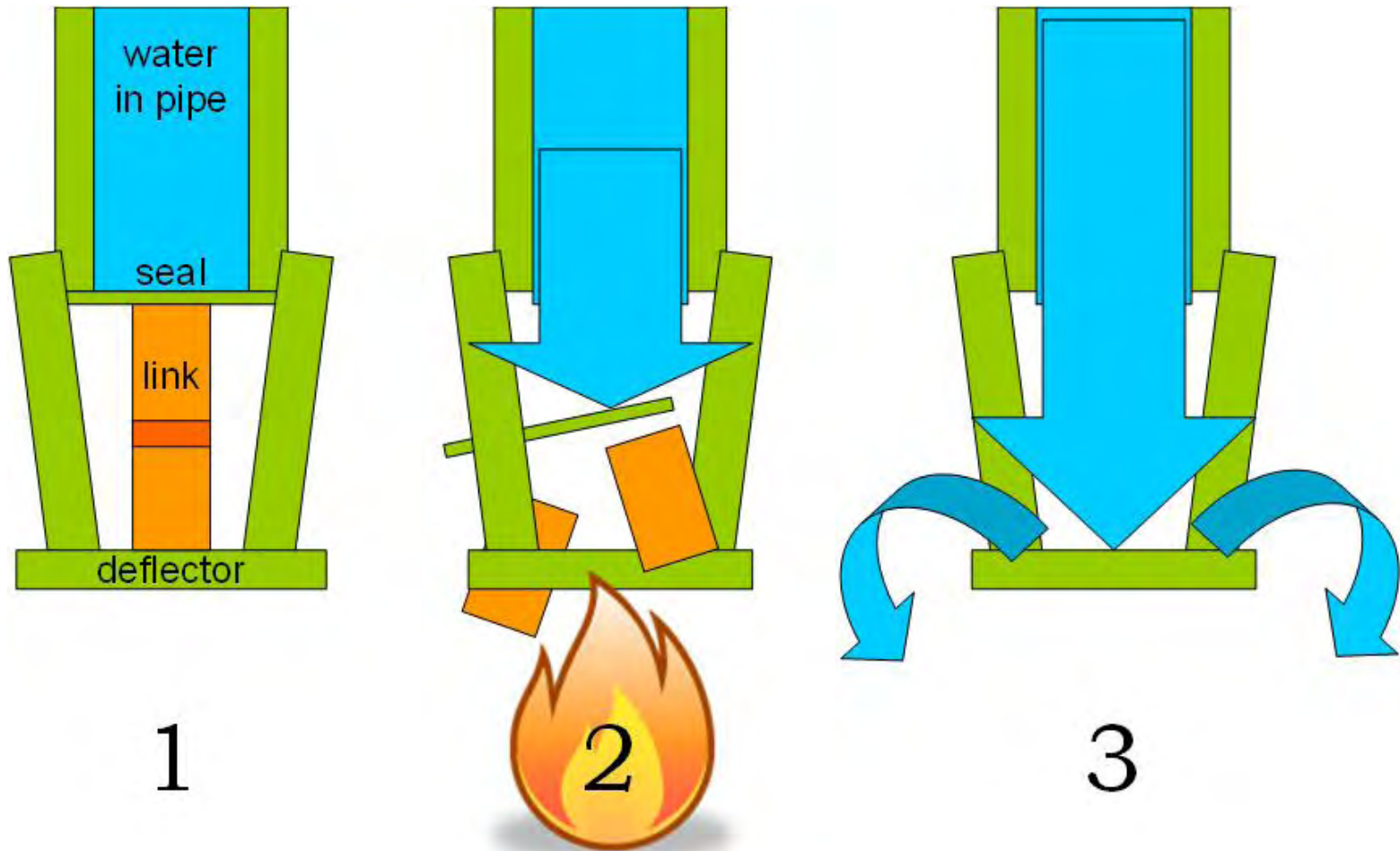
- Recessed heads vs. pendants
- Preaction System



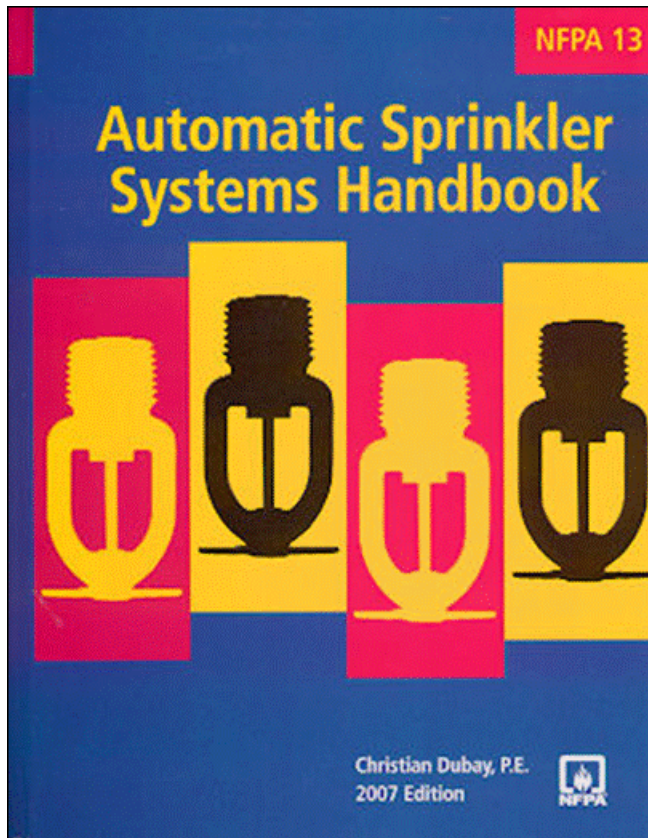
Sprinkler Head Anatomy



How a sprinkler head works



Preaction Sprinkler Systems



NFPA 13 - Automatic Sprinkler Systems

3.4.9 Preaction Sprinkler System. A sprinkler system employing automatic sprinklers that are attached to a piping system that contains air that might or might not be under pressure, with a supplemental detection system installed in the same areas as the sprinklers.

Preaction Sprinkler Systems Types

NFPA 13

7.3.2.1 Preaction systems shall be one of the following types:



(1) A **single interlock system**, which admits water to sprinkler piping upon operation of detection devices

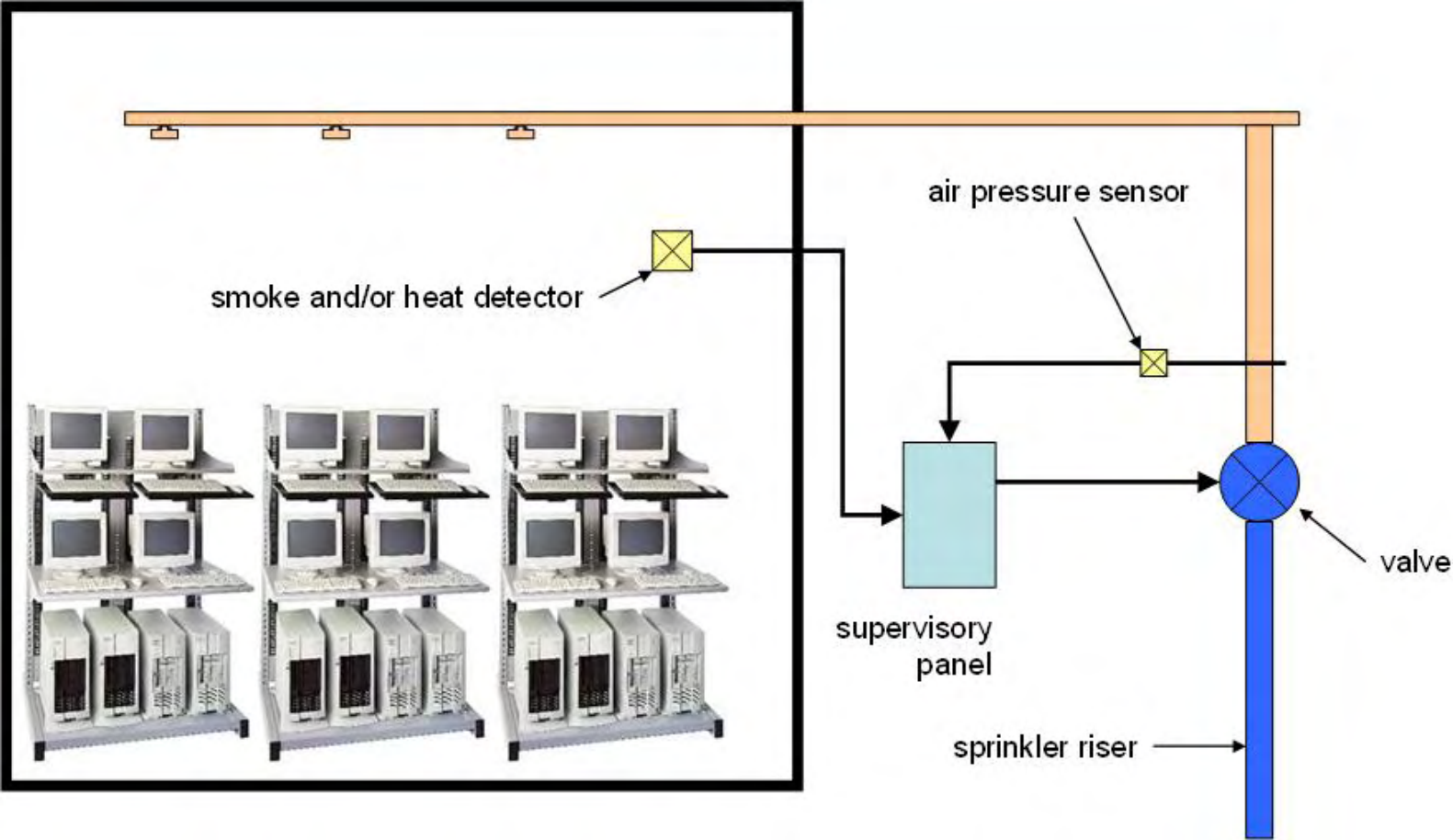


(2) A **non-interlock system**, which admits water to sprinkler piping upon operation of detection devices or automatic sprinklers



(3) A **double interlock system**, which admits water to sprinkler piping upon operation of both detection devices and automatic sprinklers

Double Interlock Preaction System



Summary

- Design Process
- Physical & Environmental Security
- Room Layout
- Heating Ventilation and Air Conditioning (HVAC)
- Power
- Fire Protection Systems

Questions / Discussion

Contact Information

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