

Smoke Control Code Requirements and Applications



Hardi Siwaily

What is a Smoke Control System?

2018 International Building Code, Section 909.1 defines a smoke control system as:

- A system designed to provide a tenable environment for the evacuation or relocation of occupants.
- 909.16.1 - Fans within the building shall be shown on the FSCS panel. A clear indication of the direction of airflow and the relationship of components shall be graphically displayed
- It is not intended for the preservation of contents, the timely restoration of operations or for assistance in fire suppression or overhaul activities.

Codes and Standards Governing Smoke Control Systems

- 2018 IBC Section 909 Smoke Control Systems
- NFPA-92, Standard on Smoke Control Systems
- NFPA-92A, Standard for Smoke-Control Systems- Utilizing Barriers and Pressure Differences.
- Underwriters laboratories, UUKL, Fire Fighters' Smoke Control Station- Includes requirements of ANSI/UL 864 Control Units for Fire-Protective Signaling Systems.

Smoke Control System Required

Covered mall buildings with an atrium connecting 3 or more stories (IBC, Section 402.7.2)



Smoke Control System Required

High-rise buildings 75 feet and higher (IBC, Section 403.4.7)



Smoke Control System Required

Atriums (IBC, Section 404.5)



Smoke Control System Required

Underground buildings having a floor level more than 30 feet below ground (IBC, Section 405.5)



Smoke Control System Required

Group I-3 buildings - Detention Facilities (IBC, Section 408.9)



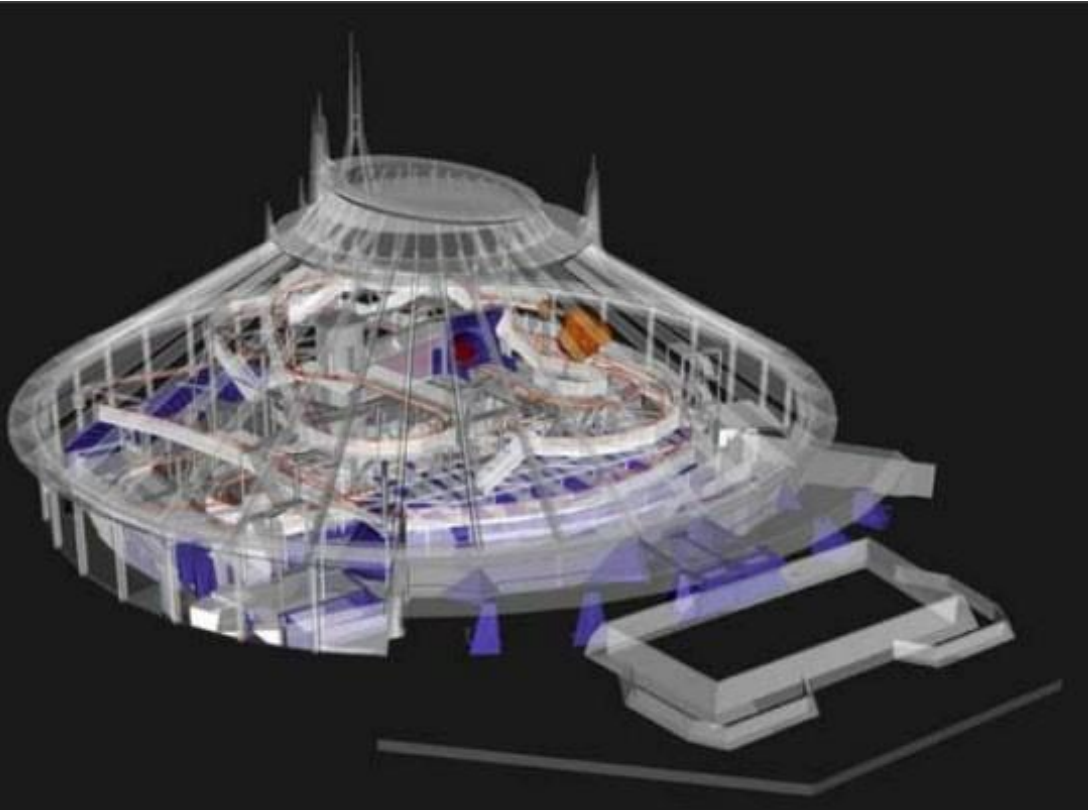
Smoke Control System Required

Stages larger than 1,000 square feet or greater than 50 feet high (IBC, Section 410.2.7.2)



Smoke Control System Required

Special amusement buildings with an occupant load of 50 or more (IBC, Section 411.1)



Smoke Control System Design

Rational Analysis (IBC, Section 909.4.1 through 909.4.7)

- Smoke control system design starts with the rational analysis
 - Types of systems to be employed
 - Methods of Operation
 - Supporting Systems
 - Method of Construction
- Prepared by a Fire Protection Engineer
- Design considerations include:
 - Stack effect
 - Temperature effect of fire
 - Wind effect
 - HVAC systems
 - Climate
 - Duration of operation
 - Smoke control system interaction

Methods of Operation – Passive

IBC, Section 909.5 - Walls and Floors Constructed as Smoke Barrier

Openings required to be protected with automatic closing devices, such as fire dampers and doors:

Fire Doors



Smoke and Fire Dampers



Methods of Operation – Mechanical

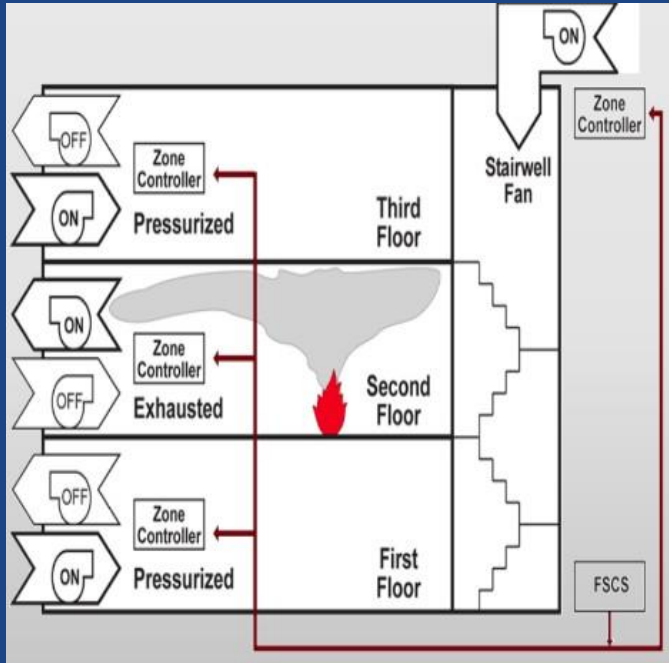
Smoke Control Definitions

- Pressurization (IBC, Section 909.6)
 - Stairwell and Shaft Pressurization
- Airflow (IBC, Section 909.7)
 - Zoned Smoke Control Systems
- Exhaust (IBC, Section 909.8)
 - Smoke Purge / Exhaust / Evacuation

Methods of Operation

IBC, Section 909.6 - Pressurization IBC

– Mechanical



- Primary mechanical means of controlling smoke across smoke barriers.
- Minimum pressure difference across smoke barriers = 0.05 inch water gage
- Maximum fire door opening force = 30 pounds to start, 15 pounds to open
- Has to meet NFPA 92 requirements

Thank you for joining today.



Hardi Siwaily

hardi.m.rasul@su.edu.krd