

NATIONAL BUILDING CODE 2016 (PART 4)

National Building Code NBC Fire and Life Safety Requirements

A Comprehensive Overview of Fire Prevention, Life Safety Systems, and Structural Fire
Protection Standards

| 1. Occupancy Classification (Groups A-J)



Residential & Assembly

Group A: Residential (Dwellings, Hotels, Dormitories).

Group D: Assembly (Theatres, Auditoriums, Monuments).



Educational & Medical

Group B: Educational (Schools, Daycare).

Group C: Institutional (Hospitals, Custodial Care Facilities).



Commercial & Business

Group E: Business Offices.

Group F: Mercantile (Shops, Malls, Supermarkets).



Industrial & Storage

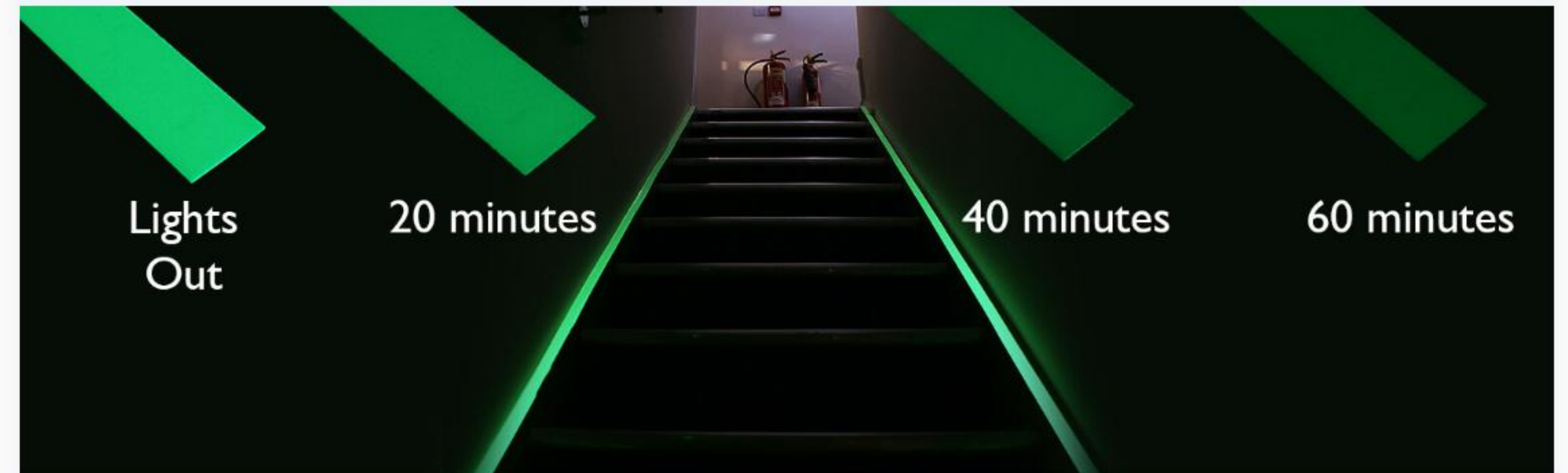
Group G: Industrial.

Group H: Storage Facilities.

Group J: High Hazard Buildings.

| 2. Means of Egress & Exit Design

- ➡ **Maximum Travel Distance:** 22.5 m to 30 m for high-hazard/assembly; up to 45 m for sprinklered residential/business.
- 🪜 **Staircase Width:** Minimum 2.0 m for hospitals, 1.5 m for assembly, and 1.25 m for residential buildings.
- 🚪 **Pressurized Stairwells:** Required for buildings above 15 m height with positive pressure of 25-30 Pa.
- 🛡️ **Unobstructed Path:** All exits must lead directly to an exterior open space with panic hardware on doors.



3. Structural Fire Resistance

Fire Compartmentation

NBC mandates division of large floor spaces into distinct fire compartments using fire-resisting walls and floors (1 to 4-hour rating) to restrict flame spread.

Max floor compartment area is restricted based on occupancy type and whether automatic sprinklers are installed.

Fire Doors & Fire Stops

Fire Doors: Self-closing doors with minimum 120-minute (2-hour) fire rating for staircases and service shafts.

Fire Stops: Intumescent seals in concealed spaces, false ceilings, and pipe/cable penetrations to block toxic smoke flues.

| 4. Fire Detection & Alarm Systems

-  **Automatic Detection:** Optical smoke detectors and rate-of-rise heat detectors installed across all habitable areas.
-  **Manual Call Points (MCP):** Located near stairwell exits and escape routes within 30 m walking distance.
-  **Public Address (PA) System:** Integrated voice alarm system for multi-zone emergency evacuation announcements.
-  **Fire Command Centre (FCC):** Dedicated control room at ground level for high-rise buildings (>15 m).



| 5. Fire Suppression

Automatic Sprinklers: Mandatory for all basements exceeding 200 m² and high-rise structures above 15 m height.

Wet Riser & Downcomer: Vertical pipe networks connected to landing valves on every floor for fire brigade intervention.

Specialized Systems: Gas-based suppression (FM-200/Novec 1230) for server rooms and electrical sub-stations.



6. Smoke Control & Ventilation



12 Air Changes/Hour

Smoke exhaust systems in basements, corridors, and enclosed spaces must maintain minimum capacity of 12 air changes per hour (ACH).



Staircase Pressurization

Staircases and lift lobbies are pressurized to prevent smoke ingress, maintaining air pressure difference of 25 to 30 Pascals.



Fire Dampers

Automatic motorized fire dampers with thermal fuses shut off air ducts at wall penetrations to prevent fire propagation.

| 7. Refuge Area & High-Rise Safety



First Refuge Floor: Mandatory at 24 m height in tall buildings (>24 m) for safe temporary shelter.



Subsequent Refuge: Provided at every 15 m height above the first refuge level.



Dedicated Fire Lift: Minimum 8-passenger capacity with fire-resistant cables and direct ground exit.

Helipad Provision: Recommended on rooftops of commercial buildings taller than 60 m.



| 8. Water Storage & Fire Pumps

2,280

LPM Main Pump Capacity



Underground Tank: 100,000 L to 200,000 L dedicated exclusively for fire fighting storage.



Standby Diesel Pump: Identical capacity (2280 LPM) diesel pump backing up the primary electric pump.



Jockey Pump: 180 LPM jockey pump maintaining baseline system pressure (7 kg/cm²).



Terrace Tank: 10,000 L to 20,000 L overhead tank feeding downcomer systems.

| 9. Electrical Safety & Power Backup

-  **Fire-Resistant Cables:** Zero-halogen fire survival cables (2-hour rating) for emergency pumps, lifts, and alarm systems.
-  **Emergency Generator (DG):** Auto-start standby generator supplying power within 15 seconds of main grid failure.
-  **Emergency Exit Signage:** Illuminated escape routes and exit signs powered by battery backup (min 90 mins).
-  **Electrical Shaft Sealing:** Vertical electrical ducts sealed at every floor slab using concrete/fire-stop barriers.

NBC 2016 Fire Safety Matrix

Building Height	Occupancy Type	Fire System Required	Refuge Area	Fire Pump Set
Below 15 m	Residential / Small Business	Extinguishers, Hose Reels	Not Required	Terrace Pump (450 LPM)
15 m - 24 m	Commercial / Mixed Use	Wet Riser, MCP Alarm, Sprinklers	Not Required	1620 LPM Electric + Diesel
24 m - 45 m	High-Rise Residential/Office	Auto Sprinklers, FCC, PA System	At 24m & every 15m	2280 LPM + Standby Diesel
Above 45 m	Institutional / Assembly / Hotel	Full Automation, Pressurization	At 24m & every 15m	Multiple 2280 LPM Pumps

Questions & Discussion

National Building Code (NBC 2016) Part 4 Compliance Overview

 Fire & Life Safety Engineering Standards

| Image Sources



<https://www.heskins.com/wp-content/uploads/2025/04/H8152-vs-H8154-on-Stairs-in-Lights-Out-Situation.jpg>

Source: www.heskins.com



<https://image.made-in-china.com/202f0j00YRuUjLfyaKcV/Center-Building-Safety-Management-Linkage-Fire-Alarm-Control-System.webp>

Source: m.made-in-china.com



<https://tiimg.tistatic.com/fp/1/007/154/fire-sprinkler-system-955.jpg>

Source: www.tradeindia.com



https://images.adsttc.com/media/images/654a/be0e/08e4/440e/9328/d101/medium_jpg/shelter-stay-taa-design_2.jpg?1699397200

Source: www.archdaily.com