

PRESENTATION OF FIRE SAFETY IN TALL RISE BUILDINGS



FIRE ACCIDENT – THE COST

- ❑ LOSS OF LIFE
- ❑ DAMAGE TO PROPERTY
- ❑ LOSS OF BUSINESS
- ❑ LOSS OF GOODWILL
- ❑ ENVIRONMENT POLLUTION

FIRE

- ❖ About 15,000 calls per year
- ❖ On an average 300 deaths per year
- ❖ Huge property losses
- ❖ About 69% fires are caused by electricity

ALL THIS CAN BE REDUCED

Fire in Highrise Building in Delhi

Year	Number of cases	Year	Number of cases
1984-85	124	1993-94	173
1985-86	130	1994-95	113
1986-87	109	1995-96	72
1987-88	153	1996-97	75
1988-89	161	1997-98	87
1989-90	158	1998-99	87
1990-91	138	1999-2000	66
1991-92	150	2000-2001	71
1992-93	128	2001-2002	63

FIRE FIGHTING AND FIRE SAFETY

THE OBJECTIVE

- ✓ **LIFE SAFETY**
- ✓ **PROPERTY PROTECTION**

LIFE SAFETY

- Designing structures to withstand fire conditions.
- Raising Alarm
- Smoke Management
- Adequate means of escape
- Protection of escape routes.

HIGH RISE BUILDING

- Building above 15m Height (N.B.C.)
- Building above 22m Height (T.A.C.)
- Building above 24m Height (B.M.A.)

A High-rise Building is one in which Emergency Evacuation is not practical and in which fires must be fought internally because of height.

PROBLEMS IN HIGHRISE BUILDINGS

- ❖ 3-D spreading of fire
- ❖ Violation of fire safety norms
- ❖ Delayed access to seat of fire
- ❖ Total Evacuation
- ❖ Limitation of the fire fighting equipment
- ❖ Limitations posed by the fire fighters
- ❖ People's behavior

SPREAD OF FIRE

- ❖ Compartment to compartment
- ❖ Floor to floor
- ❖ Unsealed service shafts
- ❖ Ceiling voids
- ❖ A.C. Ducts
- ❖ Failure of door/windows

FIRE RISK MANAGEMENT

- ❖ Unfortunately in Today's context Fire Risk Management is an after thought and hence the success is partial.
- ❖ To have nearly complete success the process of Fire Risk Management must begin right from the conceptual stage.

SMOKE MANAGEMENT

- ❑ SELECTION OF MATERIALS
- ❑ SMOKE VENTING
- ❑ SMOKE BARRIERS
- ❑ SMOKE EXTRACTION SYSTEM
- ❑ POSITIVE PRESSURE VENTING

ACCIDENT PREVENTION

- ❑ Safety Audits
- ❑ Routine Safety Inspection
- ❑ Safe Working Practices
- ❑ Performance Assessment
- ❑ Interaction
- ❑ Education and Training
- ❑ Following Safety Standards.

An Overview of National Building Code of India

- What is this Code all about?
- Construction - In all Sectors of Development.
- Planning Commission - A need felt for in-depth Study, Reason & its Justification.
- Linkage- Latest Technology V/S Outdated Byelaws
- Resulted in the Evolution of NBC.
- Formation of Guiding Committee in 1967 & its Outcome

Applicability of the Code

To Service as model for adoption by

- ❑ Public works department, other government construction departments and other construction agencies.
- ❑ To be adopted by State Government / local bodies

NBC

- Birth of NBC 1970
- First Revision of NBC 1983
(after 13 years)
- Second Revision of NBC-IV 1997
(after 14 years)
- 3rd Revision of NBC 2005
(after 22 years)

Sub panels constituted for revision of NBC of India

Administration, Development Control Rules and General Building Requirements	CED46:P1
Fire Protection	CED 46:P2
Building Materials	CED 46:P3
Loads, Forces and Effects	CED 46:P4
Soils and Foundations	CED 46:P5
Timber	CED 46:P6
Masonry	CED 46:P7
Plain, Reinforced and Prestressed concrete	CED 46:P8
Steel	CED 46:P9
Prefabrication and Systems Buildings	CED 46:P10
Constructional Practices and Safety	CED 46:P11

Sub panel constituted for revision of NBC of India....2

Lighting & Ventilation	CED 46:P12
Electrical Installations	CED 46:P13
Air Conditioning and Heating	CED 46:P14
Acoustics, Sound Insulation and Noise Control	CED 46:P15
Installation of Lifts and Escalators	CED 46:P16
Plumbing Services	CED 46:P17
Landscaping, Signs and Outdoor Display Structures	CED 46:P18

Revision in Code

- Purpose
- To make the Same as Living Document
- Salient Features of the Amendment
- 20 Year's of Experience resulted in-
State-of-the-art, modern and contemporary
features of development.

Classification of Buildings

- Group A Residential
- Group B Educational
- Group C Institutional
- Group D Assembly
- Group E Business
- Group F Mercantile
- Group G Industrial
- Group H Storage
- Group J Hazardous

PART 4 FIRE AND LIFE SAFETY

- Deals with Safety from Fire.
- Exits in Building V/S Importance of Life Safety.
- Involvement of Qualified & Trained Fire Protection Engineers from the very beginning.
- Standards Laid Down to provide safety from fire.
- Potential Panic Hazard - measures to minimize Panic hence control on accidents.
- Flexibility V/S Rigidity.
- Limitation of Height and areas of Building for Occupants Safety.
- Phasing out of Ozone Depleting Substance- Under Country Program.
- New standards have been already developed and put in place for Halon alternative clean agents.

Some Major Changes in 2005 Edition

- **Coverage of Starred Hotels – Under New Sub Division (Group A)**
- **Heritage Structures, Archeological monument - (Group D)**
- **Underground/Elevated railways - (Group D)**
- **TV Stations covered under- (Group E)**
- **Minimum Capacity of Smoke Extraction System Equipment revised**
- **Increase in Width for exits from 1.5 mts to 2 mts.**
- **Cognizance to the HALON Phase Out Program.**
- **Requirements for Fire Fighting Installation made Comprehensive**

ABSOLUTE SAFETY FROM FIRE IS NOT ATTAINABLE IN PRACTICE

- The objective of this part is to specify measures that will provide that degree of safety from fire which can be reasonably achieved.
- The Code endeavours to avoid requirements that might involve unreasonable hardships or unnecessary inconvenience or interference with normal use and occupancy of buildings, insist upon compliance with minimum standards for fire safety necessary in public interest.
- It is desirable to use such equipments/installation duly certified under the BIS Certifications Marks Scheme.

FIRE PREVENTION

- Classification of Buildings (9)
- Fire Zones (3)
- Types of Construction (4)
- Requirements common to all Occupancies
 - Heating/Smoke venting
 - Surface and Interior Finish
 - Glazing/Casement/Skylights/Louvers
 - Passive systems

Life Safety

General Exit requirements	Internal Staircases
Occupants Load	External Staircases
Capacities of Exit	Pressurization of escape routes
Arrangement of Exits	Ramps
Number of Exits	Refuge Area
Doorways	Fire lifts/Fire tower
Corridors/Passage ways	Emergency Escape lighting/ Illumination
Horizontal Exits	Fire detection & Warning

FIRE PROTECTION (Components)

Extinguishers	Manual Fire Alarm System
Small Bore Hose Reels	Automatic Fire Alarm System
Dry Riser	Underground Storage Tank
Wet Riser	Terrace Tank
Down Comer	Ground Level Pumps
Yard Hydrant System	Terrace Level Pumps
Automatic Sprinkler Installation	

PASSIVE SYSTEMS

- Openings in Separating walls and Floors
(for all types of construction)
- Fire Stops/Enclosure of Openings
- Air-conditioning/Ventilation (dampers)
- Surface of Flame Spread definitions
- Glazing/Skylights (Wired Glass)

Internal Staircases (Min. Width)

Residential buildings (dwellings)	1.0 m
Residential hotel buildings	1.5 m
Assembly buildings like auditorium, theatres and cinemas	2.0 m
Educational buildings up to 30 m in height	1.5 m
Institutional buildings like hospitals	2.0 m
All other buildings	1.5 m

Table 22 TRAVEL DISTANCE FOR OCCUPANCY AND TYPE OF CONSTRUCTION (Clause 4.4.1, 4.5.1 and 4.5.2)

S.No.	Group of Occupancy	Maximum Travel Distance	
		Construction Type 1&2	Construction Type 3&4
1	Residential (A)	30.0	22.5
2	Educational (B)	30.0	22.5
3	Institutional (C)	30.0	22.5
4	Assembly (D)	30.0	30.0
5	Business (E)	30.0	30.0
6	Mercantile (F)	30.0	30.0
7	Industrial (G)	45.0	22.5
8	Storage (H)	30.0	22.5
9	Hazardous (J)	22.5	22.5

Table 22 – Travel distance Contd....

Note:

1. For fully sprinklered building the travel distance may be increased by 50 percent of the values specified.
2. Ramps shall be protected with automatic sprinkler system and shall be counted as one of the means of escape.
3. Construction of type 3 or 4 is not permitted.

TO CONCLUDE -- Why NBC shall be a dynamic Document ?

Every fire is investigated by different fraternities like

- Fire Authorities
 - Police Authorities
 - Loss Prevention Authorities
 - Insurance Authorities etc..
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- And each one of them look at the fire from different angles.
 - Every fire leaves a signature behind, leaves a trail, leaves a tell tale evidence of what happened.
 - The authorities shall strive to update the respective documents from the experience obtained from the fire behavior in each occurrence.

Let me explain certain instances in the next slide

Past Experience put into the Code

Upahar Cinema Fire :- Resulted in Exclusion of Oil filled electrical equipment in the Basement

Dabwali Fire :- Provided inputs with respect to Exit difficulties and Passive provisions (Meerut fire which took place subsequent to the NBC 2005 is also an eye opener in this regard)

Underground shopping complex fires in Mumbai and Bangalore :- Derived useful inputs with regard to fire separations (For every 750M² area, Blank wall to be provided OR for Every 40M linear length if the it is a long building)

IGI Airport fire :- How dangerous buildings are when huge concealed spaces are left unattended or not protected by detectors. Some useful provisions have been made in NBC for this purpose. (and so on

IN CASE **NBC** IS NOT

FOLLOWED

CONSEQUENCES CAN BE :-



17 15:08









NBC

- All sectional committees of NBC kept alive every five years, revision has been proposed.
- Part-IV – Concerned committee has already met once for revision of some of the sections.
- The Chairman of the NBC will meet all sectional heads on 20th November, 2009 for taking up some amendment which are required in the NBC.

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AND

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THANK YOU