RJ Bartlett Engineering Ltd

FIRE PROTECTION IS OUR BUSINESS

National Building Code of Canada

Part 3 - Fire Protection & Occupant Safety

Changes to the 2015 NBC

November 30, 2021

AGENDA

- Introductions
- Changes to 2015 NBC
- Sneak Peek at 2020
- Questions/Comments

AGENDA

- General evolution / mechanics
- Midrise combustible
- Foamed plastics
- Smoke dampers & air leakage
- Self-storage buildings
- Fire performance (Appendix D)
- Exit capacities and distance between exits
- Electromagnetic locking hardware
- Harmonizing stairs, ramps, handrails and guards

RJ Bartlett Engineering Ltd

Established 1987

Fredericton & Halifax

- Fire Protection Engineering
- Building & Fire Code Consulting
- Fire Safety Planning
- Forensic Investigations

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Ben Coles, M.Sc.E., MBA, P.Eng., PE

Project Coordinator

- Fire Protection Engineering
- Building & Fire Code Consulting
- 18 Years Experience

B.Sc. Mechanical Engineering (UNB 2003)
M.Sc. Fire Protection Engineering (WPI 2009)
MBA in Engineering Management (UNB 2011)

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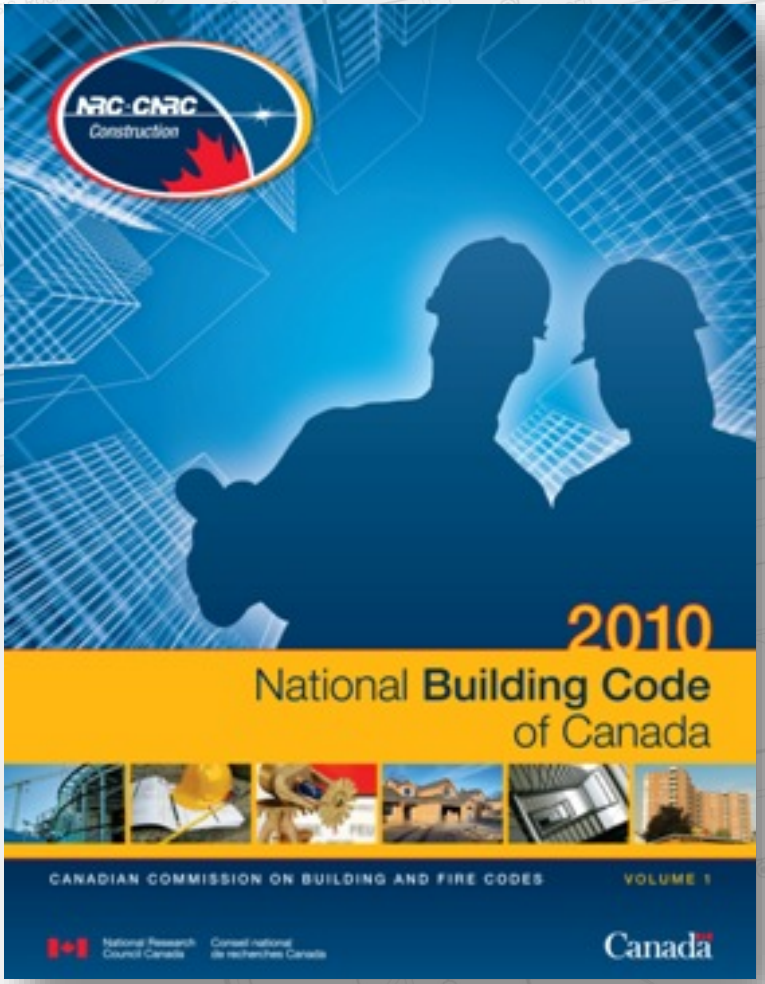
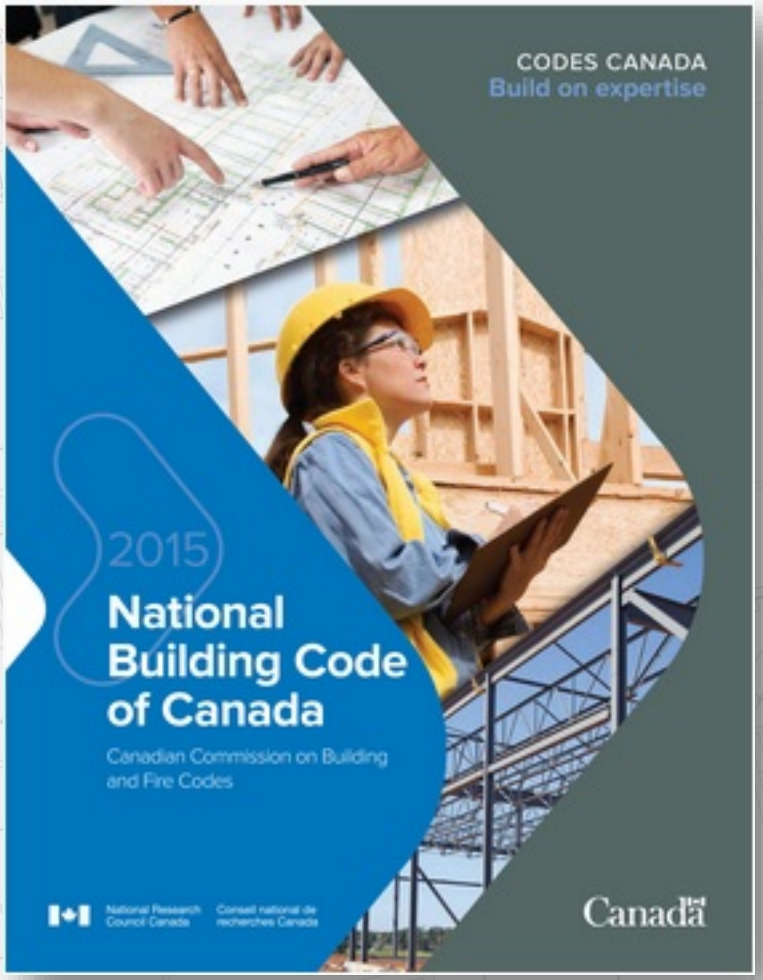
Steven Forrester, P.Eng.

- Fire Protection Engineering
- Building and Fire Code Consulting
- 7 Years Experience
- Licensed in NB

Degree in Mechanical Engineering Technology (NSCC ‘09)
B.Sc. Mechanical Engineering (UNB ‘14)

General Background





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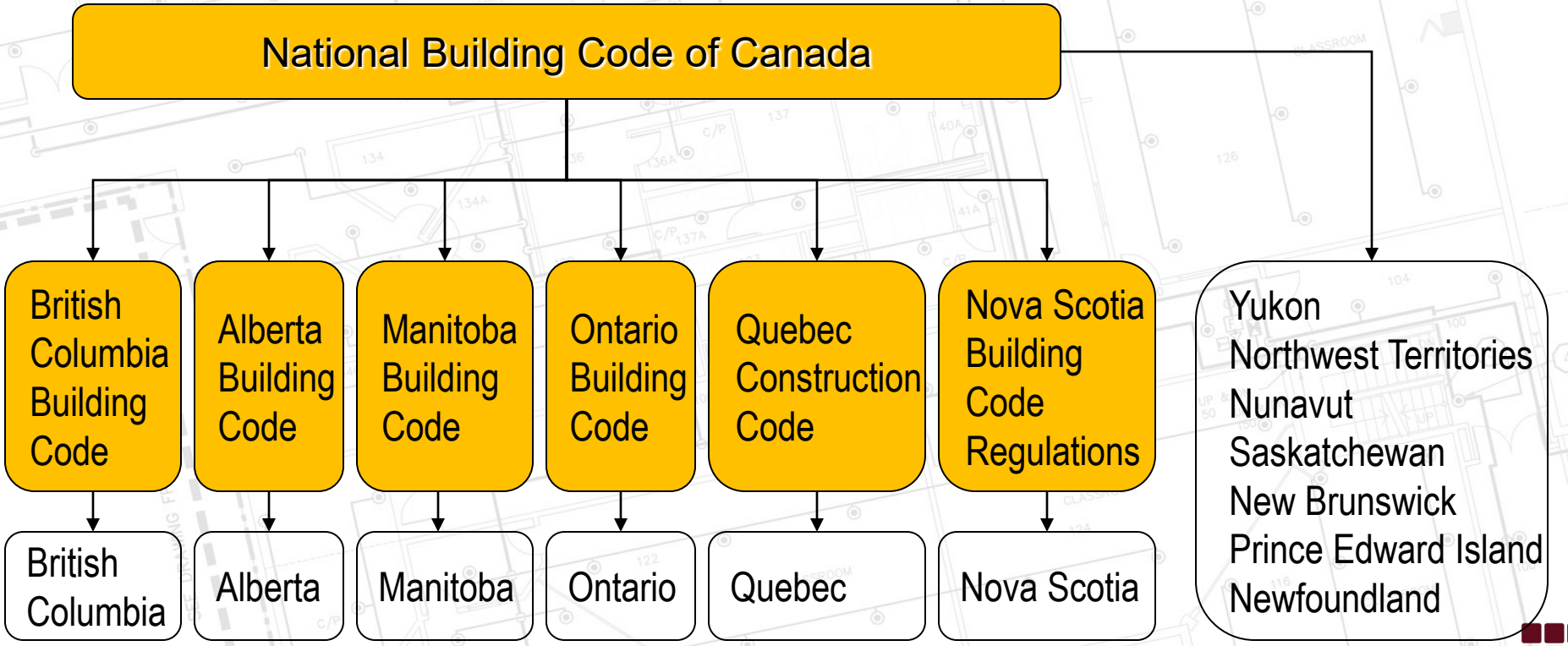
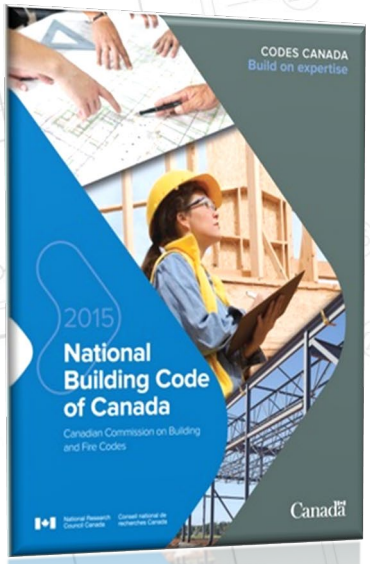
General Background

Model Code Designed to be Adopted by P&T

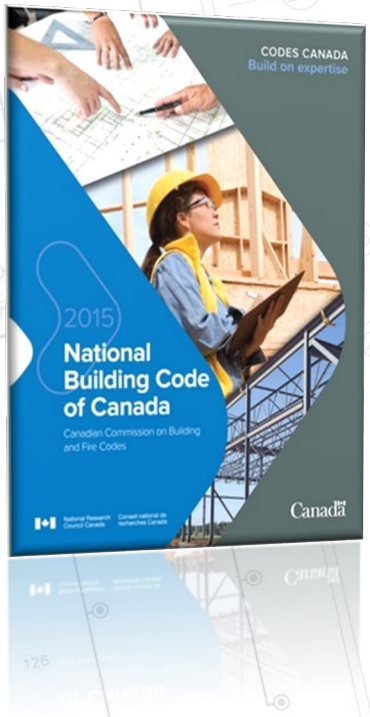


General Background



- English and French languages
- Adopted by a regulatory authority
- Amended and/or supplemented to suit regional needs
- NBC 2015 is the 14th edition / 10th for NFC
- 5 year cycles as a rule
- CCBFC
- Public Reviews - Typically in Fall
- Standards development (CGSA, NFPA, CSA, ASTM …)
- CCMC – Evaluation of New and Innovative Products

General Background



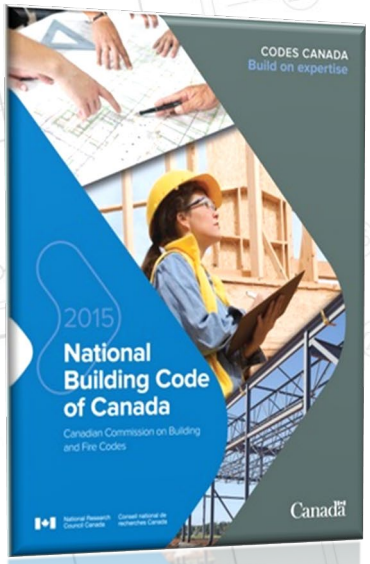
- CCBFC is aided in its work by standing committees
  - Earthquake Design
  - Energy Efficiency
  - Environmental Separation
  - Fire Protection
  - Hazardous Materials and Activities
  - Housing and Small Buildings
  - HVAC and Plumbing
  - Structural Design
  - Use and Egress
- Task groups study issues and make recommendations.

The "Inner Workings"

Each Code provision is linked to:

- Objectives & Sub Objectives
- Functional Statements
- Intent Statements

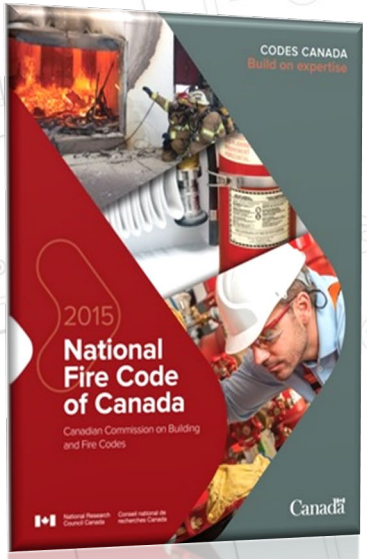
PURPOSE OF THE NBC



- Detail minimum acceptable provisions
- Maintain building safety in terms of following OBJECTIVES:
  - Safety
  - Health
  - Accessibility
  - Fire and Structural Protection

"… the 2015 NBC addresses the
design and construction of new buildings and the substantial renovation of existing buildings …"

PURPOSE OF THE NFC



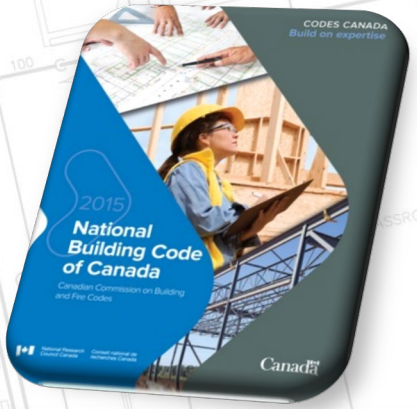
- Companion to the NBC
- Minimum acceptable provisions
- Maintain building safety in terms of following OBJECTIVES:
  - Safety
  - Health
  - Fire and Structural Protection

"… the 2015 NFC provides minimum fire safety requirements for buildings, structures and areas where hazardous materials are used, and addresses fire protection and fire prevention in the ongoing operation of buildings and facilities …"

Initiation of Requirements

The NBC applies to:

- All new construction
- Renovation and reconstruction
- Occupancy changes
- Upgrading of fire protection



Initiation of Requirements

The NFC is ongoing …

- All new construction
- Fire fighting and prevention
- Fire safety planning
- Activities involving fire hazards
- Maintenance of fire safety components
- (cont'd …)

Initiation of Requirements

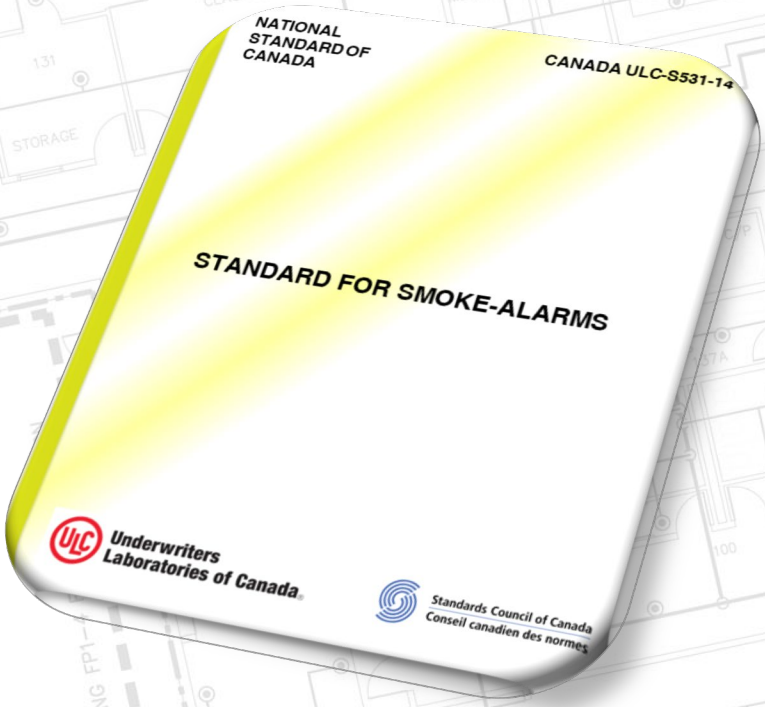
The NFC is ongoing …

- (cont'd …)
- Limits on building contents
- Fire hazards outside of buildings
- Storage & handling of dangerous goods
- Storage & handling of flammable / combustibles liquids

REFERENCED DOCUMENTS

Several Standards are referenced in the NBC

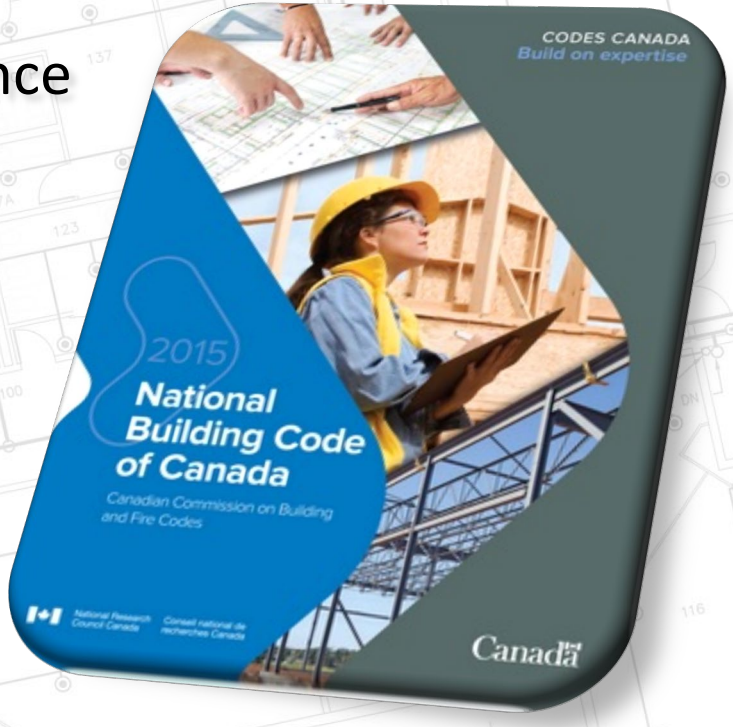
Referenced Documents



REFERENCED DOCUMENTS

When conflict arises …

- NBC ***always*** takes precedence



CHANGES TO THE 2015 NBC

The National Model Construction Codes, now collectively called Codes Canada publications, contain almost 600 technical changes approved by the Canadian Commission on Building and Fire Codes.

These changes make the provisions in the four model codes clearer and easier to apply while introducing new concepts and expanding the codes to new areas.

The intent of this presentation is to identify and summarize major changes that significantly impact the application of Part 3 of the 2015 NBC. Let's get into it!

CHANGES TO THE 2015 NBC

Major Occupancy Fire Separations

Updates to the major occupancy fire separation table have been made where you have adjoining Group A-2/Group C and Group A-2/Group D major occupancies.

As a result of the allowance of 6-storey combustible construction for Group C and Group D.

Construction requirements for these occupancies will follow.

CHANGES TO THE 2015 NBC

Major Occupancy Fire Separations

Table 3.1.3.1.
Major Occupancy Fire Separations(1)
Forming Part of Sentence 3.1.3.1.(1)

Major Occupancy	Minimum *Fire-Resistance Rating* of *Fire Separation*, h												
	Adjoining *Major Occupancy*												
	A-1	A-2	A-3	A-4	B-1	B-2	B-3	C	D	E	F-1	F-2	F-3
A-1	—	1	1	1	2	2	2	1	1	2	(2)	2	1
A-2	1	—	1	1	2	2	2	1(3)	1(4)	2	(2)	2	1
A-3	1	1	—	1	2	2	2	1	1	2	(2)	2	1
A-4	1	1	1	—	2	2	2	1	1	2	(2)	2	1
B-1	2	2	2	2	—	2	2	2	2	2	(2)	2	2
B-2	2	2	2	2	2	—	1	2	2	2	(2)	2	2
B-3	2	2	2	2	2	1	—	1	2	2	(2)	2	2
C	1	1(3)	1	1	2	2	1	—	1	2(5)	(2)	2(6)	1
D	1	1(4)	1	1	2	2	2	1	—	—	3	—	—
E	2	2	2	2	2	2	2	2(5)	—	—	3	—	—
F-1	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	3	3	—	2	2
F-2	2	2	2	2	2	2	2	2(6)	—	—	2	—	—
F-3	1	1	1	1	2	2	2	1	—	—	2	—	—

Notes to Table 3.1.3.1.:

(1) Section 3.3. contains requirements for the separation of *occupancies* and tenancies that are in addition to the requirements for the separation of *major occupancies*.

(2) See Sentence 3.1.3.2.(1).

(3) Where the *building* is constructed in accordance with Article 3.2.2.50., a *fire separation* with a 2 h *fire-resistance rating* is required between the Group C and Group A, Division 2 *major occupancies*.

(4) Where the *building* is constructed in accordance with Article 3.2.2.58., a *fire separation* with a 2 h *fire-resistance rating* is required between the Group D and Group A, Division 2 *major occupancies*.

(5) See Sentence 3.1.3.1.(2).

(6) See Sentence 3.1.3.2.(2).

CHANGES TO THE 2015 NBC

Major Occupancy Fire Separations

Notes (3) and (4) indicate that the 1 h major occupancy fire separation is to be increased to a have a minimum 2 h fire-resistance rating where a 6-storey combustible Group C or Group D occupancy adjoins a Group A-2.

CHANGES TO THE 2015 NBC

6-Storey Combustible Construction

6-storey residential, business and personal services buildings are permitted to be constructed using traditional combustible construction materials

CHANGES TO THE 2015 NBC

6-Storey Combustible Construction

Article 3.2.2.50. "*Group C, up to 6 Storeys, Sprinklered*"

- The building is to have a **height not more than 18 m** measured between the floor of the first storey and the uppermost floor level that does not serve a rooftop enclosure for elevator machinery, a stairway or a service room used only for service to the building,
- **Floor assemblies** are to be constructed as fire separations with a fire-resistance rating not less than **1 h**,
- **Mezzanines** and **Roof assemblies** are to have a fire-resistance rating not less than **1 h**,

CHANGES TO THE 2015 NBC

6-Storey Combustible Construction

Article 3.2.2.50. "*Group C, up to 6 Storeys, Sprinklered*"

- A **roof assembly** with a **height greater than 25 m** is to be constructed of noncombustible construction or fire-retardant-treated wood unless the building includes non-contiguous roof assemblies at different elevations which are permitted to be evaluated separately,
- **Loadbearing members** are to have a fire-resistance rating not less than that required for the assembly being supported, and
- **Dwelling units** that have **more than one storey** within a building are required to have floor assemblies with a fire-resistance rating not less than **1 h**.

CHANGES TO THE 2015 NBC

6-Storey Combustible Construction

Article 3.2.2.50. "*Group C, up to 6 Storeys, Sprinklered*"

Building Height	Building Area Limitations
1 storey	9 000 m^2
2 storeys	4 500 m^2
3 storeys	3 000 m^2
4 storeys	2 250 m^2
5 storeys	1 800 m^2
6 storeys	1 500 m^2

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CHANGES TO THE 2015 NBC

6-Storey Combustible Construction

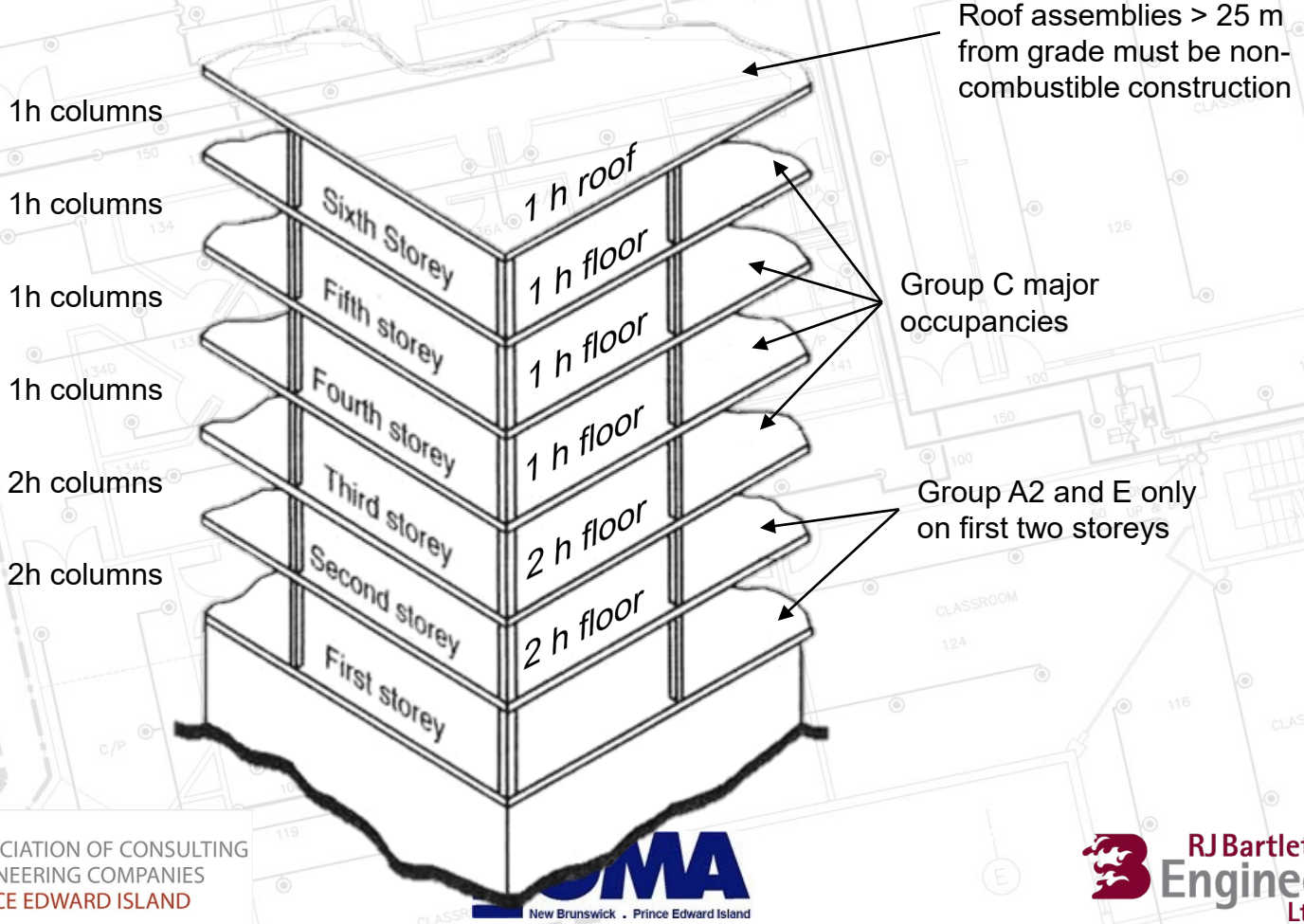
Article 3.2.2.50. "*Group C, up to 6 Storeys, Sprinklered*"

Buildings are not permitted to contain (NBC Sentence 3.2.2.7.(3)):

- A Group A, Division 1 or 3, Group B, or Group F major occupancy, or
- A Group A, Division 2 or Group E major occupancy above the second storey, or
- A storage garage above the third storey.

CHANGES TO THE 2015 NBC

6-Storey Combustible Construction



CHANGES TO THE 2015 NBC

6-Storey Combustible Construction

Article 3.2.2.58. "*Group D, up to 6 Storeys, Sprinklered*"

- The building is to have a **height not more than 18 m** measured between the floor of the first storey and the uppermost floor level that does not serve a rooftop enclosure for elevator machinery, a stairway or a service room used only for service to the building,
- **Floor assemblies** are to be constructed as fire separations with a fire-resistance rating not less than **1 h**,
- **Mezzanines** and **roof assemblies** are to have a fire-resistance rating not less than **1 h**,

CHANGES TO THE 2015 NBC

6-Storey Combustible Construction

Article 3.2.2.58. *"Group D, up to 6 Storeys, Sprinklered"*

A roof assembly with a height greater than 25 m is to be constructed of noncombustible construction or fire-retardant-treated wood unless the building includes non-contiguous roof assemblies at different elevations which are permitted to be evaluated separately, and

Loadbearing members are to have a fire-resistance rating not less than that required for the assembly being supported.

CHANGES TO THE 2015 NBC

6-Storey Combustible Construction

Article 3.2.2.58. *"Group D, up to 6 Storeys, Sprinklered"*

Building Height	Building Area Limitations
1 storey	18 000 m^2
2 storeys	9 000 m^2
3 storeys	6 000 m^2
4 storeys	4 500 m^2
5 storeys	3 600 m^2
6 storeys	3 000 m^2

CHANGES TO THE 2015 NBC

6-Storey Combustible Construction

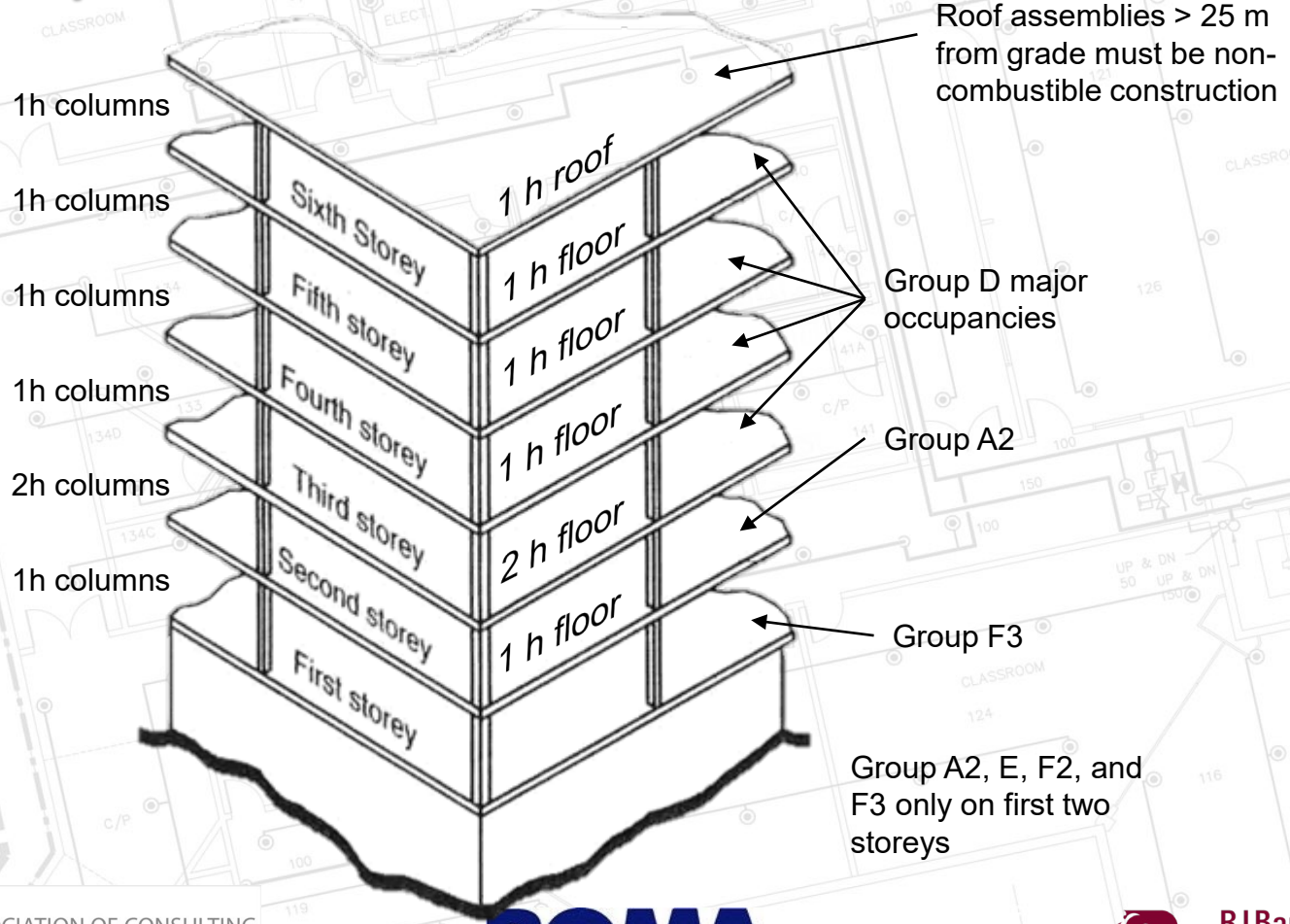
Article 3.2.2.58. "*Group D, up to 6 Storeys, Sprinklered*"

Buildings are not permitted to contain (NBC Sentence 3.2.2.7.(4)):

- A Group A, Division 1 or 3, Group B, or Group F, Division 1 major occupancy, or
- A Group A, Division 2, Group E, or Group F, Division 2 or 3 major occupancy above the second storey, or
- A storage garage above the third storey.

CHANGES TO THE 2015 NBC

6-Storey Combustible Construction



CHANGES TO THE 2015 NBC

6-Storey Combustible Construction

Articles 3.2.2.50. and 3.2.2.58.

At least 90% of the exterior cladding is to be

- *Noncombustible,* or
- Satisfy CAN/ULC-S134 with a *flame spread* not more than 5 m above openings and a *heat flux* not more than 35 kW/m^2

CHANGES TO THE 2015 NBC

6-Storey Combustible Construction

Articles 3.2.2.50. and 3.2.2.58.

Streets

Buildings conforming to these Articles are considered to face 1 street where not less than 25% of the building perimeter is located within 15 m of the street or streets

CHANGES TO THE 2015 NBC

Protection of Foamed Plastics

Several clarifications are introduced to protect foamed plastics in buildings required to be of combustible or noncombustible construction.

Combustible insulation is differentiated from foamed plastic insulation material, while retaining the same protection requirements.

CHANGES TO THE 2015 NBC

3.1.4.2. Protection of Foamed Plastics

Combustible Construction

- Foamed plastics forming part of a wall or ceiling assembly is to be protected from adjacent spaces in the building by:
  - Plastering, gypsum board finish, plywood finish, hardboard finish, insulating fibreboard finish, particleboard, OSB, or waferboard finish,
  - Sheet metal if it is not Group A, Group B, or Group C, or
  - A thermal barrier as described in Sentence 3.1.5.15.(2).

CHANGES TO THE 2015 NBC

3.1.4.2. Protection of Foamed Plastics

Combustible Construction

Exception:

- A walk-in cooler or freezer consisting of factory-assembled wall, floor or ceiling panels containing foamed plastics is permitted if the panels:
  - Are protected on both sides by sheet metal not less than 0.38 mm thick with a melting point not less than 650°C,
  - Do not contain an air space, and
  - Have a flame-spread rating not more than that permitted for the space in which they are located.

CHANGES TO THE 2015 NBC

3.1.5.15. Foamed Plastic Insulation

Noncombustible Construction

- Permitted to be installed in noncombustible buildings above roof decks, outside of foundation walls below ground level, and beneath concrete slabs-on-ground of a building

CHANGES TO THE 2015 NBC

3.1.5.15. Foamed Plastic Insulation

Any exposed surface

- Flame spread rating not more than 500
- Thermal barrier requirements:
  - 12.7 mm gypsum board,
  - Lath and plaster,
  - Masonry,
  - Concrete, or
  - Classification B CAN/ULC-S124 tested thermal barrier

CHANGES TO THE 2015 NBC

3.1.5.15. Foamed Plastic Insulation

Exterior walls of a noncombustible, unsprinklered building more than 18 m high

- Flame spread rating between 25 and 500
- Thermal barrier requirements:
  - 12.7 mm gypsum board,
  - Lath and plaster,
  - Masonry or concrete not less than 25 mm thick, or
  - CAN/ULC-S101 tested thermal barrier with a temperature rise:
    - Average temperature rise <140°C
    - Max temperature <180°C at any point on its unexposed face within 10 min.

CHANGES TO THE 2015 NBC

3.1.5.15. Foamed Plastic Insulation

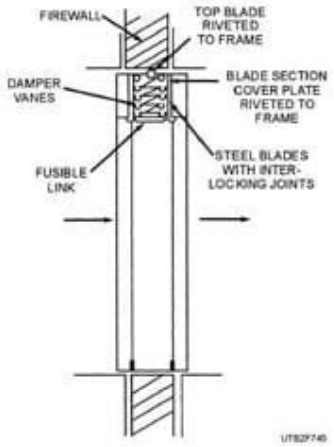
Interior walls, within ceilings and within roof assemblies of a noncombustible, unsprinklered building more than 18 m high

- Flame spread rating between 25 and 500
- Thermal barrier requirements:
  - 15.9 mm Type X gypsum board conforming to select ASTM Standards or CAN/CSA-A82.27-M,
  - Non-loadbearing masonry or concrete not less than 50 mm thick,
  - Loadbearing masonry or concrete not less than 75 mm thick, or
  - CAN/ULC-S101 tested thermal barrier that remains in place for not les than 40 min with a temperature rise:
    - Average temperature rise <140°C
    - Max temperature <180°C at any point on its unexposed face within 20 min.

CHANGES TO THE 2015 NBC

Smoke Dampers

To reduce the likelihood of smoke spreading into egress paths, smoke dampers or combination fire/smoke dampers are now required in ducts or air-transfer openings when, in specific locations, they penetrate an assembly required to be a fire separation.



Fire Damper

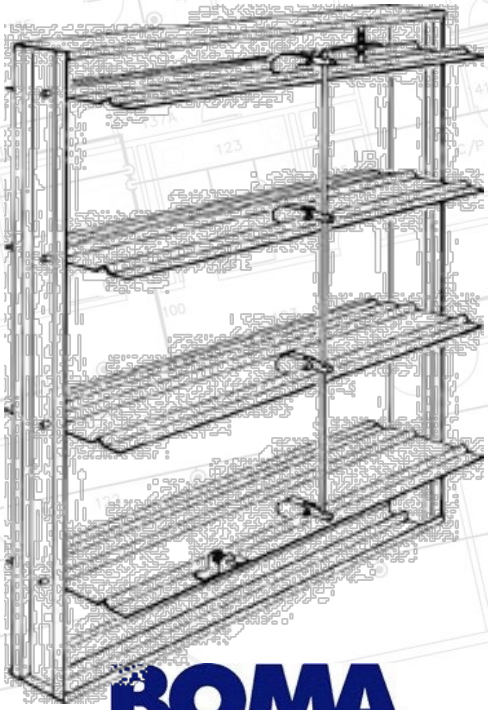
Smoke Damper

Combination Fire/Smoke Damper

CHANGES TO THE 2015 NBC

3.1.8.7. Smoke/Fire Dampers

- A smoke/fire damper installed in a wall or floor assembly closes automatically in fire conditions to maintain the integrity of the fire separation.



CHANGES TO THE 2015 NBC

3.1.8.8. Fire Dampers

- *May be waived if:*
  - Ducts are noncombustible with a melting point > 760°C, and
    - Ducts discharging 1.2 m or lower from floor having a cross-sectional area < 0.013 m^2 , or
    - Exhaust duct risers under negative pressure and rise at least 0.5 m, or
    - Ducts through non-rated horizontal fire separation, or
    - Ducts connected to vertical service spaces directly to outside at top of service space, or
    - Continuous duct through vertical fire separation between suites (not applicable for residential, care, or detention).
  - Duct penetrates non-rated vertical fire separation, or
  - Duct for commercial cooking.

CHANGES TO THE 2015 NBC

3.1.8.9. Smoke Dampers Waived

May be waived from ducts:

- That serve commercial cooking equipment,
- In which all inlet and outlet openings serve not more than one fire compartment, or
- That penetrate a vertical fire separation required for zoning for barrier-free path of travel, provided:
  - The movement of air is continuous, and
  - The configuration of the air-handling system prevents the recirculation of exhaust or return air.

CHANGES TO THE 2015 NBC

3.1.8.11. Installation of Smoke Dampers

- Where smoke dampers are used as a closure in an air-transfer opening, they are to be installed in the plane of the fire separation.

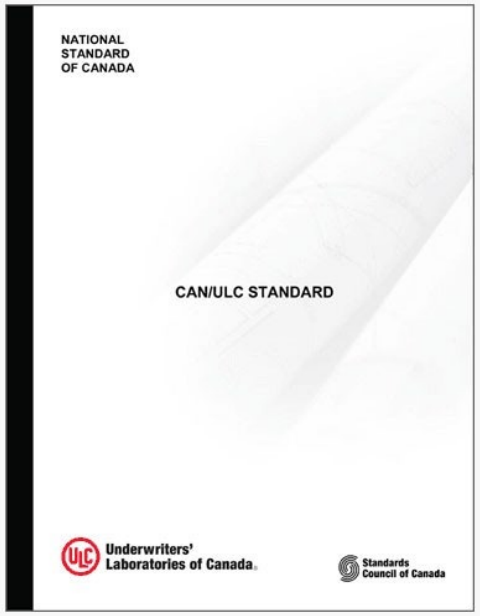
- Where combination smoke/fire dampers are used as a closure in a duct, they are to be installed within 610 mm of the plane of the fire separation, provided there is no inlet or outlet opening between the fire separation and the damper.

- To be installed in the vertical or horizontal position in which they were tested.

CHANGES TO THE 2015 NBC

3.1.8.5. Leakage Rate

- *Smoke dampers and combination smoke/fire dampers*
  - CAN/ULC-S112.1, “Leakage Rated Dampers for Use in Smoke Control Systems”
  - Conform to Class I, II or III



CHANGES TO THE 2015 NBC

Leakage Rate

Installation of a leakage-rated door assembly is now required in fire separations that protect or separate specific areas.

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CHANGES TO THE 2015 NBC

3.1.8.5. Leakage Rate

- *Door assemblies*

  - ANSI/UL-1784, “Air Leakage Tests of Door Assemblies and Other Opening Protectives”

  - Installed in fire separations in:
    - Protected barrier-free floor areas,
    - Care or treatment occupancies,
    - Public corridors serving dwelling units in storeys that are not sprinklered, unless there is a second means of egress or a large open-air balcony, and
    - Firewalls that are in a horizontal exit.

CHANGES TO THE 2015 NBC

Self-Service Storage Buildings

A new section addresses the fire protection requirements for self-service storage buildings that are not more than one storey in building height, with external access only.

It is noted that multi-storey buildings and interior access applications will be considered for the 2020 NBC.

CHANGES TO THE 2015 NBC

3.9. Self-Service Storage Buildings

- Defined as a building that is open to the public for the sole purpose of providing individual self-service storage units
- Group F, Division 2

CHANGES TO THE 2015 NBC

3.9. Self-Service Storage Buildings

Applicable Buildings:

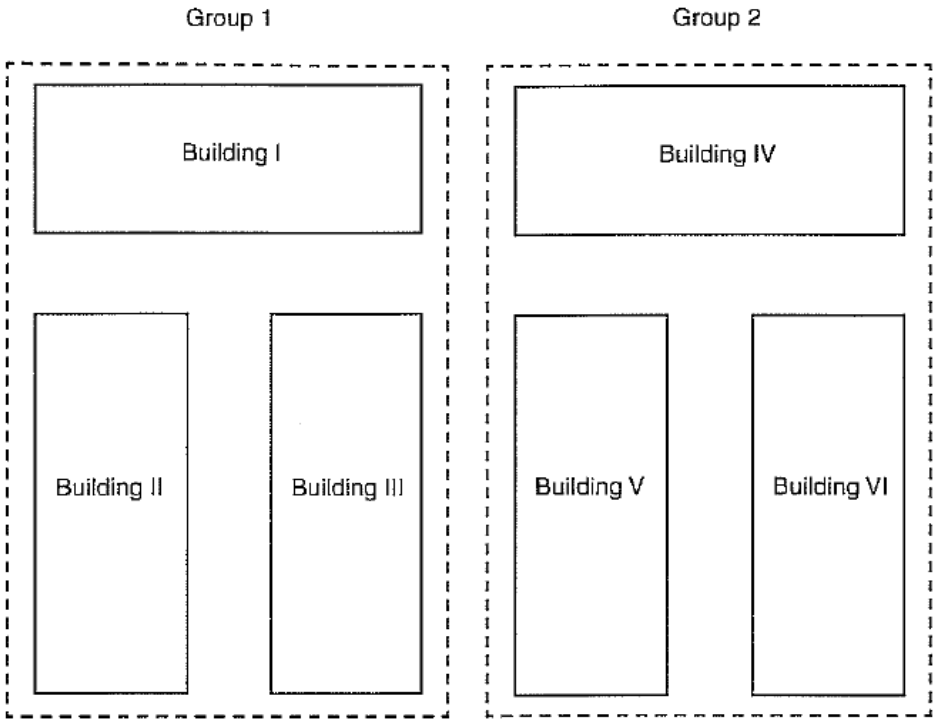
- One storey
- No basement or mezzanine
- Individual self-service storage units with external access only
- Used for no purpose other than storage
- No more than one dwelling unit (2 h fire separation)
- Adjacent offices restricted to 50 m^2 to be considered as part of the dwelling unit
- No other major occupancy permitted

CHANGES TO THE 2015 NBC

3.9. Self-Service Storage Buildings

Building Area:

- A group of self-service storage buildings is permitted to be treated as a single building for determining construction requirements and number of streets that the group faces



Group 1 building area = Area of I + Area of II + Area of III
Group 2 building area = Area of IV + Area of V + Area of VI

CHANGES TO THE 2015 NBC

Integrated Fire Protection & Life Safety

The 2010 Edition of the NBC included a new requirement (Article 3.2.4.6.(1)) that read:

"…. the commissioning of the integrated life safety and fire protection systems must be confirmed as a whole to ensure the proper operation and inter-relationship between the systems".

This was incorporated without regulations or references in place for this commissioning but has been updated for the 2015 NBC.

CHANGES TO THE 2015 NBC

Integrated Fire Protection & Life Safety

- Where fire protection and life safety systems and systems with fire protection and life safety functions are integrated with each other, testing is to be done in accordance with CAN/ULC-S1001, *"Integrated Systems Testing of Fire Protection and Life Safety Systems,"* to verify that they have been properly integrated.

May Include: Fire Alarm, Sprinkler, Fire Pump, Emergency Power, Smoke Control, Kitchen Hood Suppression, Elevators, Emergency Lighting, etc.

CHANGES TO THE 2015 NBC

3.4.2.3. Distance Between Exits*

The distance between 2 exterior discharges of exit stairs serving the same floor area is to be:

- not less than 9 m, or
- not less than 6 m,
  - in a building sprinklered throughout, and
  - where the 2 exterior discharges are located within 15 m from a street.

CHANGES TO THE 2015 NBC

Exit Width of Principal Entrances

Applicable to unsprinklered dance halls or a licensed beverage establishment with an occupant load more than 250.

CHANGES TO THE 2015 NBC

3.4.2.6. Exit Width of Principal Entrances

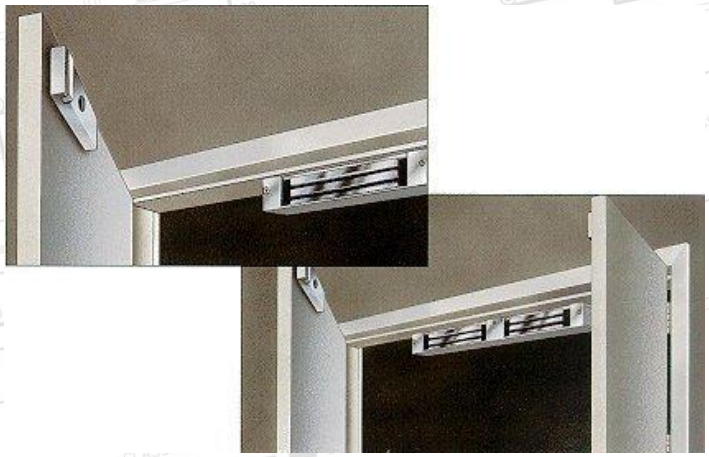
- In a building that is not sprinklered throughout, the principal entrance serving a dance hall or licensed beverage establishment where the occupant load exceeds 250 shall provide at least one half of the required exit width.

CHANGES TO THE 2015 NBC

Door Release Hardware

Various clarifications were made to Article 3.4.6.16. regarding the use of electromagnetic locks in all occupancies (except in Group F-1).

Additional information was provided to address the use of electromagnetic locks in care and treatment occupancies where release of the locking device could endanger the well-being of a patient or resident.



CHANGES TO THE 2015 NBC

3.4.6.16. Door Release Hardware

Electromagnetic locks permitted if:

- the locking device releases upon actuation of the fire alarm signal,
- the total time delay for all electromagnetic locks in any path of egress to release is not more than 15 s,
- where a bypass switch is installed to allow testing of the fire alarm system, actuation of the switch
  - can prevent the release by the fire alarm system as stated in Clause (b), of the locking device during the test, and
  - causes an audible and visual signal to be indicated at the fire alarm annunciator panel required by Article 3.2.4.9. and at the monitoring station specified in Sentence 3.2.4.8.(4),

CHANGES TO THE 2015 NBC

3.4.6.16. Door Release Hardware

Electromagnetic locks permitted if (continued):

- emergency lighting is provided at each door, and
- where they are installed on doors providing emergency crossover access to floor areas from exit stairs in accordance with Article 3.4.6.18.,
  - the locking device releases immediately upon the operation of a manual station for the fire alarm system located on the wall on the exit stair side not more than 600 mm from the door, and
  - a legible sign with the words “re-entry door unlocked by fire alarm” in letters at least 25 mm high with a stroke of at least 5 mm is permanently mounted on the door on the exit stair side.

CHANGES TO THE 2015 NBC

3.4.6.16. Door Release Hardware

Locks in Care and Treatment Occupancies:

The installation of electromagnetic locks in care and treatment occupancies requires special provisions to address the compromised condition of residents and the nature of daily operations.

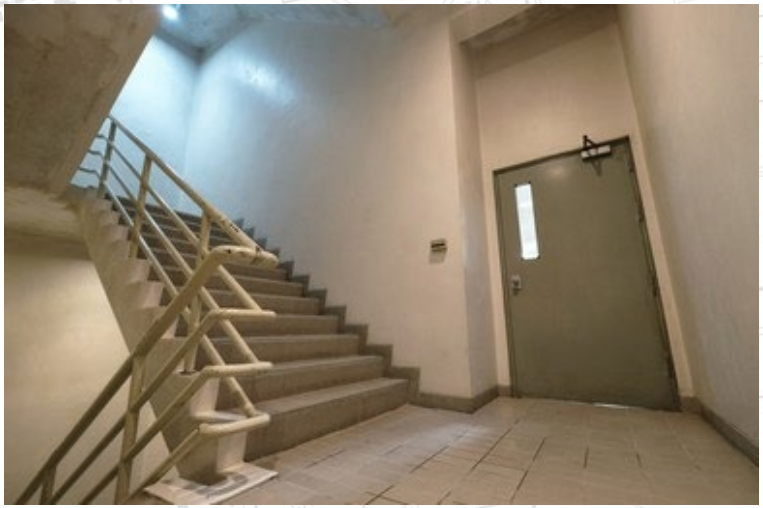
Accordingly, transparent boxes that set off an audible signal when opened can be installed to cover the manual stations. Also, one optional additional release device (e.g. swipe card device, key pad) can be installed to facilitate the free movement of staff and visitors in the building.

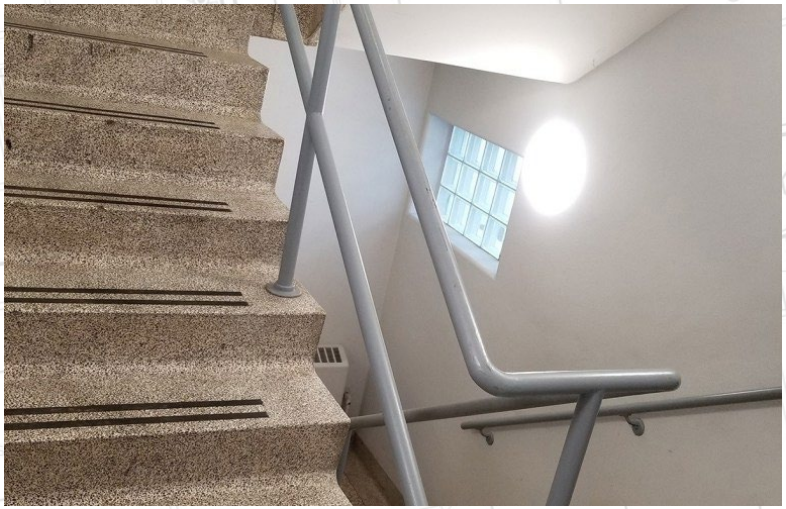
CHANGES TO THE 2015 NBC

Types of Exit Facilities

Numerous updates were made to the requirements for stairs, ramps, landings, handrails, guards, etc. which address design parameters.

In addition, many requirements have been harmonized in Part 3 and Part 9.

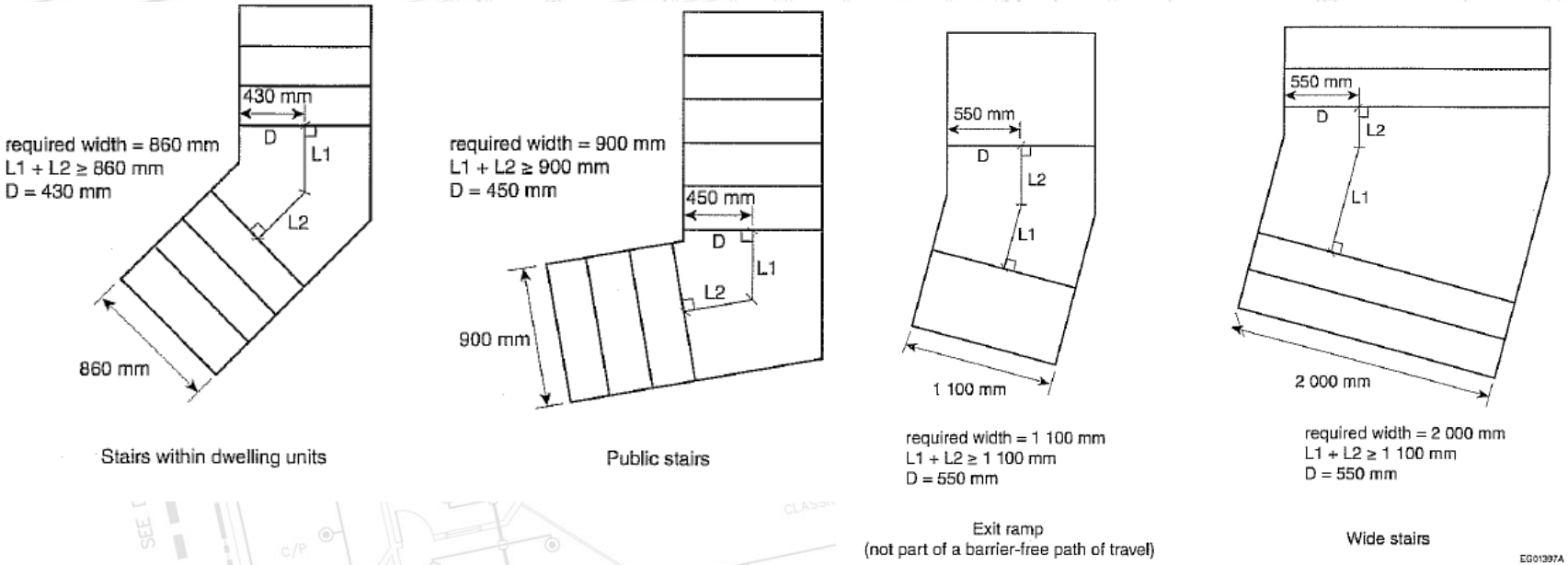




CHANGES TO THE 2015 NBC

Types of Exit Facilities

3.4.6.4. Dimensions of Landings



CHANGES TO THE 2015 NBC

Types of Exit Facilities

3.4.6.5. Handrails

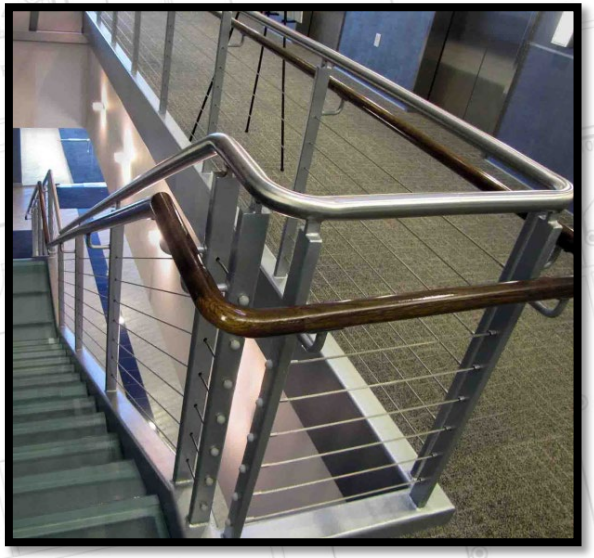
- One handrail is required on stairs that are less than 1 100 mm in width
- One handrail on each side is required on:
  - Stairs that are 1 100 mm wide or more
  - Curved flights of any width, and
  - Ramps.
- Intermediate handrails to ensure:
  - A handrail is reachable within 750 mm
  - At least one portion of the stair or tamp between two handrails is the minimum width of stairways/ramps
  - All other portions of the stair or ramp between two handrails have a clear width of 510 mm or more.

CHANGES TO THE 2015 NBC

Types of Exit Facilities

3.4.6.5. Handrails

- If a stair/ramp is wider than required, handrails are to be located along the most direct path of travel
- Handrails are to be free of any sharp or abrasive elements
- Height of handrails on stairs/ramps and on aisles with steps:
  - Between 865 mm and 1070 mm.
- Required to be continuously graspable throughout the length of the ramp and flight of stairs



CHANGES TO THE 2015 NBC

Types of Exit Facilities

Guards – harmonize Part 3 and Part 9 requirements (3.4.6.6. & 9.8.8.)

Exits that require a wall or well-secured guard on each side:

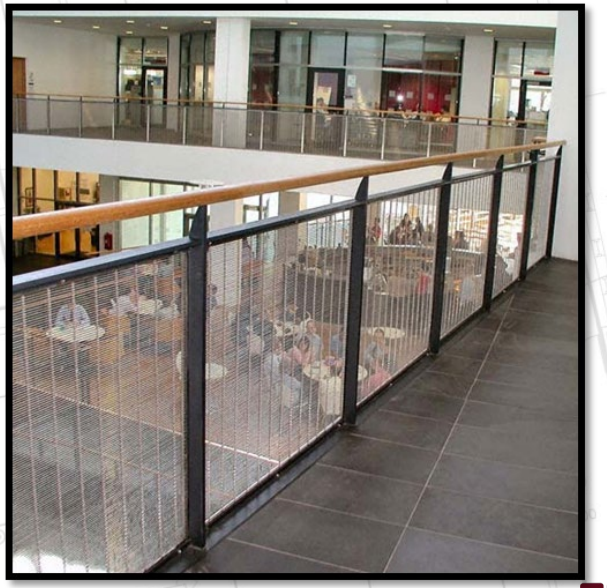
- If there is a difference in elevation of more than 600 mm between the walking surface and the adjacent surface, or
- If the adjacent surface within 1.2 m of the walking surface has a slope of more than 1 in 2.

The *height of guards* is to be not less than 1 070 mm, measured vertically to the top of the guard from:

- A line drawn though the outside edge of the stair nosings, or
- The surface of the ramp/landing.

CHANGES TO THE 2015 NBC

Types of Exit Facilities



Guards – design to limit climbing

Except where they serve storage garages, guards in industrial occupancies are permitted to consist of *top railing* and one or more *intermediate rails* spaced with openings that prevent the passage of a spherical object with a 535 mm diameter.

Otherwise, guards that protect a level located more than *one storey or 4.2 m above the adjacent level* are to be designed so that no member, attachment or opening located between 140 mm and 900 mm above the level being protected by the guard facilitates *climbing*.

CHANGES TO THE 2015 NBC

Types of Exit Facilities

3.4.6.7. Ramp Slope

Reallocation of ramp slope requirements for some occupancy types.

Except for aisle requirements, the maximum slope of a ramp:

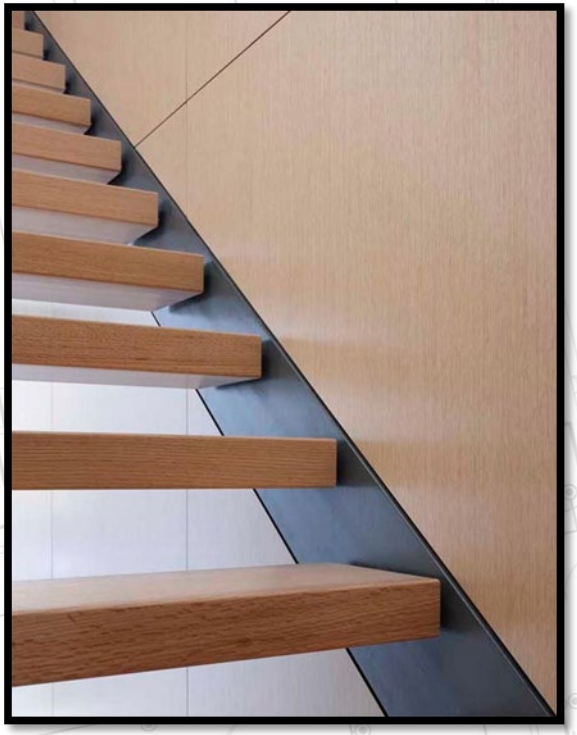
a) 1 in 10 in any assembly, care, treatment, detention or residential occupancy,
b) 1 in 6 in an industrial occupancy,
c) 1 in 8 in all other occupancies, and
d) 1 in 10 for an exterior ramp.

CHANGES TO THE 2015 NBC

Types of Exit Facilities

3.4.6.8. Treads and Risers

Steps for stairs are not permitted to have open risers



Exceptions:

- Dwelling units
- Fire escape stairs
- Stairs that are principally used for maintenance and service
- Stairs that serve industrial occupancies other than storage garages

CHANGES TO THE 2015 NBC

Types of Exit Facilities

3.4.6.9. Curved Flights in Exits

Exit stair flights are to consist solely of:

- straight flights, or
- curved flights with:
  - a handrail on each side,
  - a minimum run of 240 mm,
  - run that conforms to tread and riser requirements when measured at a point 300 mm from the center line of the handrail at the narrow end of the tread, and
  - an inside radius that is not less than twice the stair width.

CHANGES TO THE 2015 NBC

Types of Exit Facilities

3.4.6.9. Curved Flights in Exits

Tapered treads:

- consistent angle and uniform run and rise dimensions in accordance with the construction tolerances for treads and risers when measured at a point 300 mm from the center line of the handrail at the narrow end of the tread.

All tapered treads within a flight must turn in the same direction.

CHANGES TO THE 2015 NBC

Types of Exit Facilities

3.4.6.11. Doors

A threshold for a doorway in an exit cannot be more than 13 mm higher than the surrounding finished floor surface

Except:

- where doorways are used to confine the spillage of flammable liquids
- where there is a risk of blockage by ice or snow (permitted to open onto not more than one step (not more than 150 mm high)

CHANGES TO THE 2015 NBC

Types of Exit Facilities

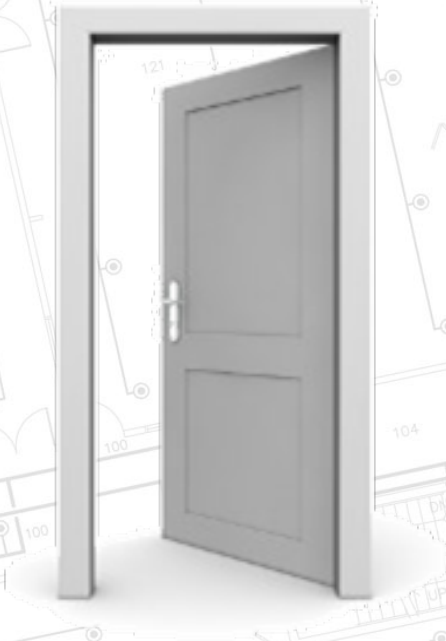
3.4.6.11. Doors

Where an exit door leading directly to the outside is subject to being obstructed by parked vehicles or storage, a visible sign or a physical barrier prohibiting such obstructions is to be installed on the exterior side of the door.

CHANGES TO THE 2015 NBC

Types of Exit Facilities

3.4.6.12. Direction of Door Swing



Every exit door is required to:

- Open in the direction of exit travel, and
- Swing on its vertical axis.

CHANGES TO THE 2015 NBC

Types of Exit Facilities

3.4.6.12. Direction of Door Swing

Exceptions for door swing requirements:

- Doors serving single dwelling units
- Sliding doors
- Doors serving storage garages serving not more than one dwelling unit
- Doors serving accessory buildings serving not more than one dwelling unit
- Doors opening directly outdoors at ground level that serve storage suites not more than 28 m^2 on the first storey of warehousing buildings
- Doors serving individual self-service storage units

CHANGES TO THE 2015 NBC

NBC Fire-Performance Ratings

Wood and Steel Framed Walls, Floors, and Roofs

- *Maximum Fire-Resistance Rating**
- Limitations of Component Additive Method*
- Method of Calculation*

The fire-resistance rating of walls, floors and roofs constructed of either wood or steel can be determined for ratings up to 90 minutes using the above mentioned method of calculation

CHANGES TO THE 2015 NBC

NBC Fire-Performance Ratings

Wood and Steel Framed Walls, Floors, and Roofs

- Maximum Fire-Resistance Rating*
- *Limitations of Component Additive Method**
- Method of Calculation*

The fire-resistance rating of a framed assembly depends primarily on the time which the membrane on the fire-exposed side remains in place

The assigned times calculated are ***not*** intended to be construed as the fire-resistance rating of the individual component, ***nor*** are they intended to be construed as times that are applicable or acceptable for use beyond the method and systems described.

CHANGES TO THE 2015 NBC

NBC Fire-Performance Ratings

Wood and Steel Framed Walls, Floors, and Roofs

- Maximum Fire-Resistance Rating*
- *Limitations of Component Additive Method**
- Method of Calculation*

These times are the individual ***contributions*** to the overall fire-resistance rating of the assembly, which is permitted to be derived using the ***component additive method***.

CHANGES TO THE 2015 NBC

NBC Fire-Performance Ratings

Wood and Steel Framed Walls, Floors, and Roofs

- Maximum Fire-Resistance Rating*
- *Limitations of Component Additive Method**
- Method of Calculation*

The fire-resistance rating calculated by the component additive method cannot be increased by installing members in multiple layers, other than specified in the Tables.

Table D-2.3.4.-A
Time Assigned to Protective Membranes on Fire-Exposed Side of Wood-Framed and Cold-Formed-Steel-Framed Walls

Description of Finish	Time, min	
	Loadbearing Walls	Non-Loadbearing Walls
11.0 mm Douglas Fir plywood phenolic bonded	–	10(1)
14.0 mm Douglas Fir plywood phenolic bonded	–	15(1)
12.7 mm Type X gypsum board	25(2)	25
15.9 mm Type X gypsum board	40(2)	40(3)
Double 12.7 mm Type X gypsum board(4)	50	80

CHANGES TO THE 2015 NBC

NBC Fire-Performance Ratings

Wood and Steel Framed Walls, Floors, and Roofs

- Maximum Fire-Resistance Rating*
- Limitations of Component Additive Method*
- *Method of Calculation**

New materials and assemblies of materials have been added to the Tables in Appendix D-2.3.

CHANGES TO THE 2015 NBC

NBC Fire-Performance Ratings

Wood and Steel Framed Walls, Floors, and Roofs

- Maximum Fire-Resistance Rating*
- Limitations of Component Additive Method*
- *Method of Calculation**

The fire-resistance rating of a framed assembly is calculated by adding the time assigned to members on the fire-exposed side (found in Tables D-2.3.4.A. to D-2.3.4.D.) to the time assigned to floor and roof framing members (found in Tables D-2.3.4.E and D-2.3.4.F) plus any time assigned for protective measures such as insulation or reinforcement (found in Table D-2.3.4.-G)

CHANGES TO THE 2015 NBC

NBC Fire-Performance Ratings

Wood and Steel Framed Walls, Floors, and Roofs

- Maximum Fire-Resistance Rating*
- Limitations of Component Additive Method*
- *Method of Calculation**

For loadbearing walls where resilient metal channels are installed with a single layer of gypsum board membrane in accordance with Table D-2.3.4.-A, the fire-resistance rating determined using this method of calculation must be reduced by 10 min

CHANGES TO THE 2015 NBC

NBC Fire-Performance Ratings

Wood and Steel Framed Walls, Floors, and Roofs

- Maximum Fire-Resistance Rating*
- Limitations of Component Additive Method*
- *Method of Calculation**

Table D-2.3.4.-B
Time Assigned to Gypsum Board Membranes on Fire-Exposed Side of Floors

Description of Finish	Resilient Metal Channels[1]	Time, min	
		Floors with Wood or Steel Joists	Floors with Open-Web Steel Joists
12.7 mm Type X gypsum board	Spaced ≤ 400 mm o.c.[2]	25[3]	—
15.9 mm Type X gypsum board		40	—
12.7 mm Type X gypsum board	—	25[4]	25
15.9 mm Type X gypsum board		40[4]	40
Double 12.7 mm Type X gypsum board	Spaced ≤ 400 mm o.c.[5]	50[3]	—
Double 12.7 mm Type X gypsum board	Spaced at 600 mm o.c.[6]	45[3]	—
Double 15.9 mm Type X gypsum board	Spaced ≤ 600 mm o.c.[6]	60[3]	—

CHANGES TO THE 2015 NBC

NBC Fire-Performance Ratings

Wood and Steel Framed Walls, Floors, and Roofs

- Maximum Fire-Resistance Rating*
- Limitations of Component Additive Method*
- *Method of Calculation**

Table D-2.3.4.-F
Time Assigned for Contribution of Wood or Steel Frame of Floors and Roofs

Type of Assembly	Description of Frame Structural Members	Time, min
Floor[1]	Wood joists, wood I-joists, wood trusses and cold-formed-steel joists spaced ≤ 600 mm o.c.	10[2]
	Open-web steel joists with ceiling supports spaced ≤ 400 mm o.c.	
Roof	Wood joists spaced ≤ 400 mm o.c.	10
	Open-web steel joists with ceiling supports spaced ≤ 400 mm o.c.	10
	Wood truss assemblies [metal-plate-connected] spaced ≤ 600 mm o.c.	5

CHANGES TO THE 2015 NBC

NBC Fire-Performance Ratings

Considerations for Various Types of Assemblies

- Interior vertical separations shall be rated for exposure to fire on each side and a membrane shall be provided on both sides of the assembly … ***however***, no contribution to fire-resistance can be assigned for a membrane on the non-fire-exposed side.

- Exterior wall required to be rated from the interior side only shall have a membrane with insulation in stud space conforming to ***CSA A101-M "Thermal Insulation, Mineral Fiber for Buildings"***, and have a mass no less than ***1.22 kg/m²***

CHANGES TO THE 2015 NBC

NBC Fire-Performance Ratings

Framing Members

Listed membrane fire resistance is only applicable provided they are supported by framing members installed in their conventional orientation and spaced in conformance as shown below

Table D-2.3.4.C.
Time Assigned for Contribution of Wood or Light Steel Frame

Description of Frame	Time Assigned to Frame, min
Wood studs 400 mm o.c. maximum	20
Wood studs 600 mm o.c. maximum	15
Steel studs 400 mm o.c. maximum	10
Wood floor and wood roof joists 400 mm o.c. maximum	10
Open web steel joist floors and roofs with ceiling supports 400 mm o.c. maximum	10
Wood roof and wood floor truss assemblies 600 mm o.c. maximum	5

SNEAK PEEK AT 2020 NBC

- New Farm Code and Occupancy Classification Group G – Agricultural
- Encapsulated Mass Timber/ High-Rise Wood Construction
- Visual Signalling Devices
- Removal of Wired Glass
- FF Elevators and 1 h CI

Sneak Peek at 2020 NBC

- Emergency lighting @ EMLs
- Height of door release hardware 900 – 1,000 vs < 1,200
- Guard exception @ floor pits
- Minimum dimension on panic hardware
- Floor numbering
- Glazed area calculations in Part 9 Houses
- Interconnection of SA's in Part 9 Houses (Wireless)

QUESTIONS?