INSTRUCTIONS - READ ME FIRST

BEFORE THE COURSE STARTS, WORK ON YOUR OWN AND COMPLETE ALL OF THE EXERCISES. If you come unprepared, you will have a difficult time to keep up with the pace of instruction. To be ready for this course, you will need to schedule and dedicate 35 to 40 hours of your time as preparation time.

INTRODUCTION

The course in which you are about to participate focuses on preparing you to write the Ministry of Municipal Affairs and Housing Qualification Examination entitled, "Small Buildings -2012".

It is important that you be aware that this course is not a course designed to give you an in-depth technical appreciation of the code requirements but rather an overview of the material indicated in the examination syllabus.

The main thrust behind this course is to help you find, understand and apply the code requirements dealing with small buildings. The examinations, and therefore the course material, will NOT deal with information found in referenced standards nor application of engineering principles. More in-depth exploration of code requirements may be obtained by taking technical courses.

Equally important, passing the Small Buildings - 2012 examination permits you to be qualified for House -2012 however, for this to occur, you must check both boxes in your qualification registration application. Accreditation for House -2012 is NOT automatic upon registering for Small Buildings - 2012.

WHO IS THIS COURSE FOR?

This program has been designed to meet the needs of those who are preparing to write the Small Buildings - 2012 Qualification Examination by giving the participants an overview of the items listed in the examination syllabus. The course was designed for delivery using the same methodology as for all our other courses; that is, Facilitator-led training.

This course has been developed to address the needs of building officials, designers and inspectors. That being said, since this course is basically an overview of the material it is expected that participants

Alterations

Minor changes to signs such as re-painting are not deemed to be material changes and therefore do not require a building permit. [Sentence 3.15.2.1.(1)]

Structural Requirements

The general rule concerning signs is that signs must be designed in accordance with Part 4 [Sentence 3.15.3.1.(1)] and MUST be designed by a suitably qualified person where the sign is a;

- ground sign more than 7.5 m high,
- projecting sign weighing more than 115 kg, or
- roof sign having a face area more than 10 m^2
- projecting sign attached to a parapet wall. [Sentences 1.2.1.1.(6) and (7) - Div. C]

Facing Materials

When a sign has plastic faces, that material must meet the conditions listed in Article 3.15.4.1. These requirements include average burn rates and standards, limiting the amount of plastic on a building where the wall is required to be of noncombustible construction or the amount of plastic in an interior sign.

Location

The location of signs must be such that they do not cover important building features such as exits, access opening for fire fighting and the like.
[Sentence 3.15.5.1.(1)].

Similarly, signs must be located so as not to cause obstructions over sidewalks and vehicular pathways. These are specifically addressed in Article 3.15.5.2.

EXERCISE # 1 - REQUIREMENTS FOR SIGNS

To complete this exercise, you need to be familiar with the requirements found in Section 3.15. Provide code references, including Division designations, when asked in the questions.

1. An application for a 20 m^2 roof top sign is being applied for. This sign must be reviewed by an;
   a) a suitably qualified person
   b) architect or engineer only if the sign is more than 7.5 m above the ground
   c) architect or engineer only if the sign weighs more than 115 kg
   d) engineer only.

OBC Reference: _____

2. A projecting sign which is attached to a parapet wall must;
   a) not weigh more than 115 kg
   b) not be more than 7.5 m above the finished ground
   c) be designed by a suitably qualified person
   d) is not permitted.

OBC reference: _____

3. A projecting sign overhangs a sidewalk; the minimum clearance to this sign is;
   a) 4.25 m
   b) 7.5 m
   c) 2.4 m
   d) not permitted.

OBC reference: _____

STOP

The code goes on to say that all the requirements found in Section 3.14. apply to **large** tents and that **for smaller tents only** the requirements dealing with;

- clearances to other structures [Article 3.14.1.4.]
- clearances to flammable material [Article 3.14.1.5.]
- flame resistance, [Article 3.14.1.6.] and
- provision for firefighting [Article 3.14.1.9.] apply. [Sentence 3.14.1.2.(2)]

Means of Egress (Applies to LARGE tents)

Tents are required to comply with the code requirements for means of egress and exiting just as for any other building, EXCEPT; [Sentence 3.14.1.3.(1)]

- if swing doors are provided, they must swing on a vertical axis in the direction of exit travel [Sentence 3.14.1.3.(2)],

  and

- the CLEAR distance between stake lines and tents or between a tent and a property line should be equal to the width required for a means of egress but not less than 3 m. [Sentence 3.14.1.3.(3)]

Clearance to Other Structures (Applies to ALL tents)

Tents cannot be closer than 3 m to a property line. [Sentence 3.14.1.4.(1)]

Usually tents are not to be closer than 3 m to other tents or structures, EXCEPT; [Sentence 3.14.1.4.(2)]

- a walkway between a tent occupied by the public and a building is acceptable if the distance from the tent to the building is at least 3 m and the walkway conforms to the code, [Sentence 3.14.1.4.(3)]
- tents NOT occupied by the public may be placed closer to each other, [Sentence 3.14.1.4.(4)]
- tents on fair grounds may be placed closer to each other as long as the condition is considered safe. [Sentence 3.14.1.4.(5)]

Clearance to Flammable Material (Applies to ALL tents)

Any combustible material or vegetation must be removed from the ground enclosed by the tent and for at least 3 m outside the tent.
[Sentence 3.14.1.5.(1)]

Flame Resistance (Applies to ALL tents)

Films and fabrics used in the construction of tents or on tents, must comply with either;

- CAN/ULC S-109, or
- NFPA 701.
  [Sentence 3.14.1.6.(1)]

Design of Framing and Supports (Applies to LARGE tents)

A person suitably qualified and experienced is required to review the structural framing and anchorage for tents having an area greater than 225 m^2.
[Sentence 1.2.2.1.(7) - Div. C]

Bleachers (Applies to LARGE tents)

Bleachers, where provided in tents, must be designed according to Articles 3.3.2.8. for guards, 3.3.2.10 for conditions specific to bleachers, and 4.1.5. for specific live loads.
[Sentence 3.14.1.7.(1)]

Sanitary Facilities (Applies to LARGE tents)

The number of water closets for tents must comply with Table 3.7.4.3.E. [Sentence 3.14.1.8.(1)]. As well, the privacy requirements found in Article 3.7.4.17. also apply. [Sentence 3.14.1.8.(2)]

Other types of disposal methods may be provided (sanitary privies, chemical toilets, etc).
[Sentence 3.14.1.8.(3)]

Provision for Fire Fighting (Applies to ALL tents)

Access for fire fighting must be provided to all tents.
[Sentence 3.14.1.9.(1)]

Electrical Systems (Applies to ALL tents)

The electrical system and equipment in a tent including electrical fuses and switches, must be inaccessible to the public.
[Sentence 3.14.1.10.(1)]

REQUIREMENTS FOR AIR-SUPPORTED STRUCTURES

An air-supported structure is a building which is held up by air pressure only and is placed either on the ground or on a building. This type of structure also requires a method of perimeter sealing to prevent the loss of positive air pressure. Part 9 refers you to Subsection 3.14.2. for the specific requirements dealing with this type of structure.
[Sentence 9.1.1.4.(2)]

The basic assumption in the OBC is that ALL the provisions of the code apply to air-supported structures EXCEPT those specifically listed in Subsection 3.14.2.
[Sentence 3.14.2.1.(1)]

General

Occupancies classified as:

- Group B (Care and Detention)
- Group C (Residential)
- Group F-1 (High Hazard Industrial), or
- classrooms

may NOT be located within an air-supported structure.
[Sentence 3.14.2.2.(1)]

Air-supported structures usually must contain only ONE major occupancy or if there are 2 or more, only those occupancies that do not require a fire separation between them are permitted.
[Sentence 3.14.2.2.(2)]

None of the construction requirements based on occupancy (use) and size apply EXCEPT for building classification the maximum building areas apply.
[Sentence 3.14.2.2.(3)]

Air-supported structures may contain interior walls and/or mezzanines [Sentence 3.14.2.2.(4)]; also, interior construction must comply with the applicable 3.2.2. classification for the building.
[Sentence 3.14.2.2.(5)]

Spatial Separation

The basic rule for spatial separation for air-supported structures is that there must be a separation of at least 3 m from other structures and the property line.
[Sentence 3.14.2.3.(1)]

The following are EXCEPTIONS to the general rule stated above;

- if the air-supported structure is NOT occupied by the public, it may be located closer to other structures **on the same property** as long as the condition is considered safe.
  [Sentence 3.14.2.3.(2)]

An air-supported structure may be attached to another building if the building to which it is attached;

- conforms to the requirements of Div. B based on the sum of the building areas of the attached building and the air-supported structure,
- the building is sprinklered, and
- the building is separated from the air-supported structure by a fire separation having a fire-resistance rating of at least 1 h.
  [Sentence 3.14.2.3.(3)]

Also, an air-supported structure may be attached to another building if the building to which it is attached;

- has a building area ≤ 200 m^2,
- conforms to the code requirements for a building having a building area equal to the attached building,
- is sprinklered or is separated from the air-supported structure by a fire separation having at least a 1 h fire-resistance rating,
  [Sentence 3.14.2.3.(4)]

Clearance to Flammable Material

Just as for tents, all flammable material, vegetation or combustible material must be removed from the area enclosed by the air-supported structure and for at least 3 m beyond.
[Sentence 3.14.2.4.(1)]

EXERCISE # 4 - CONDITIONS SPECIFIC TO AIR-SUPPORTED STRUCTURES

Include the Code Divisions in your answers.

1. Which of the following occupancy is permitted in an air-supported structure?
   a) residential
   b) institutional
   c) classroom
   d) mercantile

OBC Reference: _____

2. An air-supported structure occupied by the public must be separated from other structures on the same property by a minimum of;
   a) less than 3 m
   b) more than 3 m
   c) as required by the spatial separation requirements but not less than 3 m
   d) at least 6 m.

OBC Reference: _____

STOP

FOOD PREMISES

The requirements dealing with food premises are referenced in Part 9 to Subsection 3.7.6. These requirements would apply for example to a restaurant/cafeteria serving only the occupants of a Part 9 building (the restaurant/cafeteria is an assembly occupancy but NOT a major occupancy in this case). [9.1.1.6.(1)]

The requirements as found in Subsection 3.7.6. apply to all food premises.
[Sentences 9.1.1.6.(1) & 3.7.6.1.(1)]

Room Finishes

Basically the floor and floor coverings are required to be tight, smooth and non-absorbent in areas where food is being prepared, utensils are being washed and also in bathrooms and where washing

must be reduced to such an extent that they will not affect the building's stability and the performance of the structure's assemblies. Additional information on this topic may be found in Appendix A. [Sentence 9.4.4.4.(1)]

Walls Supporting Drained Earth

If foundation walls are NOT constructed according to Section 9.15., "Footings and Foundations", and assuming the soil adjacent to the foundation is drained, the foundations must be designed for a loading of not less than 480 kg/m^3 acting as if the soil was a fluid and for a depth of the actual backfill depth, or those foundation walls must be designed to conform with Section 4.2, "Foundations" and are to be capable of resisting the loads stipulated in Article 4.1.2.1., "Loads and Effects".
[Sentence 9.4.4.6.(1)]

If foundations walls are subjected to UNDRAINED backfill, those walls must be designed for the loads for drained backfill as indicated above PLUS the loads imposed by the fluid pressure of the surcharge, or those walls are to be designed in accordance with Part 4, more specifically Section 4.2 and Article 4.1.2.1.

For additional information, refer to Appendix "A".
[Sentence 9.4.4.6.(2)]

- Group F-1 occupancies (which is NOT a Part 9 occupancy),
- buildings which are not intended to be occupied on a daily or full time basis.
  [Sentence 9.5.2.1.(1)&(2) - Div. B and 3.8.1.1.(1) - Div. B]

Additionally, where a barrier-free path of travel is provided above the first storey, the requirements of Article 3.3.1.7., "Protection On Floor Areas With A Barrier-Free Path Of Travel, also apply.
[Sentence 9.5.2.2.(1) - Div. B]

In order to get a better appreciation for the requirements for Barrier-Free Design as they apply to Part 9 buildings, we must start with a study of Section 3.8. and Article 3.3.1.7.

Entrances

The number of barrier-free entrances are based on the number of entrances into the building (not necessarily the required exits and therefore entrances) and are tabulated in Table 3.8.1.2.
[Sentence 3.8.1.2.(1)] These entrances are from the parking spaces, etc to the entrance and not simply the doors themselves.

If there are occupancies on the first storey, or a storey to which a barrier-free path of travel is provided, and those occupancies are separate from the remainder of the building, (example: a strip mall) at least 1 barrier-free entrance must be provided to each such occupancy.
[Sentence 3.8.1.2.(2)]

Article 3.8.3.3. deals with the specifics at the entrance doorway and will be dealt with later in this module.
[Sentences 3.8.1.2.(3)&(4)]

Where barrier-free storeys in different buildings are connected by a walkway or bridge the walkway or bridge must be barrier-free.
[Sentence 3.8.1.2.(5)]

Barrier-Free Path of Travel

The basic requirement is that a minimum width of 1 100 mm be provided in a barrier-free path of travel. [Sentence 3.8.1.3.(1)]
There are two exceptions to this general rule which will be addressed shortly.

The barrier-free path of travel has certain required design features namely;

- no openings larger than 13 mm,
- any elongated openings must be at right angles to the path of travel,
- be stable, firm and slip-resistance,
- to have bevelled edges with a 1 in 2 slope max. if the difference in elevation is less than or equal to 13 mm,
- if the difference in elevation is more than 13 mm, be provided with sloped floors or ramps.
  [Sentence 3.8.1.3.(2)]

Obviously a barrier-free path of travel is permitted to include ramps, elevators and the like in order to bridge differences in elevations.
[Sentence 3.8.1.3.(3)]

Where the width of 1 600 mm cannot be provided throughout the barrier-free path of travel, widened areas of at least 1 600 mm by 1 600 mm are to be provided every 30 m max.
[Sentence 3.8.1.3.(4)]

If the headroom is less than 1 980 mm high in a barrier-free path of travel, then a guardrail is required not more than 680 mm above the finished floor. This guardrail is to guide the visually impaired away from the reduced headroom location. As such this guardrail is to be located in line with the headroom height of 1 980 mm.
[Sentence 3.8.1.3.(5)]

If transportation, in the form of escalators or moving walkways, is provided from the entrance floor level and the barrier-free storey, a barrier-free path of travel is also required to those storeys. This may be accomplished by providing elevator(s) or the like. See Appendix "A" from more information.
[Sentence 3.8.1.4.(1)]

Controls for the operation of building services; for example, elevator call buttons, thermostats, electrical switches, etc., are required to be located not more than 1 200 mm high and not less than 900 mm.
[Sentence 3.8.1.5.(1)]

The illumination of a barrier-free path of travel is mandated to be at an average level of at least 50 lx measured at the floor level.
[Sentence 3.8.1.6.(1)]

4. If a barrier-free corridor is less than 1 600 mm wide throughout its length, then widened areas must be provided every 30 m max. These widened areas must be a minimum of;

   a) 1 060 wide by 1 060 long

   b) 1 600 wide by 1 600 long

   c) 1 060 wide by 1 600 long

   d) 1 600 wide by 1 060 long

OBC Reference: _____

5. Controls for the building services which are located in a barrier-free path of travel must be situated NOT;

   a) more than 1 600 mm above the floor

   b) more than 900 mm above the floor

   c) more than 1 200 mm above the floor

   d) more than 1 060 mm above the floor.

OBC Reference: _____

6. The minimum average level of illumination in a barrier-free path of travel is:

   a) 2 lx measured at floor level

   b) 100 lx measured at floor level

   c) 50 lx measured at 1 200 m above the finished floor level

   d) 50 lx measured at the finished floor level.

OBC reference: _____

STOP

OCCUPANCY CLASSIFICATION (SUBSECTION 3.8.2. - DIV. B)

Areas Requiring Barrier-Free Path of Travel

A barrier-free path of travel is required throughout the entrance storey and within occupied floor areas served by an elevator or similar device, EXCEPT to;
[Sentence 3.8.2.1.(1)]

- service rooms,
- elevator machine rooms,

- janitors rooms,
- service spaces,
- crawl spaces,
- attic or roof spaces,
- floor levels NOT served by an elevating device,
- high-hazard industrial occupancies,
- assembly areas with fixed seats (except to those areas with seating designated for wheelchair use),
- residential suites located on other than the entrance storey and that have their entrances not located at an elevator stop level,
- inside a suite of residential occupancy except those required to be barrier-free, or
- those parts of a floor areas that are not at the entry level, provided the same amenities are provided elsewhere in a barrier-free path of travel. See Appendix "A" for additional information.
  [Sentence 3.8.2.1.(2)]

The minimum number of spaces designated for wheelchair in an assembly occupancy is based on the number of fixed seats and is found in Table 3.8.2.1.
[Sentence 3.8.2.1.(3)]

In Group C buildings, not less than 10% of the suites are to be provided with a barrier-free path of travel from the suite entrance door to the doorway to at least:

- 1 bedroom, and
- 1 bathroom which;
  - has an area of at least 4.5 m^2, and
  - conforms to the requirements of Sentence 9.5.11.3.(1),"Doors to Bathrooms".
    [Sentence 3.8.2.1.(4)]

A barrier-free path of travel must also be provided outside the building (and within) from the entrance to;

- the exterior parking area (where one is provided),
- at least one indoor parking level (if the parking is served by a passenger elevator).
  [Sentence 3.8.2.2.(1)]

5. The minimum clearance height in an exterior passenger loading zone is;

   a) 2 000 mm,

   b) 2 100 mm,

   c) 2 750 mm,

   d) 3 000 mm.

OBC Reference: _____

STOP

DESIGN STANDARDS (SUBSECTION 3.8.3. - DIV. B)

Accessibility Signs

When a building is required to have a barrier-free entrance, a sign of the International Symbol of Accessibility is to be installed so as to indicate that entrance and any ramps serving those entrances. [Sentence 3.8.3.1.(1)]

Similarly, signs are to be posted to indicate barrier-free accessibility to washrooms, elevators, telephones and parking spaces. [Sentence 3.8.3.1.(2)].

If a washroom is NOT equipped for barrier-free access, a sign indicating the location of a barrier-free washroom is to be provided. [Sentence 3.8.3.1.(3)]

It also stands to reason that barrier-free signs are to be posted where necessary to indicate the accessible means of egress. [Sentence 3.8.3.1.(4)]

Barrier-free signs are to be located not less than 1 200 mm and not more than 1 500 mm above the floor. [Sentence 3.8.3.1.(5)]

Exterior Walks

The basic rules for an exterior walkway forming part of a barrier-free path of travel are listed in Sentence 3.8.3.2.(1) and include;

- no steps or sudden changes in level,
- permanent, firm and slip-resistant finish,
- a width at least 1 100 mm and a maximum gradient of 1 in 20 (remember also Sentence 3.8.1.3.(4)),

- if the gradient is more than 1 in 20, the walkway must be designed as a ramp,
- having a different texture than the area surrounding it and be level and even with the surrounding surface,
- be free of obstructions for the full width and to a minimum height of 1 980 mm except that handrails may project 100 mm from either side into the required width,
- have a level area at the entrance doorway which is 1 670 mm wide by 1 670 mm long.
  [Sentence 3.8.3.2.(1)]

Curb ramps may be used if the difference in elevation is not more than 200 mm.
[Sentence 3.8.3.2.(2)] These curb ramps must have a;

- maximum running slope conforming with Table 3.8.3.2.,
- minimum width of 1 200 mm,
- be slip-resistant surface,
- detectable warning surface that is different in colour AND texture from the surrounding area,
- smooth transition, and
- have flare sides with a slope not more than 1 in 10.
  [Sentence 3.8.3.2.(3)]

These curb ramps do NOT require handrails nor guards.
[Sentence 3.8.3.2.(4)]

Doorways and Doors (See also Appendix "A")

Every doorway located in a barrier-free path of travel must have a clear width of at least 850 mm measured when the door is open.
[Sentence 3.8.3.3.(1)]

In every residential suite, except where the bathroom is NOT located on the same level as the barrier-free entrance door, the doorway to at least 1 bathroom and to each bedroom at the same level as the bathroom, shall have a door which is not less than;

- 760 mm wide when the door is served by a corridor not less than 1 060 mm wide, or
- 810 mm where the door is served by a corridor less than 1 060 mm wide.
  [Sentence 3.8.3.3.(2)]

Opening devices for doors should be of a design which do not require tight grasping and twisting. Handle-type door opening devices are a good method of complying with this provision. [Sentence 3.8.3.3.(3)]

Usually entrance doors in a barrier-free path of travel required in Article 3.8.1.2. are required to be equipped with a power door operator in the following occupancies;

- hotels,
- Group B-2 or B-3 occupancies,
- Group A, D or E occupancies in building areas greater than 300 m^2.
  [Sentence 3.8.3.3.(4)]

If a door equipped with a power operator is located within a vestibule, the door leading from the vestibule to the floor area must also be provided with a power operator for the buildings or occupancies described above.
[Sentence 3.8.3.3.(5)]

It is important to be aware that all the requirements for power operators on doors are waived if the door serves an individual suite;

- which has an area less than 300 m^2,
- is located in a building having only suites of Group A, D or E occupancies, and
- each suite is completely separated from the remainder of the building.
  [Sentence 3.8.3.3.(6)]

The maximum force necessary to open a door in a barrier-free path of travel is 38 N for exterior doors and 22 N for interior doors [Sentence 3.8.3.3.(7)] EXCEPT;

- entrance doors to dwelling units,
- where there is a great pressure difference across the door. [Sentence 3.8.3.3.(8)]

Except for doors serving dwelling units, closures for doors in a barrier-free path of travel shall have a closing period of at least 3 seconds (measured when the door is at a 70° open position to when it is 75 mm from the closed position).
[Sentence 3.8.3.3.(9)]

If the door does not have a power door operator, a clear distance from the edge of the door (on the latch side) is required, and shall be not less than;

- 600 mm where the door swings towards you, and
- 300 mm when it swings away from you.
  [Sentence 3.8.3.3.(10)]

Where vestibules are provided in a barrier-free path of travel, the minimum length of the vestibule is 1 200 mm plus the width of the door when the door swings into the vestibule. [Sentence 3.8.3.3.(11)] If the vestibule is provided with multiple-leaf doors, only the active leaf is required to comply with the barrier-free requirements. [Sentence 3.8.3.3.(12)]

Except for ramps, the floor surface on each side of a door in a barrier-free path of travel shall have a rectangular level area;

- as wide as the door plus the clearance required on the latch side, and
- the dimension in the direction of travel (i.e., perpendicular to the closed door) is not less than the width of the barrier-free path of travel, but need not be more than 1 500 mm.
  [Sentence 3.8.3.3.(13)]

If a door is provided with a vision panel, that panel must;

- be at least 75 mm wide,
- be located so that the bottom of the panel is not more than 900 mm above the floor, and
- the panel is not more than 250 mm from the latch side of the door.
  [Sentence 3.8.8.3.(14)]

Should a door in a barrier-free path of travel be made entirely of glass, its presence is required to be marked with a continuous opaque strip;

- the colour of which must contrast with the background,
- be at least 50 mm wide,
- be located from 1 350 mm to 1 500 mm high and extend the full width of the door,
- may incorporate a logo or symbol as long as the logo or symbol does not reduce or diminish the;
  - opacity of the strip,

- width of the strip,
- colour or contrast with the background, and
- continuity of the strip.
  [Sentence 3.8.3.3.(15)]

Where power door operators are required, people are to be capable of activating the door from either side.
[Sentence 3.8.3.3.(16)

The control for the power door operators shall;

- have no dimension less than 100 mm,
- be located so that the centre is between 1 000 mm and 1 100 mm above the floor or ground level,
- be located not less than 600 mm beyond the door swing, and
- be signed.
  [Sentence 3.8.3.3.(17)]

Ramps (Refer to Appendix "A" for more information)

The required geometry of ramps in a barrier-free path of travel is as follows;

- minimum width between handrails - 900 mm,
- maximum gradient - 1 in 12,
- must have a level area at least 1 670 mm by 1 670 mm at the following locations;
  - at the top of the ramp,
  - at the bottom of the ramp,
    - where a door is located in a ramp (the level area must also extend at least 600 mm beyond the latch side of the door and if the door swings away from the ramp - 300 mm),
- must have a level area at least 1 670 mm long and as wide as the ramp;
  - at intervals of not more than 9 m, or
  - where there is a change in direction,
- must have a handrail on both sides which are;
  - continuously graspable and having specific dimensions,
  - not less than 865 mm and not more than 965 mm high,
  - be terminated so as not to be dangerous,

- extend horizontally not less than 300 mm beyond the top and bottom of the ramp,
- be not less than 50 mm clear to the wall,
- be designed to resist the loads specifically listed in this Sentence.

- Also be provided with a wall or guard on both sides of the ramp, and when a guard is provided that guard shall;
  - not less than 1 070 mm high,
  - not facilitate climbing between 140 mm to 900 mm high,
  - have a curb at least 50 mm high if the guard is not solid, and
  - have the barrier extending to within 50 mm of the ramp surface or be provided with a curb as described above. [Sentence 3.8.3.4.(1)]

If the ramp serves an aisleway serving fixed seating, the requirements for handrails do NOT apply.
[Sentence 3.8.3.4.(2)]

If a floor slopes more than 1 in 20, those floors shall be designed as ramps as long as the floor is in a barrier-free path of travel.
[Sentence 3.8.3.4.(3)]

Elevators

Passenger-type elevating devices must conform with the provisions of CAN/CSA B355 standard, "Lifts for Persons with Physical Disabilities".
[Sentence 3.8.3.5.(1)]

Spaces in Seating Areas

Where spaces for wheelchairs are required in areas with fixed seating [Sentence 3.8.2.1.(3)], those areas shall be;

- clear and level or level with removable seats,
- at least 900 mm wide by 1 525 mm long to allow approach from the side and 1 220 mm long where the wheelchair enters from the front or rear,
- have at least 2 such spaces side by side,
- located next to a barrier-free path of travel without blocking egress from the rows or aisles, and
- provided with suitable viewing.
  [Sentence 3.8.3.6.(1)]

    - designed for 1.3 kN (min),
- be provided with horizontal grab bars which shall be;
    - 900 mm long,
    - located about 850 mm above the floor,
    - located on the wall so that at least 300 mm of its length is reachable from one side of the seat.
- be provided with pressure equalizing or thermostatic mixing value controlled by a lever operable with a closed fist from the seated position,
- have a hand-held shower head with at least 1 500 mm of flexible hose placed so it can be reached from a seated position and must be designed so as to also operate as a fixed shower head, and
- have reachable fully recessed soap holders. [Sentence 3.8.3.13.(1)]
- Individual shower stalls used in Group B-2 or B-3 occupancies must also comply with the requirements listed above. [Sentence 3.8.3.13.(2)]
- Individual bathtubs used in Group B-2 or B-3 occupancies shall have;
    - non-spring loaded faucet handles or automatic operable,
    - faucets are to be located so as to be accessible when the person is seated,
    - unless the bathtub is free-standing, have an "L"-shaped grab bar as described in Subclauses 3.8.3.8.(1)(d)(iv) to (vi) mounted on the wall with;- each leg at least 900 mm long,
    - formed at a 90° angle,
    - have the horizontal leg located between 150 mm to 200 mm above and parallel to the rim, and
    - the vertical leg located between 300 mm to 450 mm from the control end of the tub. [Sentence 3.8.3.13.(3)]

Shelves or Counters for Telephones

Where shelves or counters are provided for telephones, they shall be level and they also shall;

- be at least 350 mm deep,
- have a clear space of at lest 250 mm wide without obstructions within 250 mm above the surface for each telephone.
  [Sentence 3.8.3.15.(1)]

The top surface of the shelf or counter should be not more than 865 mm above the floor and have a knee space of not less than 685 mm.
[Sentence 3.8.3.15.(2)]

If a wall-hung telephone is provided above a shelf or counter, the telephone is to be located so that the receiver and the coin slot are not more than 1 200 mm above the floor.
[Sentence 3.8.3.15.(3)]

Drinking Fountains

Where drinking fountains are provided, at least 1 shall be barrier-free and it shall;

- have a spout near the front of the unit not more than 915 mm above the floor, and
- be equipped with controls which are operable using one hand while in a wheelchair and using a force of not more than 22 N or be automatically operable.
  [Sentence 3.8.3.16.(1)]

EXERCISE # 3 - DESIGN STANDARDS

Include the Division designation with your answers.

1. An exterior walkway in a barrier-free path of travel is required to be designed as a ramp if the gradient is;
   a) greater than 1 in 20
   b) less than 1 in 20
   c) greater than 1 in 50
   d) an exterior walkway is not governed by the building code.

OBC Reference: _____

- have no projections above the walking surface more than 13 mm high,
- at least 1.5 m deep, and
- provide at least 0.5 m^2 of floor area for each occupant of the suite.
  [Sentence 3.3.1.7.(7)]

EXERCISE # 4 - PROTECTION WITHIN FLOOR AREAS

Include the Code Division designation in your answers.

1. An unsprinklered floor area is divided into 2 zones. The occupancy on the floor area is Group D. What is the maximum travel distance from the most remote point in one zone to the door leading into the other zone?

   a) 25 m

   b) 40 m

   c) 45 m

   d) 105 m

OBC Reference: _____

2. The fire-resistance rating for the fire separation which creates the zones in a barrier-free path of travel when the floor is required to have a fire-resistance rating of 1 h is;

   a) 45 min

   b) 1 h

   c) just a fire separation without a fire-resistance rating

   d) no fire separation is required just a smoke barrier.

OBC Reference: _____

Camps For Workers

Camps for housing workers require at least 3.72 m^2 per employee for rooms used for sleeping.
[Sentence 9.5.7.6.(1)]

The requirements as found in Subsection 3.7.6. apply to all food premises.
[Sentence 3.7.6.1.(1), 9.1.1.6.(1)]

STOP

INTRODUCTION

In The House - 2012 course, the topic was introduced to the specific requirements for doors serving only dwelling units.

In this module we will look at some specific requirements addressing doors located in other than dwelling units. This also includes doors serving residential occupancies which may or may not be dwelling units. You may want to re-read the definitions of dwelling unit and residential occupancy before proceeding in order not to get confused. It is also important to keep this clear in your mind since this distinction will come up time and time again.

OBJECTIVES

Upon completion of this module, you will be able to;

a) list the required opening sizes for doors,

b) recognize the conditions which require door openings to be limited,

c) explain the restrictions dealing with glass in doors and sidelights.

REQUIRED DOORS

Application and Doorway Sizes

The important thing to remember is that the following information is also to be verified against other areas in the code which may also deal with this subject matter. These Sections are;

- Section 3.8 (Barrier-Free Design),
- Section 9.9 (Means of Egress), and
- Section 9.10 (Fire Protection).

Should a door size be governed by any of these Sections, those requirements will most likely be more restrictive than those found in Section 9.6 (Doors) and would therefore apply.

Any glass in doors, storm doors, glass sliding doors and sidelights more than 500 mm wide located within or at an entrance to a dwelling unit or in a public area must be made of;

- tempered or laminated safety glass, or
- safety or wired glass.
  [Sentence 9.6.1.4.(1)]

Except for sliding glass partitions, which will be addressed in another module, glass in doors in locations other than at an entrance to a dwelling unit or in a public area, is to be of safety glass or wired glass as described above where the glass area is;

- more than 0.5 m^2, and
- the glass extends to less than 900 mm from the bottom of the door.
  [Sentence 9.6.1.4.(2)]

Visibility of Glass Doors

Except for sliding glass partitions, every glass or transparent door which is accessible to the public is to be equipped with;

- hardware,
- bars, or
- other permanent fixtures

so that the existence of the door is readily apparent.
[Sentence 9.6.1.4.(5)]

EXERCISE # 1 - DOORS

Answer the following questions with code references and Code Division designators.

1. A door to a bathroom located in a barrier-free path of travel in a residential occupancy is served by a corridor which is 980 mm wide. If the bathroom door is on the same level as the entrance to the suite, the minimum door width is;

   a) 610 mm

   b) 760 mm

   c) 810 mm

   d) 870 mm

OBC Reference: _____

2. The finished interior floor level in a Group D occupancy is 190 mm below the sliding door sill while the distance from the finish floor to the ground level is 1 200 mm. The door must be;
   a) openable only to 200 mm maximum
   b) openable only to 100 mm maximum
   c) openable only to 150 mm maximum
   d) protected by a guard

OBC reference: _____

3. Glass in a 500 mm wide sidelight must be made of;
   a) safety glass,
   b) laminated glass,
   c) wired glass,
   d) not regulated.

OBC Reference: _____

4. Glass in a 650 mm wide sidelight must be made of;
   a) safety glass,
   b) laminated glass,
   c) safety glass of the laminated type,
   d) protected by a guard.

OBC Reference: _____

5. Safety glass in a 1 200 mm wide sidelight adjacent to an entrance door in a public area unit must conform to:
   a) CAN/CGSB - 12.11 - M
   b) CAN/CGSB - 12.1 - M89
   c) CAN/CGSB - 12.1 - M
   d) CAN/CGSB - 12.11 - M90

OBC reference: _____

STOP

INTRODUCTION

Most of the window, door and skylight requirements in Part 9 are applicable to dwelling units. The areas within Part 9 dealing with this subject are usually limited to live/work units and to the protection of windows in public areas. A point to keep in mind is that except for live/work units, windows areas as stated in the code apply to residential uses.

OBJECTIVES

Upon completion of this module, you will be able to;

a) determine the minimum size of windows serving live/work units,

b) identify the maximum openable portion of windows in residential occupancies,

c) establish the necessary protection to windows in public areas.

WINDOWS, DOORS AND SKYLIGHTS (SECTION 9.7 - DIV. B)

General Requirements

Windows must comply with the requirements of Section 9.7.; however, other parts of the code may also have an impact on this subject. Specifically, one may have to verify Section 9.10. (Fire Protection), Subsection 9.10.14. (Spatial Separation) and Section 9.32, "Ventilation", if applicable. These other requirements will be addressed later in this course.
[Sentence 9.7.1.1.(1)]

Minimum Window Areas

The minimum area of window areas for rooms in buildings of residential occupancies are to comply with the areas indicated in Table 9.7.2.3.
[Sentence 9.7.2.3.(1)]

Glazing located in a door or skylight is deemed to be equivalent to a window.
[Sentence 9.7.2.3.(2)]

Window areas serving live/work areas are to comply with Clause 3.7.2.1.(2)(a)
[Sentence 9.7.2.3.(3)]

The requirements found in Part 3 for live/work units state;

- the minimum window area in a work area in a live/work unit is to be not less than 10% of the room area, exclusive of skylights.
  [Clause 3.7.2.1.(2)(a)]

The floor area which contains a bedroom area is governed by Sentence 9.9.10.1.(1) which basically states;

- the window area is as stated in Sentence 9.9.10.1(1) and;
- has direct access to the exterior,
- is located on every level containing a bedroom,
- is openable without the use of tools,
- has minimum openable area of 0.35 m^2 and no dimension less than 380 mm)

and by extension be at least 5% of the area served.

Where, in a live/work unit only, the bedroom area is located on a mezzanine which has no obstructions higher than 1 070 mm above the floor, the bedroom window may be located on the main floor if the mezzanine;

- is NOT more than 25% of the area of the live/work unit, or
- 20 m^2

whichever is less.

Also, there must be an unobstructed path of travel from the mezzanine to the window described above.
[Sentence 9.9.10.1.(4)]

REQUIRED GUARDS

Where a dwelling unit is located above another suite or unit, windows must be limited in their openability for **residential occupancies**. Those requirements are that the window(s) must;

- be protected with a guard, or
- be limited to a 100 mm vertical or horizontal opening if the other dimension is more than 380 mm.
  [Sentence 9.8.8.1.(5)]

TYPES OF GLASS AND PROTECTION OF GLASS (SUBSECTION 9.6.1. - DIV. B)

Except for sliding glass panels (e.g., sliding store fronts in an enclosed mall), any transparent panel which could be mistaken by the public as a means of egress is to be made inaccessible by the use of barriers or railings.
[Sentence 9.6.1.4.(3)]

Sliding glass partitions which constitute a boundary between an occupancy and a **public corridor** are not required to have barriers or railings nor be of safety or wired glass as long as they are suitably marked so that the public is aware of their existence.
[Sentence 9.6.1.4.(4)]

Windows over stairs, ramps and landings that extend to less than 1 070 mm above the treads, ramps or landings must be;

- protected by guards, or
- non-opening and designed to resist the same loads as for a balcony guard (See Articles 4.1.5.14. & 9.8.8.2. for loading). [Sentence 9.8.8.1.(7)]

The same requirements as for windows in stairs, ramps and landings exist for windows in residential occupancies that are located in public areas, are less than 1000 mm from the floor and are above the second storey.
[Sentence 9.8.8.1.(9)]

Required exit stairs and public stairs serving buildings of other than residential occupancy must have a width of not less than the greater of 900 mm or 8 mm per person based on the occupant load limits specified in Table 3.1.17.1.
[Sentence 9.8.2.1.(3)]

Stair Configurations (Subsection 9.8.3. - Div. B)

Stairs may contain straight runs or (**not and**) curved runs.
[Sentence 9.8.3.1.(1)]

Every interior flight of stairs must have at least 3 risers.
[Sentence 9.8.3.2.(1)]

The maximum height between landings is 3.7 m.
[Sentence 9.8.3.3.(1)]

Stair Dimensions (Subsection 9.8.4. - Div. B)
See also Appendix "A"

Riser height within a flight must comply with Table 9.8.4.1. and is measured vertical nosing-to-nosing distance.

To properly apply Table 9.8.4.1. it is important to realize that the table addresses 3 different types of stairs;
different types of stairs;

- stairs to service spaces or room and stairs that serve mezzanine areas with an area not greater than 20 m^2 in live/ work units,
- interior and exterior stairs serving a single dwelling unit,
- public or other stairs not described above.
  [Sentence 9.8.4.1.(1)]

Risers are to be uniform within a flight with allowable tolerances of 5 mm between;

- adjacent treads or landings, and
- 10 mm between the tallest and shortest riser in that flight.
  [Sentence 9.8.4.4.(1)]

Except for required exit stairs, where the top or bottom riser adjoins a sloping walking surface, the variation in height of the risers *across* the stair width is to be not more than 1 in 12.
[Sentence 9.8.4.4.(2)]

Stair treads are to be uniform in run and width with allowable tolerances of 5 mm between;

- adjacent treads, and
- 10 mm between the deepest and shallowest runs and treads in any one flight.
  [Sentence 9.8.4.4.(3)]

Where angled treads that form part of the stair, all the treads must angle or turn in the same direction.
[Sentence 9.8.4.4.(4)]

The cross-slope of treads is not to exceed 1 in 50.
[Sentence 9.8.4.4.(5)]

The minimum dimensions for run and tread depth for rectangular treads must comply with Table 9.8.4.1.
[Sentence 9.8.4.2.(1)]

The actual tread depth must be not;

- less than the run of the steps (Table 9.8.4.1.), and
- more than the run plus 25 mm [Sentence 9.8.4.2.(2)], but not more than the maximum tread depth as found in Table 9.8.4.1.

If angled treads are used in an exit stair, the design must comply with Article 3.4.6.9.
[Sentence 9.8.4.3.(1)]

Angled treads in stairs other than exit stairs are to have;

- an average run of not less than 200 mm, and
- a minimum run of 150 mm.
  [Sentence 9.8.4.3.(2)]

The minimum depth of an angled tread is to be **not**;

- less than the minimum run at any point, and
- more than that actual run plus 25 mm.
  [Sentence 9.8.4.3.(3)]

If the leading edge of a tread is rounded or bevelled, that edge is;

- to NOT reduce the required tread depth by more than 15 mm, and
- to NOT extend horizontally more than 25 mm.
  [Sentence 9.8.4.6.(1)]

Where an interior stair extends through the roof, the stair must be protected from the elements.
[Sentence 9.8.4.7.(1)]

Ramps (Subsection 9.8.5. - Div. B)

Article 9.8.5.1. applies to pedestrian ramps other than ramps required to be barrier-free accessible.

Ramps in a barrier-free path of travel are covered in Article 3.8.3.4.
[Sentence 9.8.5.1.(2)]

Public ramps and exit ramps serving residential buildings are to be at least 900 mm wide. This requirements does NOT apply to other ramps used as exits.
[Sentence 9.8.5.2.(1)]

Exit ramps and public ramps serving buildings other than residential occupancy must have a clear width of not less than the greater of 900 mm or 8 mm per person on the occupant load limits specified in Table 3.1.17.1.

The clearance above a ramp is to be 2 050 mm minimum.
[Clause 9.8.5.3.(1)(b)]

The maximum slope for a ramp is;

- 1 in 10 for an exterior ramp,
- 1 in 10 for an interior ramp serving residential occupancies,
- 1 in 6 for mercantile and industrial occupancies, and
- 1 in 8 for all other occupancies.
  [Sentence 9.8.5.4.(1)]

If the ramp slope is steeper than 1 in 12, the maximum rise between floors or landings is limited to 1 500 mm.
[Sentence 9.8.5.5.(1)]

A landing may be omitted at the bottom of an exterior stair or ramp as long as there is no obstruction within the LESSER of;

- the width of stair or ramp, or
- 1 100 mm.
  [Clause 9.8.6.2.(4)(b)]

Landings (Subsection 9.8.6. - Div. B)
See also Appendix "A"

Generally, the dimensions of a landing are addressed in Table 9.8.6.3. depending on the actual landing configuration.
[Sentence 9.8.6.3.(1)]

If stairs or ramps have differing widths, the width of the landing is to be not less than the greater required width of the stair or ramp, where one or more of the stair or ramp widths do not exceed their respective widths,or not less than the lesser actual stair or ramp width, where all of the widths of the stairs or ramps exceed their respective require widths.
[Sentence 9.8.6.3.(3)]

Where a door swings toward a stair, the full arc of the swing must be over the landing.
[Sentence 9.8.6.3.(4)]

If a doorway or stairway opens onto a ramp, the length of the landing is to be equal to the width of the door plus 300 mm on either side of the door.
[Sentence 9.8.6.3.(6)]

The minimum clear height over a landing is to be 2 050 mm.
[Clause 9.8.6.4.(1)(b)]

Generally, there are 3 conditions in which a landing is required;

1. at the top and bottom of every flight of interior and exterior stairs
   [Clause 9.8.6.2.(1)(a)]
2. at the top and bottom of every exterior ramp with a slope greater than 1 in 50
   [Clause 9.8.6.2.(1)(b)]
3. where a doorway opens onto a stair or ramp.
   [Clause 9.8.6.2.(1)(c)]

7. The maximum slope for an interior ramp serving an office building is;

   a) 1 in 12

   b) 1 in 10

   c) 1 in 6

   d) 1 in 8

OBC reference: _____

8. An interior stair NOT serving a dwelling unit is required to have a landing(s) at the;

   a) top and bottom of the stair

   b) top and bottom of the stair and where a doorway occurs in the stairway

   c) bottom only if the door at the top swings away from the stair

   d) top only.

OBC Reference: _____

9. An exterior stair NOT serving a dwelling unit is required to have a landing(s) at the;

   a) top and bottom

   b) top, bottom and where a doorway opens onto the stair

   c) top, bottom and where a doorway occurs in the stairway

   d) top and where a door swings toward the stair

OBC Reference: _____

10. The minimum clear height over landings is;

    a) 1 100 mm

    b) 1 950 mm

    c) 2 050 mm just like for the headroom for stairs

    d) 3 700 mm

OBC Reference: _____

The height of handrails on stairs and ramps is measured vertically from a line drawn tangent to the stair nosings or from the ramp surface to the top of the handrail.
[Sentence 9.8.7.4.(1)] (See Appendix "A" for more information.)

That height is established as;

- not less than 865 mm,
- not more than 965 mm.
  [Sentence 9.8.7.4.(2)]
- where guards are required, handrails at landings shall be not more than 1 070 mm high.
  [Sentence 9.8.7.4.(3)]

Handrails installed in addition to required handrails need not comply with the height requirements.
[Sentence 9.8.7.4.(4)]

A clearance of at least 50 mm is required between a handrail and the wall.
[Sentence 9.8.7.5.(1)]

Handrails, in order to meet their intended function, must be "graspable" throughout their entire length except at changes in direction at newel posts.
[Sentence 9.8.7.5.(2)] (See Appendix "A" for more information.)

Handrails, indeed any projection or construction, cannot project into the **required** width of a stairway by more than 100 mm.
[Sentence 9.8.7.6.(1)]

Handrails must be positively anchored in order to resist the loads expected to be imposed upon them. This connection should be to structural members. The handrails must be designed and connected to resist;

- a point load of at least 0.9 kN applied at any point, and
- a uniformly distributed load of 0.7 kN/m.
  [Sentence 9.8.7.7.(1)]

EXERCISE # 2 - HANDRAILS

Include the Code Division indicator as part of your answers.

1. A straight run, interior stair serving a mercantile occupancy is 1 200 mm wide and has 14 risers. A handrail is required;
   a) on one side only
   b) on both sides
   c) a handrail is not required
   d) on both sides and in the middle due the stair width.

OBC Reference: _____

2. A guard is required around an interior mezzanine floor located in an office building. The continuous handrail height required on the landing cannot exceed;
   a) 800 mm
   b) 965 mm
   c) 1 070 mm
   d) the same height as the guard

OBC Reference: _____

3. The maximum height for a handrail on a ramp serving a Group C occupancy is;
   a) 800 mm
   b) 965 mm
   c) 1 070 mm
   d) 1 100 mm.

OBC Reference: _____

4. A handrail is required to have a minimum clearance to the wall it is attached to and at the same time cannot project more than a certain value into the required width of the stair. These two values are;

   a) 50 mm minimum and 100 mm maximum

   b) 50 mm maximum and 100 mm minimum

   c) 50 mm minimum for both

   d) 50 mm maximum for both.

OBC Reference: _____

5. An exit stair is determined to be a minimum of 1 100 mm wide because of the occupant load it is expected to serve but a 1 500 mm wide stair is provided. This stair is also required to have a handrail on both sides. If both handrails project into the stair width, what is the maximum projection permitted on each side?

   a) 100 mm

   b) 300 mm

   c) 400 mm

   d) 480 mm.

OBC Reference: _____

STOP

GUARDS (SUBSECTION 9.8.8. - DIV. B) (SEE APPENDIX "A" FOR MORE INFORMATION.)

Required Guards

The code basically states that a wall or guard is required anywhere there is a difference in elevation between adjacent surfaces of more than 600 mm or where the surface within 1.2 m from the walking surface has a slope of more than 1 in 2.
[Sentence 9.8.8.1.(1)]

Guards are NOT required;

- at loading docks,
- at floor pits in repair garages, or
- where access is provided for maintenance only. [Sentence 9.8.8.1.(2)]

The adjacent surface within 1.2 m from the walking surface has a slope of more than 1 vertical unit to 2 horizontal units.
[Clause 9.8.8.1.(1)(b)]

Similarly, a guard or wall is required on every open side of **interior** stairs which have more than 2 risers and on every ramp, when the difference in elevation is more than 400 mm.
[Sentence 9.8.8.1.(3)]

Doors in buildings of residential occupancy, where the finished floor on one side of the door is more than 600 mm above the floor or other surface or ground level on the other side of the door, must be protected:

by a guard in accordance with this Subsection,
[Clause 9.8.8.1.(4)(a)]

or

a mechanism capable of controlling the free swinging or sliding of the door so as to limit any clear unobstructed opening to not more than 100 mm.
[Clause 9.8.8.1.(4)(b)]

Openable windows in buildings of residential occupancy must be protected:

by a guard in accordance with this Subsection,
[Clause 9.8.8.1.(5)(a)]

or

a mechanism capable of controlling the free swinging or sliding of the openable part of the window so as to limit any clear unobstructed opening to not more than 100 mm measured either vertically or horizontally where the other dimension is greater than 380 mm.
[Clause 9.8.8.1.(5)(b)]

Glazing installed over stairs, ramps and landings that extend to less than 1070 mm above the surface of the treads, ramp or landing must be:

protected by guards in accordance with this Subsection,
[Clause 9.8.8.1.(7)(a)]

or

non-openable and designed to withstand the specified lateral loads for guards as provided in Article 4.1.5.14.
[Clause 9.8.8.1.(7)(b)]

Glazing installed in public areas that extends to less than 1000 mm from the floor and is located above the second storey in buildings of residential occupancy must be:

protected by guards in accordance with this Subsection,
[Clause 9.8.8.1.(9)(a)]

or

non-openable and designed to withstand the specified lateral loads for guards as provided in Article 4.1.5.14.
[Clause 9.8.8.1.(9)(b)]

Loads on Guards (See Appendix "A" for more information)

Guards must be designed to withstand the loads indicated in Table 9.8.8.2.
[Sentence 9.8.8.2.(1)]

It is important to keep in mind that these loads are not to be considered as acting at the same time.
[Sentence 9.8.8.2.(3)]

It is also important to know that guards constructed in accordance with the Supplementary Standard SB-7 are deemed to meet these loading requirements.
[Sentence 9.8.8.2.(5)]

Height of Guards (See also Appendix "A")

The general rule for the height of guards is 1 070 mm high.
[Sentence 9.8.8.3.(1)]

The other condition regarding guard height (that addresses occupancies other than dwelling units) is that guards for;

- stairs are to be at least 900 mm high (measured in the same way as height for handrails are measured).
  [Sentences 9.8.8.3.(4) & (7)]
- required exit stairs must not be less than 920 mm and 1070 mm around landings
  [Sentence 9.8.8.3.(5)]
- exterior stairs and landings more than 10 m above adjacent ground level must not be less than 1500 mm.
  [Sentence 9.8.8.3.(6)]

Guards for Floors and Ramps in Garages

Floors for garages serving a single dwelling unit will be addressed later in the appropriate part of the course.

For all other storage garages, a 150 mm high curb in addition to a 1 070 mm high guard (measured from the floor and not from the top of the curb) are required at every opening where the difference in elevation is more than 600 mm.
[Sentence 9.8.8.4.(1)]

Vehicle guardrails must be designed for a concentrated horizontal load of 22 kN applied outward at any point 500 mm above the floor surface.
[Sentence 9.8.8.4.(2)]

Openings in Guards (See also Appendix "A")

The basic rule for permitted openings in required guards is 100 mm max.
[Sentence 9.8.8.5.(1)]

Openings in guards in industrial occupancies are limited to 200 mm maximum. [Sentence 9.8.8.5.(2)] This maximum opening size is waived where the occupancy and use would permit a greater opening size without creating a hazard.

Openings in any guard that is not a required guard and serves a building other than an industrial building, are restricted to 100 mm maximum or 200 mm minimum unless the in size and location of the openings would not create a hazard.
[Sentence 9.8.8.5.(3)]

Design To Prevent Climbing (See Appendix "A" for more explanations).

Required guards, except those in industrial occupancies, are to be designed so that climbing them is NOT facilitated. (Unless it can be proven that the location and size of openings do not present a hazard.)
[Sentence 9.8.8.6.(1)]

This "climbability" concept may be deemed to have been complied with when parts of the guard that extend from the vertical are located between 140 mm and 900 mm; do not facilitate climbing.

Glass in Guards

Glass located in guards must be;

- laminated or tempered safety glass, or
- wired glass.
  [Sentence 9.8.8.7.(1)]

Construction of Guards

Guards are required to resist the loads as described and listed in Table 9.8.8.2.
[Sentence 9.8.8.2.(1)]

OR

they are to be constructed EXACTLY as detailed in SB-7 of the Supplementary Standards. Guards complying with the Supplementary Standards comply with the loading requirements.
[Sentence 9.8.8.2.(5)]

SB-7 SUPPLEMENTARY STANDARDS TO THE 2012 ONTARIO BUILDING CODE

The guards as detailed in SB-7 of the Supplementary Standards are simply a "pick and choose" but DO NOT MIX & MATCH process. Just pick a guard that you wish to build and simply follow the rules WITHOUT MODIFICATION. All these details were tested in the lab on full-scale models to the specified loading conditions. When you examine SB-7 closely, it will become apparent that much of the information deals with connections (as this was determined under testing to be the critical element).

It is therefore very important to closely look at some of the material which may be inadvertently overlooked;

- Section 2 deals with **exterior** guards,
  [1.1.1.(2) - SB-7]
- Sections 2 and 3 may be applied to **interior** guards.
  [1.1.1.(3) - SB-7]
- the minimum sizes of loadbearing members in **exterior** guards are listed in Table 2.1.2.,
  [2.1.2. - SB-7]
- the minimum sizes of floor members for **exterior** guards are listed in Table 2.1.3.,
  [2.1.3. - SB-7]
- for **exterior** guards, fasteners are to be corrosion-resistant screws, nails, lag bolts or machine bolts as detailed in the appropriate drawing. When nails are used they must be common spiral type nails.
  [2.1.4. - SB-7]
- **Exterior** lumber for guards is to be decay-resistant,
  [2.1.5. - SB-7]
- Table 2.2.1. addresses the connection of an **exterior** post and rail system whereas, Table 2.2.2. addresses the connections **exterior** cantilevered picket system type guards.
  [2.2 - SB-7]
- **Interior** guards are to made of wood species as listed in Table 3.1.2. for the various uses described.
  [3.1.1.(1) - SB-7]
- Table 3.1.3. deals with the minimum sizes of floor members related to **interior** guard construction.
  [3.1.3.(1) - SB-7]
- Connectors for **interior** guards may be nails, screws, lag bolts or machine bolts as described in the details.
  [3.1.4.(1) - SB-7]
- Table 3.2.1. addresses connection details dealing with **interior** guards [3.2.1.(1) - SB-7] using the post and rail system while Table 3.2.2. deals with **interior** guards of the cantilever picket system.
  [3.2.2.(1) - SB-7]
- Table 3.2.3. describes connections for **interior** guards serving stairs.
  [3.2.3.(1) - SB-7]

Use of SB-7

The use of SB-7 simply requires a designer to establish;

1. if the guard is an interior or exterior guard and which Section is applicable,
2. specify the type of lumber to be used,
3. establish the minimum loadbearing member sizes,
4. confirm the minimum floor construction member sizes,
5. confirm the type of connectors and which connection detail is applicable as referenced in the connection tables and referenced sketch,
6. confirm the type of guard you wish to construct.

CONSTRUCTION OF STAIRS & RAMPS (SUBSECTION 9.8.9. - DIV. B)

Except for wooden stair stringers and treads, which will be discussed shortly, stairs and ramps must be designed to be rigid and to support a load of 4.8 kPa.
[Sentence 9.8.9.1.(1)]

Wood Stairs

Wooden stairs are required to have stringers (the sloping members at each side of stairs) that;

- must have at least 90 mm of solid lumber measured perpendicular to the bottom of the stringer,
- have an overall depth of at least 235 mm,
  [Clause 9.8.9.4.(1)(a)]
- are supported and secured top and bottom,
  [Clause 9.8.9.4.(1)(b)]
- are at least 25 mm in actual thickness if they are supported **throughout** their length and 38 mm if they are not supported throughout their length,
  [Clause 9.8.9.4.(1)(c)]
- be spaced not more than 600 mm on centre
  [Clause 9.8.9.4.(1)(d)].

It is important to keep in mind that treads and landings for interior and exterior stairs and all ramps must be;

- wear-resistant,
- slip resistant, and

- smooth, even and free of open defects.
  [Sentence 9.8.9.6.(1)]

In order to make the stairs and ramps as safe as possible, a colour contrast or distinctive pattern is required at the following locations, the;

- leading edges of treads,
- leading edges of landings, and
- beginning and end of a ramp.
  [Sentence 9.8.9.6.(3)]

Another requirement for treads and landings of interior and exterior stairs and ramps is that they be provided with slip-resistant strips which do not extend higher than 1 mm above the surface of the tread or landing.
[Sentence 9.9.9.6.(4)]

EXERCISE # 3 - GUARDS

Include the Code Division in your answers.

1. A guard is required around an exterior stair that has;
   a) more than 2 risers
   b) 6 or more risers
   c) a difference in elevation greater than 900 mm
   d) a difference in elevation greater than 600 mm

OBC Reference: _____

2. A guard is required around a landing for an interior stair that has;
   a) 6 or more risers
   b) more than 6 risers
   c) more than 2 risers
   d) more than 2 risers and a difference in elevation greater than 600 mm

OBC Reference: _____

3. A required guard in a Group D occupancy is required to be;
   a) 1 070 mm high
   b) 900 mm high
   c) 800 mm high
   d) 1 800 mm high

OBC Reference: _____

4. The maximum opening size in a required guard in a Group F Division 2 occupancy must prevent the passage of a sphereical object with a diameter of;
   a) 100 mm
   b) 150 mm
   c) 200 mm
   d) any size.

OBC Reference: _____

5. Consider a guard constructed in accordance with Detail ED-1 in SB-7. Answer the following questions.
   - What specific type of lumber is required for the pickets?
     a) Northern Species #2
     b) Oak #2
     c) Maple #2
     d) Douglas Fir-Larch

Reference: _____

   - What is the minimum size of pickets?
     a) 89 X 89
     b) 38 X 89
     c) 32 X 32
     d) 45 X 45

Reference: _____

- horizontal exit (passage through a firewall or via a bridge to another building),
- interior passageway,
- interior ramp, or
- interior stairway.
  [Sentence 9.9.2.1.(1)]

While we have mentioned fire escapes as acceptable exits, the code limits the application of this particular type of exit facility to existing buildings only and only if they have been designed and installed as described in Part 3, specifically Subsection 3.4.7. [Sentence 9.9.2.1.(2)] This obviously means that fire escapes are NOT acceptable exits for new buildings.
[Sentence 9.9.2.1.(3)]

A horizontal exit which is defined as, "an exit from one building to another by means of a doorway, vestibule, walkway, bridge or balcony" must meet the requirements as found in Sentence 3.4.1.6.(1) and Article 3.4.6.10. [Sentence 9.9.2.1.(4)] The most common examples of horizontal exits are doorways through a firewall (a firewall creates separate buildings) or via a raised walkway or bridge linking two or more buildings.

Exits cannot be used for any other purpose other than for gaining access to the floor area. [Sentence 9.9.2.2.(1)] For example, you cannot use an exit to gain access to a service room, garbage room or another room or part of a floor area.

Items which MAY NOT BE CONSIDERED AS ACCEPTABLE means of egress include elevators, slide escapes and windows.
[Sentence 9.9.2.3.(1)]

Obviously, access to fire escapes are usually through windows and therefore the code permits the use of windows to gain access to fire escapes only when;

- the use of a fire escape is permitted,
- the occupancy is NOT Group E (mercantile),
- the window is a casement window which meets the following dimensions:
  - not less than 1 060 mm high,
  - not less than 560 mm wide,

- sill height not more than 900 mm from the inside floor level.
  [Sentence 9.9.2.3.(2)]

At least 1 door in the principle entrance to a building is to be designed as an exit.
[Sentence 9.9.2.4.(1)]

In order to make travel over stairs as safe as possible, especially in emergency situations, the code mandates that, except for curved stairs, the front edge of the stair treads in stairs in exits and access to exits must be at right angles to the direction of exit travel. [Sentence 9.9.2.5.(1)]. This would disallow a stair which has the steps skewed or at an angle to the direction of travel.

Treads and landings for an exterior exit stairs are to be designed to be free of snow and ice. Although it would make sense to have the following requirement applicable to all occupancies, this particular Sentence deals specifically with exterior exit stairs that serve a hotel.
[Sentence 9.9.2.6.(1)]

Dimensions for Means of Egress (Subsection 9.9.3. - Div. B)

Remember the definition of a means of egress which in its most simplified version is basically the path you would have to travel from anywhere within a floor area to the exterior and therefore includes, access to exits and exits.

The information we will be introducing on this topic deals with every means of egress except those serving a single dwelling unit and access to exits within a dwelling unit.
[Sentence 9.9.3.1.(1)]

The width of every exit facility shall be at least 900 mm. For door width see Article 9.9.6.3. and for stairs refer to Subsection 9.8.2.
[Sentence 9.9.3.2.(1)]

Every public corridor, corridor used by the public and exit corridor is to be not less than 1 100 mm.
[Sentence 9.9.3.3.(1)]

Except for stairways, doorways and storage garages, the minimum headroom clearance in exits and access to exits is to be 2 100 mm. Refer to Article 9.8.2.2. for stairway headroom clearances and

Subsection 9.9.6. for doorways.
[Sentence 9.9.3.4.(1)]

Exits and access to exits in storage garages must have a minimum headroom clearance of 2 000 mm.
[Sentence 9.9.3.4.(2)]

EXERCISE # 1 - GENERAL REQUIREMENTS AND DIMENSIONS IN A MEANS OF EGRESS

To complete this exercise, you need to be familiar with the requirements found in Subsections 9.9.1., 9.9.2., and 9.9.3. Provide code references and Division designations.

1. A Part 9 hotel has 10 suites on one floor. The suites have one bedroom. What is the total occupant load for the floor area?

   a) 10

   b) 15

   c) 20

   d) Hotels are Part 3 occupancies.

OBC Reference: _____

2. An engineering office has an area of 93 m^2. What is the occupant load for this area?

   a) 20

   b) 10

   c) 15

   d) 5

OBC reference: _____

3. An aircraft hangar has an occupant load of 10 people. What is the area which would support this occupant load?

   a) 46 m^2

   b) 460 m^2

   c) 280 m^2

   d) 560 m^2

OBC Reference: _____

4. Fill in the code references to the following chart dealing with Dimensions in a Means of Egress.

TOPIC	VALUE	CODE REF.
General		
Exit Width		
Access to exit width, exit corridor		
Headroom		
Stair width (2 references)		
Headroom for exits or access to exits in storage garages		

STOP

Fire Protection of Exits (Subsection 9.9.4. - Div. B)

Subsection 9.9.4. applies to the fire protection of all exits except for exits serving a single dwelling unit.
[Sentence 9.9.4.1.(1)]

Except for exterior passageways with conditions, every exit (other than an exterior exit door) must be protected from the remainder of the floor area, or from another exit, with a fire separation having a fire-resistance rating at least equal to the fire-resistance rating required for the floor assembly above the floor area in question.
[Sentence 9.9.4.2.(1)]

Where there is no floor above, the fire-resistance rating for the fire separation enclosing the exit is to be equal to the rating for the floor below but not less than 45 minutes.
[Sentence 9.9.4.2.(2)]

Where you have two exits sharing a common wall as is the case when you have scissor stairs or adjacent stairs, the common wall must be smoke-tight and may not have doorways, duct work, piping or any openings that might affect the integrity of the fire separations.
[Sentence 9.9.4.2.(3)]

In order to address all the possible conditions, Article 9.9.4.6. deals with conditions of where an exterior exit door in one fire compartment is located within 3 m of an opening in another fire compartment and the walls intersect at an angle of less than 135°. In this scenario the opening must be protected with a rated closure, wired glass in fixed steel frames or glass block installed in accordance with Table 9.10.13.1. and Articles 9.10.13.5. and 9.10.13.7. Figure 7-2 also illustrates this condition.

In spite of all the requirements for exiting, stairways in Group D (offices) and Group E (mercantile) occupancies may have an unenclosed exit stair under specific conditions. The conditions which must exist for a single unenclosed exit stairway are;

- the suite may only be Group D or E,
- the suite in question may be partly located on the first storey and partly on the second, or partly on the second and partly on the third storey,
- the building cannot be higher than 3 storeys,
- the suite in question is separated from all other suites by at least a 45 minute fire separation,
- the maximum area is limited to 100 m^2 per storey except for the entry level storey,
- the maximum travel distance from anywhere within the suite to an exterior exit is not more than 25 m,
- the floor assemblies have a 45 minute fire-resistance rating or are of noncombustible construction,
- the basement is separated from the first floor with a fire separation having a 45 minute fire-resistance rating,
- smoke alarms are installed on each floor of the suite and the basement.
  [Sentence 9.9.4.7.(1)]

Above we dealt with obstructions in corridors, in Sentence 9.9.5.4.(1), the code deals with obstructions within the required width of an exit. The general rule is that no obstructions such as turnstiles, fixtures or any construction may encroach into the required width of an exit EXCEPT for;

- doors and door swings (Subsection 9.9.6.), and
- the 100 mm projection for handrails (Article 9.8.7.6.)

Up until now we have discussed obstructions in corridors and exits, the only remaining topic is obstructions in means of egress. These requirements are covered in Article 9.9.5.5.

Unless an additional, adjacent, unobstructed means of egress is provided, NO obstructions (e.g. posts, turnstiles) are to be placed in a means of egress so as to reduce the width to less than 750 mm. [Sentence 9.9.5.5.(1)] An example would be turnstiles on the way out of a grocery store.

Counter gates (i.e. at check outs) which do not meet the requirements for exit doors, are not to be placed in a required means of egress unless there is another unobstructed, adjacent means of egress.
[Sentence 9.9.5.5.(2)]

The conditions listed in the paragraph above may be waived in Group D and E occupancies as long as the floor area which would be served by the obstructed means of egress is not generally accessible to the public.
[Sentence 9.9.5.5.(3)]

Now that we have discussed obstructions in a means of egress, let's examine the hazards in a means of egress.

In order not to confuse people, especially in a panic situation, as to the direction of exit travel, NO mirrors are to be place in or next to an exit. Similarly, NO mirrors or draperies are to be placed on or over exit doors.
[Sentence 9.9.5.6.(1)]

No fuel-fired appliances are to be installed in an exit or in a corridor which is an access to exit.
[Sentence 9.9.5.7.(1)]

Service rooms containing equipment that may explode and some types of refrigerating equipment and transformers are not to be placed under required exits.
[Sentence 9.9.5.8.(1)]

Subsidiary rooms, such as storage rooms, washrooms, laundry rooms and service rooms, are NOT permitted to open directly into an exit.
[Sentence 9.9.5.9.(1)]

BEWARE:

As an aside, a point which is extremely important for the correct application of the code: Be very careful to read EXACTLY what is written, as the code is extremely specific in the wording that is used. For example, certain conditions may apply to REQUIRED exits or to exits in general (whether required or provided in addition to the required exits). Another example is where the code requires the building to be sprinklered or the occupancy to be sprinklered. This type of subtle differentiation is used throughout the code, at times extensively, and special care must be exercised in order to properly interpret the intent of the regulations.

Doors in a Means of Egress (Subsection 9.9.6. - Div. B)

For exit doors, doors opening in or located in a public corridor and doors providing access to exit from a suite, in their fully open condition, are not to reduce the required exit width in exit corridors by more than 100 mm and not more than 50 mm for all other types of exit facilities. [Sentences 9.9.6.2.(1)&(2)] Also, door swings cannot reduce the path of travel to less than the required width in exit corridors and 750 mm on exit stairs or landings.
[Sentence 9.9.6.1.(3)]

The clear opening height for doorways in the locations described in the paragraph above is to be 2 030 mm minimum.
[Sentence 9.9.6.2.(1)]

Door closers or other devices for that matter, which are installed in doorways described in Sentence (1) cannot reduce the headroom clearance to less than 1 980 mm.
[Sentence 9.9.6.2.(2)]

Every exit doorway and every doorway that opens into or is located in a public corridor or any other access to exit shall be at least;

- 800 mm wide for a single leaf door,
- 800 mm wide in multiple leaf doors with only one active leaf, or
- 1 210 mm in multiple leaf doors with 2 active leaves.
  [Sentences 9.9.6.3.(1)&(2)]

Where doorways are provided with multiple leaves, NO;

- active leaf is to be less than 810 mm wide where only 1 leaf is active, and
- single leaf is to be less than 610 mm wide where 2 leaves are active.
  [Sentence 9.9.6.3.(3)]

Except for the exceptions provided in Sentences (4) and (5), every exit door or door in a required means of egress is to swing on a vertical axis.
[Sentences 9.9.6.4.(1),(4)&(5)]

Where break away exit doors are provided as required exit doors or required doors in a means of egress (e.g., in movable store front partitions in covered malls), that door must be clearly indicated as a swing door by the application of a label or decal on that door.
[Sentence 9.9.6.4.(2)]

When revolving doors are within an exit they must conform with Article 3.4.6.15. which basically states that (for non-electrically operated revolving doors);

- the doors shall be collapsible,
- have hinged doors providing equivalent exiting capacity located next to the revolving doors,
- be used as an exit from the ground floor only,
- be not closer than 3 m from the foot of any stairway,
- have glass which is tempered or laminated safety glass or wired safety glass, and
- the revolving door is not to be considered to serve more than 45 people.

If the revolving doors are electrically operated they must comply with Sentence 3.4.6.15.(3).
[Sentence 9.9.6.4.(3)]

Exit doors must swing in the direction of exit travel.
[Sentence 9.9.6.5.(1)]

Doors opening onto a corridor or other similar facility providing access to exit from a room or suite having an occupant load greater than 60 must also swing on a vertical axis in the direction of exit travel
[Sentence 9.9.6.5.(3)]

Doors that divide a corridor and that are not located within a suite must also swing in the direction of exit travel.
[Sentence 9.9.6.5.(4)]

In the situation where doors are located in a corridor that provides access to exit in either direction, the door on the right side is to swing in the direction of travel where doors swing in opposite directions. Otherwise, the doors are to swing in both directions.
[Sentence 9.9.6.5.(5)]

Except for doors which are equipped with electromagnetic locking devices which must then comply with Sentence 3.4.6.16.(4), exit doors and doors to suites must be openable from the inside without the use of keys or specialized knowledge.
[Sentence 9.9.6.7.(1)]

Door serving suites (not only residential suites) which open onto a PUBLIC CORRIDOR which provides access to exit must NOT lock automatically when these doors are equipped with self-closing devices. The only exception to this rule is for doors serving hotel or motel suites.
[Sentence 9.9.6.7.(4)]

The distance from a door swing to a stair riser is not to be less than 300 mm.
[Sentence 9.9.6.6.(1)]

Where an exit door may be blocked by ice or snow, the door may open onto a step provided the riser of that step is not more than 150 mm.
[Sentence 9.9.6.6.(2)]

Door release mechanisms must be designed to be openable with one hand and not more than 1 releasing operation.
[Sentence 9.9.6.7.(2)]

Door release hardware is to be located not more than 1 200 mm above the floor.
[Sentence 9.9.6.7.(3)]

Except for doors in the barrier-free path of travel, every exit door must be designed to open, when unlatched, with a force of not more than 90 N.
[Sentence 9.9.6.8.(1)]

EXERCISE # 2 - MEANS OF EGRESS

1. A 3 storey office building is required to have floors that are fire separations with a 1 h fire-resistance rating. A fire-resistance rating 30 minutes is required for the roof . What is the required fire-resistance rating for the fire separation of the exit stair shaft from the second to the third floor?

   a) 30 minutes

   b) 45 minutes

   c) 1 h

   d) 1 h if of combustible construction or 45 minutes if of noncombustible construction.

OBC References: _____

2. A 3 storey office building is provided with floors which are fire separations with a 1 h fire-resistance rating and a fire-resistance rating of 45 minutes to the roof . What is the required fire-resistance rating for the fire separation of the exit stair shaft from the third floor to the roof?

   a) 30 minutes

   b) 45 minutes

   c) 1 h

   d) 1 h if of combustible construction or 45 minutes if of noncombustible construction.

OBC Reference: _____

3. A window is located in an exterior wall of a building adjacent to the only required unenclosed exit stair. This particular window is 4 500 mm above the stair and 3 500 mm away from the stair. This window; (Refer to Figure 7-1.)

   a) must be protected with wired glass in fixed steel frames,

   b) must be protected with glass block,

   c) may be protected with either wired glass in fixed steel frames or glass block,

   d) requires no special protection.

OBC Reference: _____

4. A window is located in an exterior wall of a building adjacent to an enclosed exit stair which has full height windows in its exterior wall at every landing level. This particular building window is 2 500 mm above the landing and 2 500 mm away from the stair; (Refer to Figures 7-2 & 7-3)

   a) this window must be protected with wired glass in fixed steel frames or glass block

   b) the window in the stair wall must be protected with wired glass in fixed steel frames or glass block

   c) either window must be protected with wired glass in fixed steel frames or glass block

   d) no window protection is required

OBC Reference: _____

5. An exterior exit door is located in an exterior wall at the main floor of a 3 storey building. There is no internal enclosure to the exit stair and the main floor has a single tenancy (i.e., no public corridor). Adjacent to the exit door is a window which is 1 200 mm away from the door. This window;

   a) must be protected with wired glass in fixed steel frames

   b) must be protected with glass block

   c) must be protected with wired glass in fixed steel frames or glass block

   d) no window protection is required

OBC Reference: _____

6. An exterior exit door is located in a wall at the main floor of a 3 storey building and faces 90° to the exterior wall. There is no internal enclosure to the exit stair and the main floor has a single tenancy (i.e., no public corridor). Adjacent to the exit door is a window which is 1 200 mm away from the door; this window;

   a) must be protected with wired glass in fixed steel frames

   b) in the stair wall must be protected with wired glass in fixed steel frames or glass block

   c) either window must be protected with wired glass in fixed steel frames or glass block

   d) no window protection is required

OBC Reference: _____

7. A doorway within a public corridor on a floor area of a multi-tenant mercantile building is perpendicular to the public corridor and is comprised of two active leafs. This doorway must be 2 030 mm high and not less than;

   a) 610 mm wide

   b) 750 mm wide

   c) 810 mm wide

   d) 1 210 mm wide

Code Reference: _____

8. A door serving a floor area swings onto a landing. The minimum distance between the path of the door swing and the first riser is;

   a) 150 mm

   b) 300 mm

   c) 450 mm

   d) 750 mm

Code Reference: _____

9. Complete the following chart.

Subject	Value	Code Reference
Exit doorway width (single leaf)		
Exit doorway width (multiple leafs, no latching)		
Exit door height		
Minimum headroom clearance for exit doors		
Distance to closest riser		

10. A door wiht a self-closing device serving a suite in a hotel and opening into a public corridor;

    a) not lock automatically

    b) may lock automatically

    c) must be openable with a force of not more than 90 N

    d) must be openable with a force of not more than 22 N

OBC Reference: _____

11. The maximum force permitted to open an interior exit door, except in a Barrier-Free path of travel is;

    a) 90 N

    b) 45 N

    c) 38 N

    d) 22 N

OBC References: _____

STOP

Access to Exits (Subsection 9.9.7. - Div.B)

Even though certain areas may not be enclosed by walls and or a roof every;

- roof intended for occupancy,podium,
- terrace,
- platform, or
- contained open space

must have an access to exit.
[Sentence 9.9.7.1.(1)]

Additionally, if a roof has an occupant load more than 60 people, two means of egress are required.
[Sentence 9.9.7.1.(2)]

Occupied open spaces such as terraces and platforms must have egress requirements based on those that would be required for rooms or suites of similar sizes and use.
[Sentence 9.9.7.1.(3)]

When there is more than one suite on a floor area, each suite is to have;

- an exterior exit door, or
- a doorway which opens into a public corridor or onto an exterior passageway.
  [Sentence 9.9.7.2.(1)]

When the situation of a door opening into a public corridor occurs, it must be possible to travel in opposite directions to separate exits; in other words you must not be in a situation of having to travel in one direction to an exit to the two exits. [Sentence 9.9.7.2.(2)] The situation where you have only one direction of travel is called a dead end corridor and will be examined next.

An example of a dead end corridor is shown in Figure 7-5. Dead end corridors are permitted if the conditions listed in Table 9.9.7.3. are complied with. In addition to the travel distance and occupant load limitations found in Table 9.9.7.3., it is important to keep in mind certain other conditions which must be present, namely;

- the doors in the dead end portion must be equipped with self-closing devices, or

- the total occupant load served by the exit in question does not exceed 60 persons.
  [Sentence 9.9.8.2.(2)]

Another exception is for boarding, lodging and rooming houses. These particular occupancies may be provided with one exit from each floor area as long as;

- sleeping accommodation is provided for not more than 8 persons, OR
- where sleeping accommodation is not provided in the basement area, a single exit from the basement is permitted.
  [Sentence 9.9.8.2.(3)]

The third exception will be addressed in dealing with exiting from dwelling units in Subsection 9.9.9.

If more than one exit is required from a floor area, each exit will be considered as contributing not more than ½ of the required exit width so that one exit cannot be made wider and assumed to service more of the occupant load.
[Sentence 9.9.8.3.(1)]

Where there is a requirement for more than 1 exit from a floor area, the code requires that the exits be placed as far apart as practicable so that if one exit is made untenable or inaccessible because of the fire, the other exit(s) will be available to permit the occupants to escape. Designs in which the exits are so close together that they will obviously both become contaminated in the event of a fire are not acceptable [Sentence 9.9.8.4.(1)] (See Appendix A).

Not more than one required exit may open directly into a lobby rather than opening to the exterior.
[Sentence 9.9.8.5.(1)]

In order for the exit, as described in the paragraph above, to discharge into the lobby the lobby must not be more than 4.5 m above grade and the distance of travel from the exit door opening into the lobby to the exterior exit cannot exceed 15 m.
[Sentence 9.8.8.5.(2)]

Since, in the condition described above, the lobby in fact becomes somewhat of a continuation of an exit, it must comply with all the requirements of a exit (e.g., fire separation from the floor area, flame spread rating, etc.) except that service rooms, storage rooms and residential or industrial suites cannot open directly into the lobby.
[Sentence 9.8.8.5.(3)]

An exit cannot open into a lobby that forms part of an interconnected floor space except an interconnected floor space that meets the conditions of Sentence 3.2.8.2.(6). [Sentence 9.9.8.5.(4)] However, if the EXIT serves a hotel, the exit may lead through a lobby as long as the lobby is NOT in an interconnected floor space.
[Sentence 9.9.8.5.(6)]

Also, passenger elevators may open into a lobby as described above as long as the elevator doors stay closed except while loading or unloading.
[Sentence 9.9.8.5.(5)]

Where certain occupancies are permitted to open directly into the lobby and those occupancies and the lobby are sprinklered, the fire separation between the lobby and the occupancies does not require a fire-resistance rating (a fire separation is still required however).
[Sentence 9.9.8.5.(7)]

The basic rule is that mezzanines require at least 2 means of egress leading to exits located at the mezzanine level. This, in fact, simply applies the requirements of a floor area to a mezzanine. There are exceptions however, which will be addressed shortly.
[Sentence 9.9.8.6.(1)]

A single means of egress is permitted from a mezzanine where the:

- mezzanine is not required to be enclosed with a vertical fire separation,
- occupant load is less than 60,
- area is not more than indicated in Clause 9.9.7.4.(1)(a), and
- distance measured from any point on the mezzanine to the nearest egress door serving the space does not exceed 25 m or 25 m to the top of the stairway where the space is served by 2 egress doorways.
  [Sentence 9.9.8.6.(2)]

SIGNS FOR STAIRS AND RAMPS AT EXIT LEVEL

In buildings that are 3 storeys in building height, any part of an exit ramp or stairway that continues up or down past the lowest exit level shall be clearly marked to indicate that it does not lead to an exit where the portion below the exit level may be mistaken as the direction of exit travel.
[Sentence 9.9.11.4.(1)]

At every floor, arabic numbers indicating the floor shall be;

- except in hotels, in exit stair shafts mounted on the stair side of the wall at the latch side of the doors,
- in hotels be mounted on each side of the exit stair shaft at the exit doors,
- be at least 60 mm high and raised 0.8 mm above the surface,
- located 1 500 mm above the floor and not more than 300 mm from the door, and
- of a contrasting colour to the surface to which they are applied.
  [Sentence 9.9.11.5.(1)]

Lighting (Subsection 9.9.12. - Div.B)

The code addresses the requirement for lighting and emergency lighting for occupancies other than dwelling units.
[Sentence 9.9.12.1.(1)]

The code requires a basic level of illumination in areas of public use such as ; exits, public corridors and access to exits. This level is set at a minimum of 50 lx at the floor level, tread level in stairs and at any point where there is a change in direction, intersection at change in level, where there are stairs or ramps.
[Sentence 9.9.12.2.(1)]

The minimum value of the illumination must not be less than 10 lx.
[Sentence 9.9.12.2.(2)]

Emergency lighting is required in the following locations;

- exits,
- the routes providing access to exit in an open floor area,
- corridors used by the public,
- underground walkways, and

- public corridors.
  [Sentence 9.9.12.3.(1)]

Emergency lighting must be provided from an electrical source separate from that provided for the building (e.g., batteries, diesel generator, etc.)
[Sentence 9.9.12.3.(2)]

When there is a building power failure, the emergency lighting is to power up automatically and must provide the required lighting level for at least 30 minutes.
[Sentence 9.9.12.3.(3)]

The level of emergency lighting is to be an average level of at least 10 lx at the floor or tread level and minimum value of 1 lx.
[Sentence 9.9.12.3.(4) and (5)]

If the emergency lighting is provided by incandescent lighting, a level equal to 1 W/m^2 of floor area is acceptable.
[Sentence 9.9.12.3.(6)]

If the emergency lighting is provided by self-contained emergency lighting units, those units must comply with CSA C22.2 No.141-M.
[Sentence 9.9.12.3.(7)]

EXERCISE # 3 - ACCESS TO EXITS, EXITS FROM FLOOR AREAS, EGRESS FROM DWELLING UNITS, SIGNAGE & LIGHTING.

1. A dead end public corridor exists in a mercantile, multi-tenant floor area. What are the specifics for this dead end?
   a) max. length = 6 m, and not more than 4 suites
   b) max. length = 6 m, and not more than 30 people
   c) max. length = 9 m, and not more than 4 suites
   d) max. length = 9 m, and not more than 30 people.

OBC Reference: _____

2. Office suites open into a dead end public corridor and have other egress doors leading to an exit. What are the specifics for this dead end?

   a) max. length = 6 m, and not more than 4 suites

   b) max. length = 6 m, and not more than 30 people

   c) the dead end corridor may be of any length and may serve any number of persons

   d) max. length = 9 m, and not more than 30 people.

OBC Reference: _____

3. A medium hazard industrial occupancy suite has an area of 150 m^2. How many egress doors are required and what is the maximum distance of travel to the nearest egress door?

   a) 2 egress doors and max. 25 m

   b) 1 egress door and max. 25 m

   c) 2 egress doors and max. 45 m

   d) 1 egress door and max. 40 m.

OBC References: _____

4. A business and personal services occupancy suite, has an area of 150 m^2 and the distance to the nearest egress door is 30 m. How many egress doors are required?

   a) 2 minimum

   b) 1

   c) as many as required to have a 25 m max travel distance

   d) as many as required to have a 40 m max travel distance.

OBC References: _____

5. What is the maximum distance of travel within a suite to an egress door if the occupancy is a sprinklered business and personal services in a sprinklered floor area?

   a) 40 m

   b) 45 m

   c) 30 m

   d) 6 m

OBC References: _____

6. What is the maximum distance of travel within a suite to the nearest egress door if the occupancy is mercantile occupancy in an unsprinklered floor area?

   a) 40 m

   b) 45 m

   c) 30 m

   d) 6 m

OBC References: _____

7. A scissor stair serving a floor area has both exit doors opening onto a lobby in an apartment building. Since the floor is unsprinklered, the lobby is enclosed with a fire separation having a 1 hour fire-resistance rating. The lobby is 2 m above the ground level and the distance of travel from the exits to the outdoors is 12 m.

   a) the lobby complies with the code requirements

   b) the lobby must be sprinklered

   c) only one exit is permitted to lead through the lobby

   d) a lobby is not permitted to serve residential suites

OBC Reference: _____

8. An exit opens directly into a lobby in an apartment building. The floor is unsprinklered, the lobby is enclosed with a fire separation having a 1 hour fire-resistance rating. The lobby is 1 m above the ground level and the distance of travel from the exit to the outdoors is 15 m and a suite door opens into a vestibule which in turn opens into the lobby.

   a) the condition complies with the code requirements

   b) the lobby must be sprinklered

   c) the exit must open into a vestibule which in turn opens into the lobby

   d) a lobby is not permitted to serve residential suites

OBC Reference: _____

INTRODUCTION

In the last module we talked about egress, exiting and protection of exits. In this module we will look closely into the fire protection which should be provided in a building and how the code limits the potential for fire spread from one part of a building to another part as well as from one building to another. Also, we will look at the requirements for fire alarms, smoke alarms and the provisions for fire fighting.

As part of this material we will also look at the application of SB-2, " Fire Performance Ratings" and SB-3, "Fire and Sound Resistance of Building Assemblies".

Although this module is quite lengthy, the materials will be presented in the same manner as the previous modules and in small manageable portions.

OBJECTIVES

Upon completion of this module, you will be able to;

a) classify a building based on major occupancies,

b) determine the fire-resistance ratings for the building and rooms and spaces within the building,

c) elaborate on the requirements for closures in fire separations,

d) specify the methods for limiting the spread of fire from one building to another,

e) identify when a fire alarm system is required and how it is to be installed,

f) list the conditions relating to smoke alarms,

g) state the requirements related to fire fighting access to a building,

h) advise on the specific construction requirements dealing with construction camps,

i) apply the information contained in SB-2 and SB-3.

FIRE PROTECTION (SECTION 9.10 - DIV. B)

General Requirements

A logic concept is stated as the first sentence in this Section, that if construction (or an assembly) is required;

- to be of noncombustible construction, AND
- to have a fire-resistance rating,

that construction is to be supported by noncombustible construction. [Sentence 9.10.1.1.(1)]

For the purpose of SECTION 9.10. "FIRE PROTECTION" **ONLY** AND NOT FOR ANY OTHER APPLICATION WITHIN THE CODE, roofs that have a slope of 60° or more TO THE HORIZONTAL, AND which are adjacent to a room or space which is intended to be occupied, must be considered as a wall.
[Sentence 9.10.1.2.(1)]

Since many of the fire protection requirements are identical in Part 9 to those found in Part 3, Part 9 lists those situations which should be addressed by the provisions contained in Part 3. These are;

- Tents, air supported structures, transformer vaults, walkways, elevators and escalators,
  [Sentence 9.10.1.3.(1)]
- Rooms and spaces used for assembly occupancies,
  [Sentence 9.10.1.3.(2)]
- Basements having more than 1 storey below grade or having an area more than 600 m^2,
  [Sentence 9.10.1.3.(3)]
- Rooms or spaces used for the manufacturing or storage of exposure or hazardous materials,
  [Sentence 9.10.1.3.(4)]
- Openings through floors that are not protected with shafts, closures or walls (interconnected floor spaces),
  [Sentence 9.10.1.3.(6)]
- Chutes and shafts except those contained entirely within a dwelling unit,
  [Sentence 9.10.1.3.(7)]
- Sprinkler systems must be designed, constructed and installed to comply with Part 3,
  [Sentence 9.10.1.3.(8)]

When this situation occurs, the code states that when determining the fire-resistance rating of the fire separations for the floors BASED ON OCCUPANCY (and not the separation BETWEEN OCCUPANCIES, which will be addressed later), you consider each portion the building as if the entire building contained that occupancy. [Sentence 9.10.2.3.(1)]

For example, if there is a 3 storey building with mercantile on the first storey, offices on the second and residential on the third, the fire separations requirements for the first storey are based as if the building was a 3 storey mercantile, the fire separation requirements for the second storey are based as if the building was a 3 storey office building and the construction requirements for the third floor are based as if the building was a 3 storey residential building.

Separations between adjacent major occupancies will also be required and will be addressed later in this module. Where there are multiple major occupancies on a floor area and the aggregate area of a particular group or division occupies less than 10% of the floor area. They need not be taken into account for the classification of the floor area unless there is a Group F-2 occupancy in which case it must be considered in the classification of the floor area. [Sentence 9.10.2.4.(1)]

RATINGS (SUBSECTION 9.10.3. - DIV. B)

The fire-resistance rating is determined on the basis of test protocols as found in Part 3 or the MMAH Supplementary Standards SB-2 or SB-3.
[Sentence 9.10.3.1.(1)]

More specifically Sentence 3.1.7.1.(1) states that fire-resistance ratings are to be tested in accordance with CAN/ULC-S101-M. SB- 2, "Fire Performance Ratings" fire performance ratings assigned on the basis of SB-2 are also acceptable. We will discuss the information contained in the Supplementary Standards shortly.

Another concept is the idea of flame-spread ratings which is exactly what the term describes, the degree of propagation of a flame front along the surface of a material. Once again this value is determined in accordance with;

- Part 3, more specifically Sentences 3.1.12.1.(1),(2) and (3) which reference the CAN/ULC-S102-M standard for surface burning characteristics and CAN/ULC-S102.2-M for the surface burning characteristics for flooring, floor coverings and miscellaneous materials, or
- the values listed in the MMAH Supplementary Standard SB-2. [Sentence 9.10.3.2.(1)]

The code makes a distinction in regards to flame-spread ratings; that is, unless the term specifically used in the code is "surface flame-spread rating", the term applies to any surface of the material that would be exposed if the material was to be cut.
[Sentence 9.10.3.2.(2)]

When establishing the fire-resistance ratings of a floor, ceiling or roof, it is assumed that the assembly is exposed to the effects of fire only from the underside.
[Sentence 9.10.3.3.(1)]

Ratings for exterior walls are a little more complicated. Basically the fire-resistance ratings for exterior walls assume that the fire is located on the inside only. However since exterior walls may become radiators of energy and may expose other structures to the potential for fire, a temperature rise requirement, which forms part of the standard test, may be waived as long as the walls are at least 1.2 m from the lot line or an imaginary line between two buildings, AND as long as the effects of the wall radiating energy is taken into account as stated in Sentence 3.2.3.1.(9).
[Sentence 9.10.3.3.(2)]

Firewalls and interior vertical fire separations are required to have a fire-resistance rating to be rated from both sides since it is anyone's guess as to which side a fire would occur.
[Sentence 9.10.3.3.(3)]

If a ceiling has lay-in suspended ceiling tiles which contribute to the fire-resistance rating of the overall assembly, those tiles must be provided with hold-down clips or other methods of preventing the panels from lifting in the event of a fire.
[Sentence 9.10.3.4.(1)]

BUILDING SIZE DETERMINATION (SUBSECTION 9.10.4. - DIV. B)

The number of storeys in a building is termed as **building height** and is defined in Section 1.4 - Div. A as, " the number of storeys contained between the roof and the floor of the first storey." Part 9 buildings, by definition, may contain only a maximum of three storeys.

There are certain construction features which may be present within a building which require clarification as to whether or not those features should be considered as storeys for the determination of building height.

One such feature is a mezzanine and the code states that a mezzanine is NOT considered as a storey in determining building height if the total area of the mezzanine(s) is less than 10% of;

- the suite in which it is located (if there is more than 1 suite in the storey), or
- the area of the storey.
  [Sentence 9.10.4.1.(1)]

Another situation in which a mezzanine is NOT considered as a storey for the calculation of building height is if;

- the total area of the mezzanine(s) within a room or storey is not more than 40% of the area of the room or storey in which it is located , AND
- a clear line of sight is provided above the mezzanine floor from 1 070 mm to the ceiling.
  [Sentence 9.10.4.1.(2)]

Finally, if there is more than one level of mezzanine within a storey, each level above the first mezzanine level IS to be considered a storey. [Sentence 9.10.4.2.(1)] In other words a "one storey" building in which there are two levels of mezzanines, one above another, would have to be considered as a two storey building (the distance to the first level is NOT considered a storey).

When a basement is used as a storage garage it is possible to consider the garage as a separate building for the purposes of Section 9.10. , "Fire Protection" as long as the floor immediately above the garage (i.e. usually the ceiling level of the garage) and the exterior walls extending from the floor immediately above the

3. A floor area has multiple occupancies. One is a Group E and occupies 25% of the area, another is a Group D and occupies 70% of the area and another is a medium hazard industrial occupancy which takes up 5% of the area. The floor area should be classified as;

   a) Group E major occupancy

   b) Group D major occupancy

   c) Groups D & E major occupancies

   d) Groups D, E & F-2 major occupancies

OBC reference: _____

4. The standard for the determination of flame-spread ratings for structural lumber is;

   a) CAN/ULC-S102.1-M

   b) CAN/ULC-S102.2-M

   c) CAN/ULC-S102

   d) CAN/ULC-102.2-M06

OBC Reference: _____

5. A ceiling assembly required to have a fire-resistance rating is to be tested with the fire exposure from;

   a) the underside

   b) both sides

   c) an assembly which is not a fire separation need not be rated

   d) ceiling assemblies are not assigned fire-resistance ratings

OBC reference: _____

6. A floor assembly is required to be a fire separation with a 1 hour fire-resistance rating. The assembly is required to be tested with the fire exposure from;

   a) the underside

   b) both sides

   c) from the underside as long as due allowance is made for the effects of heat radiation

   d) as determined from the test report

OBC reference: _____

Wall or ceiling membranes are permitted to be penetrated with openings for electrical or similar outlet boxes, since these openings are rather small and do not usually constitute a significant portion of the membrane area, as long as the outlet boxes are tightly fitted.
[Sentence 9.10.5.1.(2)]

It is important to keep in mind that if the permitted outlet boxes are located on both sides of a fire separation, they are to be offset (in the case of a wall, not located within the same stud space) so that a "bridge" is not created for the passage of fire through the fire separation.
[Sentence 9.10.5.1.(3)]

Where a ceiling membrane forms part of assembly required to have a fire-resistance rating and that rating is obtained from SB-3 of the Supplemental Standards (which we will address later in this module); that membrane may be pierced with openings for ductwork as long as the amount of openings and their protection conforms with the conditions and limitations listed in the MMAH Supplemental Standards SB-2.
[Sentence 9.10.5.1.(4)]

CONSTRUCTION TYPES (SUBSECTION 9.10.6. - DIV. B)

If a building or building element (e.g. an exterior wall) is REQUIRED to be of noncombustible construction, combustible parts are permitted as long as those elements are specifically listed in Subsection 3.1.5.
[Sentence 9.10.6.1.(1)]

It is important to remember that noncombustible is defined in Div. A, Article 1.4.1.2. as meeting the criteria of the CAN4-S114 standard.

Lumber which meets the criteria for heavy timber as found in Article 3.1.4.7. may be assumed to provide a 45 minute fire-resistance rating.
[Sentence 9.10.6.2.(1)]

STEEL MEMBERS (SUBSECTION 9.10.7. - DIV. B)

Steel members used in an assembly which is required to have a fire-resistance rating must be protected to maintain that rating. The exception to this rule is found in Article 3.2.2.3. which deals with specific exceptions to structural fire protection for certain structural members.
[Sentence 9.10.7.1.(1)]

FIRE RESISTANCE IN RELATION TO OCCUPANCY AND HEIGHT (SUBSECTION 9.10.8. - DIV. B)

The fire-resistance ratings for floors, mezzanines and roof depend on the MAJOR OCCUPANCY and height of the building. This information is contained in Table 9.10.8.1.
[Sentence 9.10.8.1.(1)]

Even though Table 9.10.8.1. requires a roof to have a fire-resistance rating, that rating may be waived if the BUILDING is sprinklered and as long as;

- the sprinkler system is electrically supervised as described in Sentence 3.2.4.10.(3), and
- the operation of the sprinkler system will cause a signal to be transmitted to the fire department as described in Sentence 3.2.4.8.(4).
  [Sentence 9.10.8.2.(1)]

The supporting elements (columns, walls, etc.) are to have the same fire-resistance rating as the floor or roof they support.
[Sentence 9.10.8.3.(1)]

There are exceptions to the above "general" rules which include;

- construction supporting service rooms need not have the same fire-resistance rating as the floor they support
  [Sentence 9.10.8.5.(1)]
- Mezzanines which are considered as storeys are to be rated as floors and not mezzanines
  [Sentence 9.10.8.6.(1)]
- If a roof has an occupancy, that portion of the roof must be constructed as a FIRE SEPARATION with a fire-resistance rating equal to that which would be required for floors.
  [Sentence 9.10.8.7.(1)]

There are other exceptions dealing with particular situations but these will be dealt with as they occur in the code.

PROCEDURE FOR DETERMINING FIRE-RESISTANCE RATINGS FOR BUILDINGS

The procedure for determining the fire-resistance of a building is as follows;

1. Select the fire-resistance rating for each occupancy in the entire building as per Table 9.10.8.1.

This should not come as a surprise since the combustible wiring is enclosed in a noncombustible penetration of the assembly.

Single conductor metal-sheathed cables with combustible jacketing that are more than 25 mm in overall diameter are permitted to penetrate a fire separation required to have a fire-resistance rating without being incorporated in the assembly at the time of testing provided the cables are not grouped and are spaced a minimum of 300 mm apart.
[Sentence 9.10.9.6.(5)]

Electrical wiring with combustible jacketing is permitted to penetrate **a fire separation required to have a fire-resistance rating** without being included at the time of testing as long as the overall maximum diameter of the wiring is not more than 25 mm.
[Sentence 9.10.9.6.(6)]

Enclosed combustible raceways are permitted in a concrete floor which is **a fire separation with a required fire-resistance rating** without being incorporated in the testing of the assembly, as long as there is at least 50 mm of concrete cover from the bottom of the slab to the bottom of the raceway.
[Sentence 9.10.9.6.(7)]

Combustible outlet boxes are permitted in **a fire separation required to have a fire-resistance rating** without being tested if the opening through the membrane is not more than 160 cm^2.
[Sentence 9.10.9.6.(8)]

Combustible water distribution piping is permitted to penetrate a fire separation that is required to have a fire-resistance rating without being incorporated in the assembly at the time of testing provided the piping is protected with a fire stop in conformance with Sentence 3.1.9.4.(4).
[Sentence 9.10.9.6.(9)]

Combustible sprinkler piping may penetrate a fire separation as long as both sides of the fire separation are sprinklered.
[Sentence 9.10.9.6.(10)]

Sprinklers are permitted to penetrate a fire separation or a membrane forming part of an assembly required to have a fire-resistance rating without having to meet the fire stop requirements,

Combustible piping is allowed;

- on one side of a vertical fire separation (as long as it is NOT in a shaft), and
- to penetrate a horizontal OR vertical fire separation when the fire compartment (not necessarily the entire floor area or building) on BOTH sides of the fire separation are sprinklered. [Sentence 9.10.9.7.(5)]

In building that contain only 2 dwelling units (stacked units), combustible piping is permitted on one side of a horizontal fire separation.
[Sentence 9.10.9.7.(6)]

Combustible construction that rests on or is supported by noncombustible construction must be designed so that under fire conditions, the collapse of the combustible construction will not cause the collapse of the noncombustible construction.
[Sentence 9.10.9.8.(1)]

When beams or joists frame into a fire separation which is made of masonry or concrete, the structural members are not to reduce the thickness of the wall to less than the equivalent thickness of masonry or Type S concrete as determined in MMAH Supplementary Standard SB-2. [Sentence 9.10.9.9.(1)] (SB-2 and SB-3 will be addressed at the end of this module).

A vertical fire separation, or an equivalent rated separation, is to be continued through a concealed space or a horizontal service space located above the fire separation.
[Sentence 9.10.9.10.(1)]

The requirement for continuing a fire separation through a concealed space located above it is waived if the construction between the concealed space and the space below it is constructed as a fire separation with a fire-resistance rating equal to the vertical fire separation. However, if the vertical fire separation is not required to have a fire-resistance rating greater than 45 minutes, the fire-resistance rating of the ceiling may be 30 minutes.
[Sentence 9.10.9.10.(2)]

Residential occupancies (Group C) are to be separated from all other major occupancies with a fire separation having a 1 h fire-resistance rating.
[Sentence 9.10.9.11.(1)]

Residential occupancies, including live/work units, are to be separated from mercantile (Group E), medium hazard industrial occupancies (Group F-2) major occupancies by a fire separation have a 2 h fire-resistance rating.
[Sentence 9.10.9.11.(2)]

In a building containing a mercantile occupancy and not more than two dwelling units, the residential units may be separated from the mercantile major occupancy with a fire separation having a 1 h fire-resistance rating.
[Sentence 9.10.9.11.(3)]

Occupancies permitted within live/work units are not required to be separated from the residential portion of the live/work unit.
[Sentence 9.10.9.11.(4)]

Not more than 1 residential suite is to be contained within a building which is classified as a medium hazard industrial (Group F-2) major occupancy [Sentence 9.10.9.12.(1)] except where the Group F-2 occupancy is directly related to the occupancy contained in a live/work unit.
[Sentence 9.10.9.12.(2)]

Every suite, except for Group D occupancies, is to be separated from all other suites with a fire separation having a fire-resistance rating of at least 45 minutes.
[Sentence 9.10.9.13.(1)]

Where the BUILDING is sprinklered, Group D and Group E suites that are served by public corridors that meet the conditions of Sentence 3.3.1.4.(4) do NOT require fire separations between them.
[Sentence 9.10.9.13.(2)]

In a residential occupancy such as a motel for example, individual suites must be separated from adjacent rooms and suites by a fire separation having a fire-resistance rating of not less than 45 minutes.
[Sentence 9.10.9.14.(1)]

EXERCISE # 2 - PERMITTED OPENINGS IN WALL & CEILING ASSEMBLIES, CONSTRUCTION TYPES, STEEL MEMBERS, FIRE RESISTANCE IN RELATION TO OCCUPANCY AND HEIGHT, FIRE SEPARATIONS BETWEEN ROOMS AND SPACES WITHIN BUILDINGS.

To complete this exercise, you need to be familiar with the requirements found in Subsections 9.10.5. to 9.10.9. inclusive. Provide code references when asked in the questions.

1. Which of the following combustible elements would be permitted in construction required to be of noncombustible construction?
   a) interior wall finishes not more than 25 mm thick with a flame-spread rating of not more than 200
   b) wood frame partitions between offices in a 2 storey office building
   c) foamed plastic insulation with a flame-spread rating of 600
   d) combustible insulation with a surface flame spread rating between 25 and 500.

OBC Reference: _____

2. What is the required fire-resistance rating for a floor in a two storey Group D occupancy?
   a) 45 minutes
   b) no rating required
   c) 30 minutes
   d) 1 hour.

OBC Reference: _____

3. What is the required fire-resistance rating for a 50 % open mezzanine (i.e., 50% open to the storey below) in a two storey Group E occupancy?
   a) 45 minutes
   b) no rating required
   c) 30 minutes
   d) 1 hour.

OBC Reference: _____

8. Combustible sprinkler piping that penetrates a fire separation without a fire-resistance rating is;

   a) not permitted

   b) permitted as long as the penetration is sealed in accordance with Article 3.1.9.1.

   c) permitted if both sides of the fire separation are sprinklered

   d) permitted only if the fire separation is not required to have a fire-resistance rating

OBC Reference: _____

9. Combustible piping that penetrates a fire separation required to have a fire-resistance rating is;

   a) not permitted

   b) permitted only on one side

   c) permitted if the rating is an F rating based on the CAN4-S115 standard

   d) permitted if the rating is an F rating based on the CAN4-S115 standard with a 50 Pa pressure differential on the fire exposed side

OBC Reference: _____

10. A solid masonry party wall with a 1 hour fire-resistance rating has 2 wood beams bearing on it. The beams line up with each other, in other words, the beams are not staggered. Assuming 90 mm minimum bearing is required for each beam, what is the minimum overall thickness of masonry wall required to maintain the fire separation?

    a) 140 mm

    b) 190 mm

    c) 240 mm

    d) 290 mm

OBC Reference: _____

11. Complete the following chart for the fire separations between major occupancies.

Major Occupancy	Adjoining Major Occupancy	Fire-Resistance Rating	Code Reference
C	C,D		
C	E, F-2		
E	2 Dwelling units or Live/Work Units		
D Suites	D, E, F-2, F-3		
E Suites	E, F-2, F-3		
F-2 Suites	E, F-2, F-3		
F-3 Suites	E, F-2, F-3		

12. In a three storey hotel, what is the required degree of fire-resistance rating for the fire separation between the suites?

    a) 0

    b) 30 minutes

    c) 45 minutes

    d) 1 hour

OBC Reference: _____

13. What are the requirements for a 6 m wide public corridor in a sprinklered mall? (Assume the sprinkler system is electrically supervised and directly connected to the fire department.)

    a) 45 min fire separation

    b) 1 hour fire separation

    c) no fire separation is required

    d) no fire-resistance rating is required but a fire separation is required

OBC Reference: _____

14. An apartment building with 12 suites has an attached enclosed parking structure. Assuming each suite has 1 parking space, what is the required fire-resistance rating for the fire separation between the garage and the apartment building?

    a) 45 min

    b) 1 hour

    c) 1 ½ hour

    d) 2 hours

OBC Reference: _____

15. A repair garage is adjacent to a furniture store. The fire separation between the garage and the store is required to have a fire-resistance rating of at least;

    a) 2 hours

    b) 1 ½ hour

    c) 45 minutes

    d) no fire-resistance rating is required if both occupancies are sprinklered

OBC Reference: _____

STOP

SERVICE ROOMS (SUBSECTION 9.10.10. - DIV. B)

This subsection applies to all service rooms except those that are located within dwelling units (and by logical extension serve only those dwelling units).
[Sentence 9.10.10.1.(1)]

The fire separation of service room floors is not covered by Subsection 9.10.10. [Sentence 9.10.10.2.(1)] In other words, the fire separation required to a service room floor is the same as would otherwise be required for the floor occupancy (Subsection 9.10.9.)

If the service room is not sprinklered, the code requires it to be separated from the remainder of the building with a fire separation having a 1 hour fire-resistance rating as long as the service room does not contain an incinerator or as long as it is not used as a storage room.
[Sentence 9.10.10.3.(1)]

- where an upper floor projects beyond the face of the wall below and the projection is across a vertical separation between two suites.
  [Sentence 9.10.12.4.(2)]

The required soffit protection is to be provided when the soffit is less than 2.5 m above a window or door, for a distance equal to the width of the window or door plus 1 200mm on both sides of the opening with a minimum thickness of;

- 0.38 mm noncombustible material with a melting point of not less than 650°C,
- 12.7 gypsum soffit board or gypsum wallboard,
- 11 mm plywood,
- 12.5 mm OSB or waferboard, or
- 11 mm lumber.
  [Sentence 9.10.12.4.(1) & (3)]

If the soffit is completely fire blocked from the attic or roof space, the soffit protection as described above is not required.
[Sentence 9.10.12.4.(4)]

If all the suites under the common roof or attic space are sprinklered, the requirement for soffit protection is waived. The requirement for sprinklering extends to all rooms within the suites that have openings in the exterior walls regardless of any exceptions stated in Article 3.2.5.13.
[Sentence 9.10.12.4.(5)]

DOORS, DAMPERS AND OTHER CLOSURES IN FIRE SEPARATIONS (SUBSECTION 9.10.13. - DIV. B)

Usually, openings in fire separations are to be protected with closures. The degree of fire-protection rating for these closures is based on the fire-resistance rating of the fire separation in which they are located and these ratings are listed in Table 9.10.13.1. Also, it is important to keep in mind that not only are the closures to be rated, they are required to be installed in accordance with NFPA 80.
[Sentence 9.10.13.1.(1)]

The exception is that self-closing devices on closures are NOT required between a public corridor and Group D occupancies except in the following locations;

- in dead-end corridors, or
- a corridor that serves a hotel.
  [Sentence 9.10.13.10.(2)]

If hold-open devices are used on doors located in fire separations, the hold-open devices must be installed in accordance with Article 3.1.8.12.
[Sentence 9.10.13.11.(1)]

Swing doors must swing into service rooms containing fuel-fired appliances where the doors open into a public corridor or a room used for assembly purposes. In all other cases, the door is to swing outward.
[Sentence 9.10.13.12.(1)]

In most cases, a duct which connects two fire compartments or penetrates a fire separation required to have a fire-resistance rating must be provided with a fire damper conforming with Articles 3.1.8.4., "Determination of Ratings" and 3.1.8.9., "Installation of Fire Dampers".
[Sentence 9.10.13.13.(1)]

An exception to the general rule stated above for fire dampers is that dampers are NOT required where the penetration is;

- with a noncombustible branch duct that has a melting point not less than 760°C,
- has an area less than 130 cm^2, and
- supplies only air-conditioning units or combined air-conditioning and heating units that discharge air not more than 1.2 m above the floor.
  [Sentence 9.10.13.13.(2)]

A fire damper is also NOT required if the noncombustible duct penetrates a fire separation which surrounds an exhaust duct riser as long as;

- the air flow is upward,
- the duct has a melting point not less than 760°C,
- the duct is extended into the riser at least 500 mm, and

- the exhaust duct is under negative pressure as described in Article 9.10.9.18., "Exhaust Ducts Serving More Than One Fire Compartment".
  [Sentence 9.10.13.13.(3)]

If a noncombustible duct penetrates a fire separation which is creating a vertical service space, the duct is not required to be provided with a fire damper as long as the;

- the duct has a melting point not less than 760°C, and
- each individual duct exhausts directly to the outside at the top of the service space.
  [Sentence 9.10.13.13.(4)]

A duct that serves commercial cooking equipment is not required to be provided with a fire damper at the point where the duct penetrates the fire separation.
[Sentence 9.10.13.13.(5)]

Fire stop flaps required to maintain the integrity of the ceiling membrane in an assembly required to have a fire-resistance rating must be constructed in accordance with the MMAH Supplementary Standard SB-2, "Fire Performance Ratings".
[Sentence 9.10.13.14.(1)]

A door between an attached garage and a dwelling unit cannot be;

- tight-fitting,
- weatherstripped, and
- fitted with a self-closing device.
  [Sentence 9.10.13.15.(1)]

A doorway between an attached garage and a dwelling unit cannot open in a room intended to be used for sleeping.
[Sentence 9.10.13.15.(2)]

Door stops are to be provided if the swing of a door may be such that it may damage the integrity of the fire separation.
[Sentence 9.10.13.16.(1)]

Exposing building face - the portion of an exterior wall that faces one direction, the area of which is from the ground level to the ceiling of the top storey, or where the building is divided into fire compartments, the exterior wall of the fire compartment.

Unprotected Openings - an opening in the exposing building face, with a fire-protection rating less than required for the exposing building face; a doorway, window or opening without a closure having the required fire-protection rating, or any part of the exterior wall with a fire-resistance rating less than required for the exposing building face.

Except as permitted in Subsection 9.10.15., "Spatial Separation Between Houses", this subsection applies to all buildings. [Sentence 9.10.14.1.(1)].

Area and Location of Exposing Building Face

The area of an exposing building face is to be taken as the exterior wall area facing in one direction on any side of the building, and is calculated as the total area measured from the finished ground level to the uppermost ceiling, or the area for each fire compartment where the building is divided into fire compartments by fire separations having fire-resistance ratings not less than 45 minutes. [Sentence 9.10.14.2.(1)]

The maximum aggregate area of unprotected openings in an exposing building face is to conform to the areas as calculated in accordance with Table 9.10.14.4. For the purpose of Table 9.10.14.4., to determine the maximum aggregate area of unprotected openings permitted in an irregularly-shaped or skewed exterior wall, the location of the exposing building face is to be taken as a vertical plane which is located so that there are no unprotected openings between the vertical plane and the line to which limiting distance is measured. For illustrations, see Appendix A, Volume 2 of the 2012 Building Code Compendium.
[Sentence 9.10.14.2.(2)]

Openings in Exposing Building Face

The maximum aggregate area of unprotected openings in an exposing building face shall;

- conform with Table 9.10.14.4.,
- conform to Subsection 3.2.3., or
- where limiting distance is not less than 1.2 m be equal to or less than;
  a) the limiting distance squared, for Group C occupancies, Group D occupancies and Group F, Division 3 occupancies, and
  b) half the limiting distance squared for Group E and Group F, Division 2 occupancies
  [Sentence 9.10.14.4.(1)]

Openings in a wall having a limiting distance of less than 1.2 m shall be protected by closures, of other than wired glass or glass block, whose fire protection rating is in conformance with the fire-resistance rating required for the wall.
[Sentence 9.10.14.4.(2)]

The maximum aggregate area of unprotected openings shall be NOT more than twice the allowable calculated maximum area where the unprotected openings are glazed with;

- wired glass in steel frames as described in Article 9.10.13.5., or
- glass blocks as described in Article 9.10.13.7.
  [Sentence 9.10.14.4.(3)]

Where the building is sprinklered, the maximum aggregate area of unprotected openings shall be NOT MORE THAN twice the allowable calculated area provided all rooms, including closets and bathrooms that are adjacent to the exposing building face and that have unprotected openings are sprinklered in spite of the exemptions as found in the sprinkler standards in Article 3.2.5.13.
[Sentence 9.10.14.4.(4)]

The maximum aggregate area of unprotected openings in an exposing building face for a storage garage is unlimited where;

- all storeys are constructed as open-air storeys, and
- the storage garage has a limiting distance of not less than 3 m.
  [Sentence 9.10.14.4.(5)]

6. An exposing building face of a Group C occupancy is determined to have a 1 h fire-resistance rating. The maximum percentage of allowable unprotected openings has been established to be 9%. What are the conditions required for the construction of the exterior wall?

   a) noncombustible

   b) combustible

   c) combustible with noncombustible cladding

   d) noncombustible and noncombustible cladding

OBC Reference: _____

STOP

FIRE BLOCKS (SUBSECTION 9.10.16. - DIV.B)

Fire blocks are construction intended to prevent, or at least, retard the spread of flame from one concealed area into another concealed area.

As such, the general rule in the code is that every concealed or hidden space found in an interior wall, a ceiling or a crawl space must be fire blocked from concealed spaces in exterior walls or attic and roof spaces.
[Sentence 9.10.16.1.(1)]

Furthermore, fire blocks are to be provided at locations where hidden vertical and horizontal spaces intersect (eg., at coved ceilings, drop ceilings, bulkheads, etc.) where the materials have a SURFACE flame-spread rating greater than 25.
[Sentence 9.10.16.1.(2)]

Fire blocks are also required at the top and bottom of stairs where the stairs pass through a floor if the material has SURFACE flame-spread rating greater than 25.
[Sentence 9.10.16.1.(3)]

In buildings which are both unsprinklered and of combustible construction, every concealed space created by a ceiling, a roof space or unoccupied attic space which has exposed materials with a surface flame-spread rating more than 25, must be divided into fire compartments, with fire blocks, in areas not exceeding 300 m^2.
[Sentence 9.10.16.1.(4)]

When the attic or roof space is fire blocked as described above, the max dimension of such a separated space cannot be more than 20 m.
[Sentence 9.10.16.1.(5)]

Concealed spaces in mansard or gambrel roofs, exterior cornices, balconies and canopies of combustible construction with materials that have a SURFACE flame-spread rating more than 25 are required to be vertically fire blocked every 20 m and at every location where the concealed space extends across a REQUIRED vertical fire separation.
[Sentence 9.10.16.1.(6)]

Additionally, fire blocks must be provided within concealed spaces in wall assemblies or spaces created by the application of furring strips at;

- every floor level,
- at the ceiling level where the ceiling forms part of an assembly required to have a fire-resistance rating, and
- at every location in the wall at 20 m horizontally and 3 m vertically.
  [Sentence 9.10.16.2.(1)]

The fire blocks described above are NOT required if;

- the insulated wall assembly contains not more than one concealed air space and the horizontal thickness of that air space is not more than 25 mm,
- the exposed materials within the concealed space are noncombustible, or
- the exposed material has a flame-spread rating of not more than 25 except for wires, pipes and similar equipment.
  [Sentence 9.10.16.2.(2)]

Fire blocks must be constructed of materials that will remain in place and prevent the passage of flames for not less than 15 min when subjected to the standard fire exposure in CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials".

However, other acceptable fire block materials are limited to the following minimums;

- 0.38 mm sheet steel,
- 12.7 mm gypsum wallboard,

- 12.5 mm plywood, oriented strand board (OSB) or waferboard (if the joints are over a support),
- 2 layers of 19 mm lumber with joints staggered, and
- 38 mm lumber.
  [Sentence 9.10.16.3.(2)]

If something pierces a fire block, the continuity around the penetration must be maintained.
[Sentence 9.10.16.4.(1)]

FLAME SPREAD LIMITS (SUBSECTION 9.10.17. - DIV. B)

Before we review the actual requirements for flame-spread ratings it is important to recall that the code makes reference to two "types" of flame-spread ratings;

- SURFACE flame-spread ratings which is a measure of the spread of a flame along the surface of the material, and
- FLAME-SPREAD RATING which is the measurement of the spread of a flame front along the surface or any part of the material that would be exposed by cutting through the material.

Unless the code specifically states to the contrary, the maximum SURFACE flame-spread rating for interior walls, ceilings, skylights and glazing is limited to not more than 150.
[Sentence 9.10.17.1.(1)]

Except for doors within dwelling units, other than vehicle garage doors, the maximum SURFACE flame-spread rating for doors may be 200. Doors within dwelling units are not limited as to flame-spread rating.
[Sentence 9.10.17.1.(2) & (3)]

A limit for SURFACE flame-spread rating of not more than 25 is placed on at least 90% of every ceiling in;

- an exit, and
- a public corridor that is unsprinklered.
  [Sentence 9.10.17.2.(1)]

At least 90% of the wall surface in an exit is to have a surface flame-spread rating of not more than 25.
[Sentence 9.10.17.3.(1)]

Usually, foamed plastic insulation in a wall or ceiling of combustible construction is required to be protected from adjacent space; except for attics or roof spaces, crawl spaces and concealed spaces in wall assemblies by;

- one of the finishes described in Subsections 9.29.4. to 9.29.9 (plaster, gypsum board, plywood, hardboard, insulating fibreboard, particleboard, OSB or waferboard),
- 0.38 mm sheet metal attached to the structural members. (As long as the sheet metal has a melting point of at least 650°C AND the building DOES NOT CONTAIN A GROUP C MAJOR OCCUPANCY), or
- a thermal barrier that meets the requirements of Clause 3.1.5.11.(2)(e).
  [Sentence 9.10.17.10.(1)]

The exception alluded to above is for foamed plastic insulation having a flame-spread rating (NOT surface flame spread) of not more than 500. This material may be used in factory-assembled storage garage doors used in buildings of residential occupancy if;

- the material is covered with a metallic foil on the inside,
- the assembly has a SURFACE flame-spread rating of not more than 200, and
- the assembly does not incorporate air spaces.
  [Sentence 9.10.17.10.(2)]

In residential occupancies only, walls and ceilings in bathrooms may have a surface flame-spread rating up to 200.
[Sentence 9.10.17.11.(1)]

Duct coverings or linings are required to have flame-spread ratings as required in Part 6.
[Sentence 9.10.17.12.(1)]

EXERCISE # 5 - FIRE BLOCKS AND FLAME SPREAD LIMITS

You will have to refer to Subsections 9.10.15. and 9.10.16. to answer the following questions. Give the appropriate code reference where required.

1. An unsprinklered building of wood construction has an attic space of 600 m^2 between firewalls. Fire blocking is;
   a) not required
   b) required to create compartments not exceeding 150 m^2
   c) required to create compartments not exceeding 300 m^2
   d) firewalls are required to divide the attic space into areas not exceed 300 m^2.

OBC Reference: _____

2. A combustible canopy extends along the face of a building. If there are no required interior vertical fire separations, at what spacing would the fire blocking be required within the canopy?
   a) 20 m vertically
   b) 20 m horizontally
   c) 3 m vertically
   d) 3 m horizontally

OBC Reference: _____

5. What type of finish is NOT approved as a cover for foamed plastic insulation in a building of Group C major occupancy?

   a) sheet metal

   b) thermal barrier

   c) plywood

   d) insulating fibreboard

OBC Reference: _____

STOP

ALARM AND DETECTION SYSTEMS (SUBSECTION 9.10.18. - DIV. B)

If there is an opening through a firewall and a fire alarm system is required on one side of the firewall, that fire alarm system is required to be extended throughout the structure as though the firewall did not exist.
[Sentence 9.10.18.1.(1)]

A fire alarm system is required;

- in every building that has more than 3 storeys including the storey(s) below the first storey,
- where the total occupant load is more than 300, or
- when the occupant load for any major occupancy found in Table 9.10.18.2. is exceeded.
  [Sentence 9.10.18.2.(1)]

Despite the conditions listed as requiring a fire alarm system, a fire alarm system is NOT required in a residential occupancy where;

- an exit or public corridor serves no more than 4 suites, or
- where every suite has direct access to an exterior exit facility leading to ground.
  [Sentence 9.10.18.2.(2)]

Fire alarm, fire detectors and smoke detection devices and systems and their installation must conform to Subsection 3.2.4. and Articles 3.2.7.8. and 3.2.7.10. Articles 3.2.4.1., 3.2.4.11., 3.2.4.12., 3.2.4.13., 3.2.4.14., 3.2.4.22. and 3.2.4.23. do not apply to Part 9 buildings.
[Sentence 9.10.18.3.(1) and (2)]

Where a fire alarm system is required, every public corridor in buildings of Group C occupancy and every exit stair shaft are to be provided with smoke detectors.
[Sentence 9.10.18.4.(1)]

Smoke detector is a defined term and is very different from a smoke alarm. A **smoke detector** is a piece of equipment that **initiates an alert or alarm signal with the fire alarm system** while a smoke alarm is not connected to a fire alarm system and has its own audible signal. Smoke alarms are the type of equipment found in most homes adjacent to sleeping areas.

Buildings that are required to have a fire alarm system are also required to have heat detectors or smoke detectors in the following locations;

- storage rooms, not within dwelling units
- service rooms, not within dwelling units
- elevator hoistways, chutes and dumbwaiter shafts,
- janitors rooms,
- laundry rooms in buildings of residential occupancies except within dwelling units
- rooms where hazardous substances are to be used or stored. [Sentence 9.10.18.4.(2)]

The heat and smoke detectors mentioned above are NOT required;

- in dwelling units, or
- in sprinklered buildings that have electrically supervised systems with a water flow alarm. [Sentence 9.10.18.4.(3)]

If a fire alarm is required in a hotel, heat detectors are to be installed in EVERY ROOM IN A SUITE except for a washroom in a suite. Also heat detectors are required in every room that is not in a hotel suite except for saunas, refrigerated areas and swimming pools. [Sentence 9.10.18.4.(4)]

Except for a system serving only a single dwelling unit, where a fire alarm system is required, the air recirculating system must be designed to not propagate smoke from one suite to another or from one storey to another when the fire alarm system receives a signal from a duct type smoke detector. [Sentence 9.10.18.5.(1)]

In a building which has at least a one hour vertical fire separation separating one part of the building from another and there are no openings through the fire separation except for piping, tubing, wiring and conduit penetrations, the requirements for a fire alarm system

may be applied to both portions as though they were separate buildings.
[Sentence 9.10.18.6.(1)]

This consideration for the requirements for a fire alarm system in a building with a vertical fire separation as described above does not apply to service rooms and storage rooms as they are required to be separated from the building and they would contain openings other than those permitted.
[Sentence 9.10.18.6.(2)]

A central vacuum cleaning system serving more than one suite or storey in a building equipped with a fire alarm system must be designed to shut down upon activation of the fire alarm system.
[Sentence 9.10.18.7.(1)]

As long as access is NOT through a firewall, a fire alarm system is NOT required for an open-air storage garage that complies with Article 3.2.2.83. as long as the building does not contain another occupancy.
[Sentence 9.10.18.8.(1)]

If a hotel is required to have a fire alarm system, that system must be a single stage system; that is, the signal goes directly to an alarm signal without an alert signal.
[Sentence 9.10.18.9.(1)]

Where life safety and fire protection systems are installed to comply with the provisions of this Code or the Fire Code made under the Fire Protection and Prevention Act, 1997, the commissioning of these integrated systems must be performed as a whole to ensure the proper operation and inter-relationship of the systems. This does not apply to a building that contains only dwelling units and has no dwelling unit above another dwelling unit.
[Sentence 9.10.18.10.(1) and (2)]

SMOKE ALARMS (SUBSECTION 9.10.19. - DIV.B)

Smoke alarms (NOT to be confused with smoke detectors) are required to be installed in every dwelling unit and each sleeping room not in a dwelling unit (e.g., hotel room). These units are to conform with the CAN/ULC-S531, "Smoke Alarms" standard.
[Sentence 9.10.19.1.(1)]

Buildings in camps for the housing of workers are required to be separated from each other by at least 10 m unless the Spatial Separation requirements found in Subsection 9.10.14. are complied with in their entirety.
[Sentence 9.10.21.5.(1)]

Except for dwelling units, the SURFACE flame-spread rating for walls and ceiling surfaces in corridors and walkways, except for doors, is to be not more than;

- 25 for not less than 90% of the exposed surface, and
- 150 for the remaining area.
  [Sentence 9.10.21.6.(1)]

Corridors that have a 45 minute fire-resistance rating and that provide access to exit from sleeping rooms are to comply with Subsection 9.10.17. for maximum surface flame-spread ratings.
[Sentence 9.10.21.6.(2)]

Corridors providing access to exit from sleeping rooms in camps for housing workers with sleeping accommodation for more than 10 persons must have a smoke detector connected to the building fire alarm system.
[Sentence 9.10.21.7.(1)]

Every building providing housing for camp workers are to have portable fire extinguishers, the type and location as determined by the Ontario Fire Code.
[Sentence 9.10.21.8.(1)]

A fire hose cabinet is required in every camp with a occupant load of more than 30. The cabinet is to have a length of hose adequate to cover every portion of the building. It is also important that this fire hose cabinet be protected from freezing.
[Sentence 9.10.21.9.(1)]

The fire hose cabinet is to be located near an exit.
[Sentence 9.10.21.9.(2)]

The hoses contained in the required fire hose cabinets must;

- have a minimum inside diameter of 19 mm,
- be connected to a central water supply, or

EXERCISE # 6 - ALARM AND DETECTION SYSTEMS, SMOKE ALARMS, FIRE FIGHTING, FIRE PROTECTION FOR CONSTRUCTION CAMPS AND FIRE PROTECTION FOR GAS AND ELECTRIC RANGES, FIRE STOPS AND FLAME SPREAD LIMITS

You will have to refer to Subsections 9.10.18. to 9.10.22. to answer the following questions. Give the appropriate code reference where required.

1. A building of Group D major occupancy without a basement is NOT required to have a fire alarm system if;
   a) it is three storeys in building height
   b) the total occupant load is more than 300
   c) the occupant load above the first storey is more than 150
   d) it is two storeys in building height

OBC Reference: _____

2. A building of Group C major occupancy with a public corridor is required to have a fire alarm system if;
   a) the public corridor serves five or more suites
   b) the total occupant load is not more than 10
   c) the building is two storeys in building height
   d) the total occupant load in the building is less than 300

OBC Reference: _____

3. An unsprinklered one storey building of Group F-2 major occupancy without a basement and having an occupant load of 200 is;
   a) required to have heat and smoke detectors
   b) not required to have heat and smoke detectors
   c) required to have heat or smoke detectors in storage rooms, service rooms and janitors closets
   d) required to have the sprinkler system electrically supervised

OBC Reference: _____

8. A building used for the housing of construction workers is required to be equipped with a;

   a) smoke alarm connected to the fire alarm system in every sleeping room

   b) smoke detector in the public corridor connected to the fire alarm system which is required in all camps housing workers

   c) smoke detector in a public corridor in a building having sleeping accomodations for more than 10 persons

   d) a fire alarm system is not required in camps for housing workers

OBC Reference: _____

9. The minimum distance between combustible unprotected cabinets above a gas cooktop burner level is;

   a) 125 mm

   b) 450 mm

   c) 600 mm

   d) 750 mm

OBC Reference: _____

STOP

SUPPLEMENTARY STANDARDS SB-2 AND SB-3 - VOL 2

Supplementary Standards SB-2 and SB-3 form part of the Ontario Building Code (OBC) because they are referenced in Sentence 9.10.3.1.(1).

In this part of the module, we will examine the contents of Supplementary Standards SB-2 and SB-3 as they relate to the requirements found in Part 9 of the OBC.

We will study the methods used for calculating fire-resistance ratings, using 'generic materials' that can be described using referenced product standards. We will learn how to use the Tables providing ratings of materials for flame-spread, smoke developed classifications, and noncombustibility.

We will learn how to use the Tables in SB-3 describing assemblies that have been tested in accordance with referenced national

2. What is the smoke developed classification of woven wool carpet, with a pile weight of 1500 g/m^2, applied without felt underlay? Give material Standard in your answer.

_____[_____]

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6.7 SUPPLEMENTARY STANDARD SB-3 FIRE AND SOUND RESISTANCE OF BUILDING ASSEMBLIES

Every dwelling unit and suite in hotels and motels must be separated from every other space by construction having a Sound Transmission Class Rating of at least 50 measured according to the referenced standards in Sentence 9.11.1.1.(1), or as listed in Tables 1 and 2 in the Supplementary Standard SB-3.
[Sentence 9.11.2.1.(1)]

Where a dwelling unit or a suite within a hotel is located next to an elevator shaft or refuse chute, the separating construction must provide an STC of at least 55.
[Sentence 9.11.2.1.(2)]

If building services are located within an assembly that is required to have an STC, the services must be installed so as not to degrade the required STC.
[Sentence 9.11.2.2.(1)]

Supplementary Standard SB-3 comprises two tables: Table 1 which provides fire-resistance ratings and typical sound transmission classes for wall assemblies.

Table 2 provides fire-resistance ratings and typical sound transmission classes for floors, ceilings and roof assemblies.

These Tables are referenced in Sentences 9.10.3.1.(1), 9.10.5.1.(4) and 9.11.2.1.(1) of the OBC.

Sentence 9.10.3.1.(1) indicates that the assemblies contained in SB-3 can be used for determining the fire-resistance rating of assemblies required by Section 9.10. of the OBC. It should be noted that the fire-resistance ratings of these assemblies cannot be used in buildings under Part 3 of the OBC.

EXERCISE # 12 - SOUND TRANSMISSION RATINGS

Using Tables 1 and 2, identify assemblies that comply with the following descriptions:

1. Wall assembly, with wood studs @ 406 mm o/c in a single row, using two layers of 15.9 mm Type X gypsum board on each side, with the following ratings.

FRR		Sound Transmission Class (STC)
Loadbearing	Non-loadbearing	
1.5 h	2 h	38

2. Wall assembly with non-loadbearing steel studs (25 gauge) @ 610 mm o/c incorporating 15 mm thick Type X gypsum board with the following ratings:

FRR		Sound Transmission Class (STC)
Loadbearing	Non-loadbearing	
--	1 h	50

3. Wall assembly with hollow concrete block normal weight aggregate, with two layers 15.9 mm Type X gypsum board on one side only with the following rating:

FRR		Sound Transmission Class (STC)
Loadbearing	Non-loadbearing	
3 h	3 h	56

4. Floor assembly incorporating wood joists @ 610 mm o/c, 15.5 mm plywood subfloor, no absorptive material, and one layer 15.9 mm Type X gypsum board with the following rating:

STC	TYPICAL IMPACT INSULATION CLASS
29	27

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with their use. (This has already been taken into account in the members as found in Tables A-1 to A-11) [Sentences 9.23.4.2.(1)&(2)] Appendix Note A-9.23.4.2 - Vol. 2 has more information on this situation.

Notching and Drilling (Subsection 9.23.5. - Div.B)

Although Part 9 permits, within certain parameters, the notching and drilling of joists, loadbearing studs, rafters, beams and plates; the code is very clear in stating that truss members are NOT to be notched nor drilled unless the reduction in the area of the member is taken into account in the actual design of the truss.
[Sentence 9.23.5.1.(1), 9.23.5.5.(1)]

Roof and Ceiling Framing (Subsection 9.23.13. - Div.B)

Roof trusses may be either designed in accordance with Part 4 or in accordance with Article 9.23.13.11.

Roof trusses not designed under Part 4 must;

- be capable of supporting the total ceiling load (live load + dead load) of 0.35 kPa PLUS 2 2/3 the specified roof LIVE load for 24 hours, and
- the deflections in the Table 9.23.13.11. are not to be exceeded when the truss is loaded with the ceiling load plus 1 1/3 times the snow roof load for 1 hour.
  [Sentence 9.23.13.11.(1)]

This sentence basically states the loading and serviceability conditions for trusses not designed under Part 4.

Joint connections for trusses analysed and sized using the loading described above are to be designed under Subsection 4.3.1. - Div.B.
[Sentence 9.23.13.11.(2)]

If a web member of a truss designed using the conditions as described in Sentence 9.23.13.11.(1) is longer than 1 830 mm, the web must be provided with continuous bracing so as to prevent the member from buckling.
[Sentence 9.23.13.11.(3)]

This continuous bracing refers to continuous in that the bracing itself is continuous not that the web be continuously braced. The web bracing consists simply of a 19 mm by 89 mm board, running at right angles to the web in question, placed near the web midpoint and

water closet is required for each sex.
[Sentence 3.7.4.2.(7)]

Additionally, shelves or projections above lavatories are to be located so as not to be hazards. Also, lavatories in other than dwelling units are to be operated automatically or have lever handles that do not close with a spring action.
[Sentence 3.7.4.2.(9)]

PLUMBING FIXTURES FOR DWELLING UNITS

Every dwelling unit is to be provided with a;

- kitchen sink,
- lavatory,
- water closet, or drainless composting watercloset, and
- bathtub or shower

where a piped water supply is available.
[Sentence 3.7.4.5.(1)]

PLUMBING FIXTURES FOR OTHER RESIDENTIAL OCCUPANCIES

The number of water closets are based on occupant load and Table 3.7.4.6.
[Sentence 3.7.4.6.(1)]

That being said, it is important to note that at least one water closet is to be provided for every;

- 10 campers of each sex in a recreational camp, and
- 10 employees of each sex in a camp for housing of workers. [Sentence 3.7.4.6.(2)]

In the case of recreational camps or camps for the housing of workers, at least two lavatories or a pail or other portable container are to be provided for each of the required water closets. It is interesting to note that the code here seems to indicate that at least two lavatories are to be provided or a pail for each water closet.
[Sentence 3.7.4.6.(3)]

Additionally, for camps for housing workers, the code requires at least one shower or other bathing area and at least 1 washing machine or laundry tubs for every 15 beds.
[Sentence 3.7.4.6.(4)]

PLUMBING FIXTURES FOR BUSINESS AND PERSONAL SERVICES OCCUPANCIES (GROUP D)

The number of water closets required for Group D occupancies is based on occupant load and Table 3.7.4.7.
[Sentence 3.7.4.7.(1)]

If the Group D occupancy has an occupant load of not more than 10 persons, one water closet to serve both sexes may be provided.
[Sentence 3.7.4.7.(2)]

PLUMBING FIXTURES FOR MERCANTILE OCCUPANCIES (GROUP E)

The number of water closets required FOR EMPLOYEES in mercantile occupancies is based on Table 3.7.4.8.
[Sentence 3.7.4.8.(1)]

The number of water closets required FOR THE PUBLIC in mercantile occupancies is to be;

- 1 fixture per 300 males and 1 fixture per 150 females.

If the staff washrooms are accessible to the public, the fixtures in the staff washrooms may be considered to contribute to the required number of fixtures.

If the total area of the mercantile occupancy, excluding the basement, is not more than 600 m^2, not more than 1 water closet for each sex is required.
[Sentence 3.7.4.8.(2)]

One water closet serving both sexes may be provided in Group E occupancies as long as;

- the occupant load is not more than 9 people, OR
- the total area, excluding the basement) is not more than 300 m^2.
  [Sentence 3.7.4.8.(3)]

Separate employee washroom facilities may be shared by both male and female employees as long as there are not more than 5 (total) employees and the door can be locked from the inside.
[Sentence 3.7.4.3.(8)]

PLUMBING FIXTURES FOR INDUSTRIAL OCCUPANCIES (GROUP F)

The number of water closets and lavatories required for industrial occupancies are to be determined based on occupant load and Table 3.7.4.9.
[Sentence 3.7.4.9.(1)]

The code permits the use of a shared washroom for both sexes in industrial occupancies if;

- the occupant load is not more than 10 people, or
- the total area of the occupancy (excluding basements) is not more than 300 m^2.
  [Sentence 3.7.4.9.(2)]

As is the case in Part 9, Part 3 prohibits the use of glazing other than safety glass, for a shower or tub enclosure. Since these areas are high accident areas, glass other than safety glass might increase the severity of a possible injury.
[Sentence 3.7.4.11.(1)]

The wall and floor surfaces from the top of a urinal to not less than 900 mm beyond the outline of the urinal, must be protected by an impervious and durable material in order to prevent deterioration of the surface finish.
[Sentence 3.7.4.12.(1)]

If urinals are equipped with automatic flushing devices, a floor drain is required in public washroom.
[Sentence 3.7.4.13.(1)]

If garb bars are installed, even if they are not required, must be capable of resisting a vertical or horizontal load of at least 1.3 kN.
[Sentence 3.7.4.14.(1)]

Except for a dwelling unit and as required by Section 3.8, a minimum clearance of 380 mm in front of water closet is required.

If a room contains only 1 water closet, the doorway to the room must be provided with a full height door which can be locked from the inside.
[Sentence 3.7.4.16.(1)]

Except for private, if a room contains at least 2 water closets or 1 water closet and 1 urinal, one shower or one bathtub, the design of the room is to be such that the water closets, urinals and lavatories are not visible from the entrance to the room.
[Sentence 3.7.4.16.(2)]

Water temperature control to bath tubs, showers and hand basins is limited to 49°C. More information may be obtained by referring to Subsection 7.6.5.
[Sentence 3.7.4.17.(1)]

On every floor where work will be undertaken and within 100 m of any area where work will be undertaken, a source of drinkable water is to be provided by;

- a fountain with an upward flow of water,
- a tap from a piped water supply, or
- a tap from a covered container.
  [Sentence 3.7.4.18.(1)]

Every pharmacy must be provided with a sink with hot and cold potable water.
[Sentence 3.7.4.19.(1)]

8. A medium hazard industrial occupancy has a total occupant load of 8 people. How many water closets are required for each sex? (Area is 450 m^2.)

   a) 1per sex

   b) 1 shared

   c) 2 per sex

   d) 2 shared.

OBC reference: _____

9. A restaurant has an occupant load of 20 people and a staff of 4. What is the minimum number of water closets required in this case assuming the employees are not sharing an employee washroom?

   a) 1 per sex

   b) 2 per sex

   c) 1 shared

   d) 2 shared.

OBC reference: _____

10. The maximum temperature for water to a sink in a residential occupancy is;

    a) 49°C

    b) 49°F

    c) 50°C

    d) not regulated.

OBC reference: _____

STOP

All recirculating pumps used in a public pool are to be capable of being deactivated by an emergency stop button clearly labelled and located at;

- Class A Pool beside the communication systems telephone, and
- Class B Pool on the deck area.
  [Sentence 3.11.10.1.(12)]

The emergency stop button, when used, is to activate an audible and a visual signal located by the emergency stop.
[Sentence 3.11.10.1.(13)]

An emergency sign containing the words **IN THE EVENT OF AN EMERGENCY PUSH EMERGENCY STOP BUTTON AND USE EMERGENCY PHONE, AUDIBLE AND VISUAL SIGNAL WILL ACTIVATE** are to be in letters at least 25 mm high with a 5 mm stroke and posted above the emergency stop button.
[Sentence 3.11.10.1.(14)]

SERVICE ROOMS AND STORAGE FOR ALL POOLS (SUBSECTION 3.11.11. - DIV.B)

In addition to the requirements of this Subsection, service rooms are to comply with the requirements of Sentences 3.6.2.1.(5), 3.6.2.1.(7), (8) and Articles 3.5.3.3. and 3.6.2.2.
[Article 3.11.11.1]

Where compressed chlorine gas is used as a pool water disinfectant, the cylinders or containers of gas are to be located in a service room that;

- except as provided in Sentences 3.1.9.4.(3) to (7) (of 3.1.9.4. Combustible Piping Penetrations), is separated from the remainder of the building by a 1 h fire separation that is substantially gas tight,
- is designed for the sole purpose of containing all installed pressurized chlorine gas apparatus and piping and storing all chlorine gas containers or chlorine gas cylinders that are individually secured against toppling,
- is located at or above ground level,
- is provided with an exit door opening to the outdoors,
- has screened openings to the outdoors with at least one opening located within 150 mm from the floor and at least one opening located within 150 mm from the ceiling, each opening being 2% of the area of the floor,

The spa is to be surrounded with a hard-surfaced pool deck with a;

- minimum 1.8 m clear space at the main entrance point,
- 900 mm on all sides,
- sloped away from the spa to waste drains with specific slopes depending if the spa is located inside or outside. [Sentence 3.12.2.1.(4)]

The exceptions to the deck requirements above are that one portion of the deck that does not exceed 25% of the perimeter of the spa may be 300 mm if;

- the spa has an area less than 6 m^2, and
- no interior dimension greater than 2.5 m. [Sentence 3.12.2.1.(5)]

The maximum depth of water above a seat or bench is limited to 600 mm.
[Sentence 3.12.2.1.(6)]

When steps are provided into the spa, the steps are;

- to be equipped with a handrail,
- have a non-slip finish, and
- have a contrasting colour band along the entire side and top edges. [Sentence 3.12.2.1.(7)]

Every spa is to be provided with dressing rooms, water closets and shower facilities conveniently located.
[Sentence 3.12.2.1.(8)]

If there is a space between the ladder treads and the side of the spa, that space is to be not more than 150 and not less than 75 mm.
[Sentence 3.12.2.1.(9)]

If a ramp is provided into the spa, not more than 50% of the perimeter of the spa may be replaced with a ramp.
[Sentence 3.12.3.1.(1)]

Where a ramp is provided, the spa is to comply with Sentence 3.11.5.1.(1) to (3) and (5) to (8).
[Sentence 3.12.3.1.(2)]

If material alterations or repairs concern any pool fitting that passes water or air, or both, in or out of the pool tank, the affected fitting is

- totally enclosed nonmetallic raceways conforming to Clause 3.1.5.20.(1)(b).
  [Sentence 9.34.1.5.(1)]

If electrical wires are used in a space used as a plenum, those cables are to comply with the requirements found in Sentence 3.6.4.3.(1) (maximum smoke density or char tests, etc.)
[Sentence 9.34.1.5.(2)]

Public and Service Areas (Article 9.34.2.7. - Div.B)

Lighting outlets are to be controlled by a wall switch or panel in the following locations;

- public areas in buildings including recreational camps and camps for the housing of workers,
- service areas in buildings including recreational camps and camps for the housing of workers.
  [Sentence 9.34.2.7.(1)]

If the lighting is provided by the use of incandescent light, the minimum illumination levels are to be as indicated in Table 9.34.2.7.
[Sentence 9.34.2.7.(2)]

If a light source other than incandescent lighting is used, the minimum lighting levels are to be as indicated in Table 9.34.2.7. or equivalent.
[Sentence 9.34.2.7.(3)]

Emergency Lighting (Subsection 9.34.3. - Div.B)

Emergency lighting is to conform with Subsection 9.9.12. which was covered in the module dealing with Means of Egress.
[Sentence 9.34.3.1.(1)]

GENERAL REQUIREMENTS FOR ENERGY EFFICIENCY, CARBON DIOXIDE EQUIVALENTS AND PEAK ELECTRIC DEMAND (SECTION 12.2 - DIV. B)

Energy Efficiency Design (Subsection 12.2.1. - Div. B)

These new construction requirements apply to construction for which a permit has been applied for BEFORE January 1, 2017.
[Sentence 12.2.1.1.(1)]

There are two methods of comply with this Section for a Part 9 building or part of a building containing a **residential occupancy** which is intended for year-round occupancy;

1. Meet the performance level that is equal to a rating of 80 or more when evaluated in accordance with NRCan, or
2. Conform to Chapters 1 and 2 of MMAH Supplementary Standard SB-12, "Energy Efficiency for Housing".
   [Sentence 12.2.1.1.(3)]

For all other buildings that do not contain a residential occupancy that is within the scope of Part 9, the energy efficiency of all buildings must conform to Division 1 and 2 or 4 of MMAH Supplementary Standard SB-10, "Energy Efficiency Requirements".
[Sentence 12.2.1.1.(2)]

The requirements stated above do not apply to;

1. Farm buildings,
2. A building that does not use electrical power or fossil fuel,
3. Manufactured buildings as described in Article 9.1.1.9., and
4. A seasonal recreational building, described in Sections 9.36 and 9.38.
   [Sentence 12.2.1.1.(4)]

For all buildings for which a permit has been applied for after December 31, 2016, the following energy efficiency design requirements apply:
[Sentence 12.2.1.2.(1)]

1. The energy efficiency of all buildings must;
   - be designed to exceed not less than 13% the energy efficiency levels required by Sentence 12.2.1.1.(2), or

- conform to Division 1 and Division 3 or 5 of MMAH Supplementary Standard SB-10, "Energy Efficiency Requirements"[Sentence 12.2.1.2.(2)]

2. The energy efficiency of a building or part of a building of residential occupancy that is within the scope of Part 9 and is intended for occupancy on a continuing basis during the winter months, must
   - be designed to exceed by not less than 15% the energy efficiency levels required by Sentence 12.2.1.1.(3), or
   - conform to Chapters 1 and 3 of MMAH Supplementary Standard SB-12, "Energy Efficiency for Housing" [Sentence 12.2.1.2.(3)]

These requirements once again will not apply to

1. Farm buildings,
2. A building that does not use electrical power or fossil fuel,
3. Manufactured buildings as described in Article 9.1.1.9., and
4. A seasonal recreational building, described in Sections 9.36 and 9.38.
   [Sentence 12.2.1.1.(4)]

Carbon Dioxide Equivalents (Subsection 12.2.2. - Div. B)

All buildings must be designed to conform to the CO2e emission requirements set out in MMAH Supplementary Standard SB-10, "Energy Efficiency Requirements".
[Sentence 12.2.2.1.(1)]

These requirements do not apply to;

1. A building or part of a building of residential occupancy that is within the scope of Part 9 and is intended for occupancy on a continuing basis during the winter months,
2. A farm building,
3. A building that does not use electrical power or fossil fuel,
4. A manufactured building described in Article 9.1.1.9., or
5. A seasonal recreational building described in Section 9.36 or 9.38.

Peak Electrical Demand (Subsection 12.2.3. - Div. B)

All buildings must be designed to conform to the peak electrical demand requirements set out in MMAH Supplementary Standard SB-10, "Energy Efficiency Requirments".

These requirements do not apply to;

1. A building or part of a building of residential occupancy that is within the scope of Part 9 and is intended for occupancy on a continuing basis during the winter months,
2. A farm building,
3. A building that does not use electrical power or fossil fuel,
4. A manufactured building described in Article 9.1.1.9., or
5. A seasonal recreational building described in Section 9.36 or 9.38.

Motion Sensors (Subsection 12.2.4. - Div. B)

Minium lighting levels are stipulated in the code and these lights may be controlled by motion sensors, EXCEPT;

1. for those lights installed in an exit,
2. installed in a corridor serving Group B, Division 2 or Division 3 occupancies, or
3. where those lights are required to conform with Sentence 3.2.7.1.(6) (places of assembly for the viewing of film or the performing arts).
   [Sentence 12.2.4.1.(1)]

In areas where motion sensors are used to control the lighting for public corridors or corridors providing access to exits; the sensors must be installed with controllers for fail-safe operation and timers set a at least a 15 minute duration.
[Sentence 12.2.4.1.(2)]

Motion sensors CANNOT be used to control emergency lighting.
[Sentence 12.2.4.1.(3)]

Energy Efficiency for Buildings Within the Scope of Part 9 (Section 12.3)

Section 12.3 applies to the energy efficiency of a building or part of a building of residential occupancy that is within the scope of Part 9 and is intended for winter occupancy.
[Sentence 12.3.1.1.(1)]

Windows and Sliding Glass Doors

The energy rating and the overall coefficient of heat transfer required for windows and sliding glass doors must be determined in conformance with,

The first 2.5 m of hot water outlet piping of a hot water storage tank serving a non-recirculating system must be insulated to provide a thermal resistance of not less than RSI 0.62
[Sentence 12.3.1.4.(2)]

The inlet pipe of a hot water storage tank between the heat trap and the tank serving a non-recirculating system must be insulated to provide a thermal resistance of not less than RSI 0.62
[Sentence 12.3.1.4.(3)]

Residential Furnaces After December 31, 2014

A furnace serving a dwelling unit must be equipped with a brushless direct current motor.
[Sentence 12.3.1.5.(2)]

Energy Supply for Kitchen and Laundry Facilities After December 31, 2014

In order to supply energy to cooking appliances and clothes dryers, every kitchen and laundry space must be provided with;

- an electrical outlet,
- a natural gas line, or
- a propane line
  [Sentence 12.3.1.6.(2)]

Water Efficiency - Plumbing Systems (Subsection 12.4.1.)

All buildings must conform to the water efficiency requirements of Subsection 7.6.4. "Water Efficiency". The requirements for water efficiency deal with the following;

- Water supply fittings for maximum flow rates
- Plumbing fixtures for maximum water consumption per flush cycle for sanitary fixtures

EXERCISE # 1 - ENERGY EFFICIENCY FOR ALL BUILDINGS AND RESIDENTIAL OCCUPANCY

To complete this exercise, you need to be familiar with the requirements found in Subsections 12.1.1 to 12.4.1. Provide code references and Division designations.

1. A Part 9 building, other than residential occupancy must conform to SB-10 if the permit was applied for;
   a) after January 1, 2017
   b) before January 1, 2017
   c) after December 31, 2016
   d) before December 31, 2016

OBC Reference: _____

2. The Energy Efficiency provisions of Part 12;
   a) apply to all buildings
   b) apply to all Part 9 buildings
   c) apply to all Part 3 builings
   d) do not apply to farm buildings.

OBC Reference: _____

3. Required lighting may be controlled by a motion detector, EXCEPT for lighting serving;
   a) an exit
   b) corridors serving patients bedrooms
   c) emergency lighting
   d) all of the above.

OBC Reference: _____

4. For a building in which a permit is applied for after December 31, 2016, the energy efficiency must be designed to exceed to not less than what energy efficiency levels as required by Sentence 12.2.1.1.(2)

   a) 13%

   b) 15%

   c) not required

   d) greater than 13%

OBC Reference: _____

5. The energy efficiency of a Part 9, continuously occupied residential building where a permit has been applied for after December 31, 2016 may conform to Chapters 1 and 3 of;

   a) SB-10

   b) Energuide 80

   c) Chapters 1 and 2 of SB-12

   d) SB-12

OBC Reference: _____

6. Carbon dioxide equivalents and their emission requirements apply to;

   a) all residential buildings

   b) buildings not using electrical power

   c) all buildings

   d) a farm building

OBC Reference: _____

7. The energy rating for a fixed window in a dwelling unit is;

   a) 3.0 $W/m^2 \cdot °C$

   b) 19

   c) 29

   d) determined by Standard

OBC Reference: _____

8. The overall coefficient of heat transfer for exterior sliding glass door in a dwelling unit is

   a) determined by CAN/CSA-A440.2

   b) determined by CAN/CSA-A440.3

   c) determined by CAN/CSA-A440

   d) 36.

OBC Reference: _____

9. At least one programable thermostatic control device in a dwelling unit must allow the setting of air temperature when air-conditioning is provided of;

   a) 13 degrees C or higher in cooling mode

   b) 29 degrees C or lower in heating mode

   c) 13 degrees C or lower in cooling mode

   d) 29 degrees C or higher in cooling mode

OBC References: _____

10. Hot water pipes connected to a hot water storage tank must have heat traps on both the inlet and outlet piping;

    a) when the tank has an integral heat trap

    b) as close as practical

    c) when the tank serves a recirculating system

    d) within the 2.5 m of the tank

OBC Reference: _____

11. Furnaces serving a commercial occupancy where a permit has been applied for after December 31, 2014 must be equipped with a brushless direct current motor in;

    a) an office

    b) a church

    c) furnaces serving a dwelling unit

    d) all buildings

OBC Reference: _____

12. A clothes dryer supplied energy must be provided with which of the following in the laundry space?

    a) electrical outlet and natural gas outlet

    b) a propane line

    c) only an electrical outlet

    d) only a natural gas outlet

OBC Reference: _____

13. The water efficiency requirements for a commercial building are required to conform to;

    a) 7.6.4. of the code

    b) peak demand flow

    c) the amount of fixtures in a building

    d) SB-10

OBC Reference: _____

STOP

CLOSING COMMENTS

Your evaluation of the course and its workbook is important; it enables George Brown College to keep the course current, improve the learning experience and implement changes to meet your needs. As soon as you have finished this course, please complete the anonymous online survey which may be found at: http://ce.georgebrown.ca/buildingcode/

If you find an error in the workbook, please let us know at: http://ce.georgebrown.ca/buildingcode/ under Manual Revisions.

MODULE 2 B

(MODULE 2 B) EXERCISE # 1 - REQUIREMENTS FOR SIGNS

1. An application for a 20 m^2 roof top sign is being applied for. This sign must be reviewed by an;

   a) a suitably qualified and experienced person

OBC Reference: Clause 1.2.1.1.(6)(c) - Div. C

2. A projecting sign which is attached to a parapet wall must;

   c) be designed by a suitably qualified person

OBC reference: Sentence 1.2.1.1.(7) - Div. C

3. A projecting sign overhangs a sidewalk; the minimum clearance to this sign is;

   c) 2.4 m

OBC reference: Sentence 3.15.5.2.(1) - Div. B

EXERCISE # 2 - CONDITIONS SPECIFIC TO SELF-SERVICE STORAGE BUILDINGS

1. What is the maximum number of dwelling units permitted within a self-service storage building?

   b) two

OBC Reference: Sentence 3.10.2.4.(9) - Div. B

2. A single self-service storage building has an occupant load of 50. How many water closets and lavatories are required?

   c) 2

OBC Reference: Sentence 3.10.2.7.(2) → 3.7.4.9.(2) - Div. B

3. For a 3 storey self-service storage building, what is the minimum distance between buildings for spatial separations requirements to another SSSB on the same property?

   c) 9 m or as determined from Section 3.2.3.

OBC Reference: Sentence 3.10.3.2.(2) - Div. B

4. The fire separation required between a dwelling unit and the remainder of the self-service storage building is;

   d) 2 h fire-resistance rating.

OBC Reference: Sentence 3.10.2.4.(10) - Div. B

EXERCISE # 3 - CONDITIONS SPECIFIC TO TENTS

1. A tent has an occupant load of 230 people. What is the minimum number of water closets for each sex?

   c) 6

OBC Reference: Sentence 3.14.1.8.(1) - Div. B → Table 3.7.4.3.E.

2. Tents not occupied by the public are required to be separated from each other by;

   d) no requirement as long as the condition is considered safe

OBC Reference: Sentence 3.14.1.4.(4) - Div. B

3. Fabric used in tents must comply with;

   a) CAN/ULC S-109-03

OBC Reference: Sentence 3.14.1.6. - Div. B → Table 1.3.1.2. - Div. B.

EXERCISE # 4 - CONDITIONS SPECIFIC TO AIR-SUPPORTED STRUCTURES

1. Which of the following occupancy is permitted in an air-supported structure?

   d) mercantile

OBC Reference: Sentence 3.14.2.2.(1) - Div. B

2. An air-supported structure occupied by the public must be separated from other structures on the same property by a minimum of;

   c) as required by the spatial separation requirements but not less than 3 m

OBC Reference: Sentence 3.14.2.3.(1) & 3.14.2.1.(1) - Div. B

3. A doorway in a barrier-free path of travel must have a clear width of;

   c) 850 mm wide

OBC Reference: Sentence 3.8.3.3.(1) - Div. B

4. Closers for doors in a barrier-free path of travel and opening into entrances to dwelling units, must open with a force of not more than;

   d) the code does not state the maximum force.

OBC Reference: Sentence 3.8.3.3.(8) - Div. B

5. Doors in a barrier-free path of travel are required to be provided with clear wall space on the latch side of the door. Where a door swings away from the approach side, the wall space shall be;

   a) 300 mm

OBC Reference: Clause 3.8.3.3.(10)(b) - Div. B

6. Handrails provided on both sides of ramps in a barrier-free path of travel are required to resist the following loads;

   d) either a point load of 0.9 kN or a uniformly distributed load of 0.7 kN/m

OBC Reference: Subclause 3.8.3.4.(1)(e)(vi) - Div. B

7. Floors in a barrier-free path of travel are required to be designed as ramps if the gradient is greater than;

   d) 1 in 20

OBC Reference: Sentence 3.8.3.4.(3) - Div. B

8. A space designated for wheelchair use in an assembly occupancy which is designed for a side approach is required to be;

   b) 900 mm wide by 1 525 mm long

OBC Reference: Clause 3.8.3.6.(1)(b) - Div. B

9. Grab bars in water closet stalls that are required to be barrier-free accessible must be designed to resist the following load(s);

   b) 1.3 kN applied horizontally or vertically

OBC Reference: Subclause 3.8.3.8.(1)(d)(iv) - Div. B

10. Automatic hand dryers for a lavatory in a Barrier-Free washroom are to be located;

    a) between 900 mm and 1 200 mm above the floor

OBC Reference: Sentence 3.8.3.11.(3) - Div. B

11. The minimum turning radius for a wheelchair in a Universal Toilet Room is;

    d) 1 500 mm

OBC Reference: Clause 3.8.3.12.(1)(i) - Div. B

12. The spout on a drinking fountain located in a Barrier-Free path of travel is to be located a maximum of;

    c) 915 mm above the floor

OBC Reference: Clause 3.8.3.16.(1)(a) - Div. B

EXERCISE # 4 - PROTECTION WITHIN FLOOR AREAS

1. A floor area is divided into 2 zones. The occupancy on the floor area is Group D. What is the maximum travel distance from the most remote point in one zone to the door leading into the other zone?

    b) 40 m

OBC Reference: Subclause 3.3.1.7.(1)(b)(ii) - Div. B →3.4.2.5.(1)(b) - Div. B

2. The fire-resistance rating for the fire separation which creates the zones in a barrier-free path of travel when the floor is required to have a fire-resistance rating of 1 h is;

    b) 1 h

OBC Reference: Sentence 3.3.1.7.(4) - Div. B

3. A residential suite has an occupant load of 4 people. What is the minimum area for a balcony used to provide protection on the floor area?

    d) 2.0 m^2.

OBC Reference: Sentence 3.3.1.7.(7) - Div. B

MODULE 4 B

(MODULE 4 B) EXERCISE # 1 - DOORS

1. A door to a bathroom located in a barrier-free path of travel in a residential occupancy is served by a corridor which is 980 mm wide. If the bathroom door is on the same level as the entrance to the suite, the minimum door width is;

   c) 810 mm

OBC Reference: Sentence 9.5.11.3.(1) - Div. B

2. The finished interior floor level in a Group D occupancy is 190 mm below the sliding door sill while the distance from the finish floor to the ground level is 1 200 mm. The door must be;

   d) protected by a guard

OBC reference: Sentence 9.8.8.1.(1) - Div. B

3. Glass in a 500 mm wide sidelight must be made of;

   d) not regulated.

OBC Reference: Sentence 9.6.1.4.(1) - Div. B

4. Glass in a 650 mm wide sidelight must be made of;

   c) safety glass of the laminated type,

OBC Reference: Sentence 9.6.1.4.(1) - Div. B

5. Safety glass in a 1 200 mm wide sidelight adjacent to an entrance door in a public area unit must conform to;

   c) CAN/CGSB - 12.1 - M

OBC reference: Clause 9.6.1.4.(1)(a) - Div. B

MODULE 6 B

(MODULE 6 B) EXERCISE # 1 - GENERAL REQUIREMENTS, STAIR DIMENSIONS AND LANDINGS

1. A flight in an exit stairway serving an office building may contain;

   a) only a curved or straight run

OBC Reference: Sentence 9.8.3.1.(1) - Div. B

2. An interior stair serving a Group D occupancy must contain a minimum of;

   c) 3 risers

OBC reference: Sentence 9.8.3.2.(1) - Div. B

3. A stair serving a Group E occupancy must meet the following minimum dimensions;

	RISE	RUN	TREAD DEPTH
d)	125	280	280

OBC Reference: Sentence 9.8.4.1.(1) - Div. B → Table 9.8.4.1.

4. An interior stair serving a duplex must meet the following minimum dimensions;

	RISE	RUN	TREAD DEPTH
d)	125	280	280

OBC Reference: Sentence 9.8.4.1.(1) - Div. B → Table 9.8.4.1.

5. The minimum width of a ramp NOT in a barrier-free path of travel in a Group D Occupancy is;

   b) 900 mm

OBC reference: Sentence 9.8.5.2.(3) - Div. B

6. The minimum clear height over a ramp serving a duplex is;

   b) 2 050 mm

OBC reference: Clause 9.8.5.3.(1)(b) - Div. B

7. The maximum slope for an interior ramp serving an office building is;

   d) 1 in 8

OBC reference: Clause 9.8.5.4.(1)(d) - Div. B

8. An interior stair NOT serving a dwelling unit is required to have a landing(s) at the;

   b) top and bottom of the stair and where a doorway occurs in the stairway

OBC Reference: Sentence 9.8.6.2.(1) - Div. B

9. An exterior stair NOT serving a dwelling unit is required to have a landing(s) at the;

   b) top, bottom and where a doorway opens onto the stair

OBC Reference: Clause 9.8.6.2.(1)(a) & (c) - Div. B

10. The minimum clear height over landings is;

    c) 2 050 mm just like for the headroom for stairs

OBC Reference: Clause 9.8.6.4.(1)(b) - Div. B

11. The maximum height between landings is;

    d) 3 700 mm

OBC reference: Sentence 9.8.3.3.(1) - Div. B

EXERCISE # 2 - HANDDRAILS

1. A straight run, interior stair serving a mercantile occupancy is 1 200 mm wide and has 14 risers. A handrail is required;

   b) on both sides

OBC Reference: Sentence 9.8.7.1.(1) - Div. B

2. A guard is required around an interior mezzanine floor located in an office building. The continuous handrail height required on the landing cannot exceed;

   c) 1 070 mm

OBC Reference: Sentence 9.8.7.4.(3) and 9.8.7.2.(1) - Div. B

3. The maximum height for a handrail on a ramp serving a Group C occupancy is;

   b) 965 mm

OBC Reference: Clause 9.8.7.4.(2)(b) - Div. B

4. A handrail is required to have a minimum clearance to the wall it is attached to and at the same time cannot project more than a certain value into the required width of the stair. These two values are;

   a) 50 mm minimum and 100 mm maximum

OBC Reference: Sentences 9.8.7.5.(1) and 9.8.7.6.(1) - Div. B

5. An exit stair is determined to be a minimum of 1 100 mm wide because of the occupant load it is expected to serve but a 1 500 mm wide stair is provided. This stair is also required to have a handrail on both sides. If both handrails project into the stair width, what is the maximum projection permitted on each side?

   b) 300 mm

OBC Reference: Sentence 9.8.7.6.(1) - Div. B

EXERCISE # 3 - GUARDS

1. A guard is required around an exterior stair that has;

   d) a difference in elevation greater than 600 mm

OBC Reference: Clause 9.8.8.1.(1)(a) - Div. B

2. A guard is required around a landing for an interior stair that has;

   c) more than 2 risers

OBC Reference: Sentence 9.8.8.1.(3) - Div. B

3. A required guard in a Group D occupancy is required to be;

   a) 1 070 mm high

OBC Reference: Sentence 9.8.8.3.(1) - Div. B

4. The maximum opening size in a required guard in a Group F Division 2 occupancy must prevent the passage of a spherical object with a diameter of;

   c) 200 mm wide

OBC Reference: Sentence 9.8.8.5.(2) - Div. B

5. Consider a guard constructed in accordance with Detail ED-1 in SB-7. Answer the following questions.

    - What specific type of lumber is required for the pickets?

    d) Douglas Fir-Larch

Reference: 2.1.1.(2) SB-7 & Detail Note #2 - Vol.2

    - What is the minimum size of pickets?

    c) 32 X 32

Reference: Table 2.1.2. SB-7 - Vol. 2

    - What is the minimum size for the top rail?

    a) 38 X 89

Reference: Table 2.1.2. SB-7 - Vol. 2

    - How many connectors are required for the rim joist per joist?

    d) 3 - 82 mm nails

Reference: Detail Note #3 SB-7 - Vol. 2

    - How many fasteners are required for each picket to the rim joist?

    a) 2 - #7 X 76 mm screws

Reference: Detail ED-1 drawing SB-7 - Vol. 2

    - What is the minimum deck joist size for this construction detail?

    c) 38 X 184

Reference: Table 2.1.3. & Detail ED-1 drawing SB-7 - Vol. 2

6. Wooden stairs used as an exit stair for a Group D occupancy span from the 1st floor to the 2nd floor. The stairs are free-standing. What is the minimum stringer size?

    d) 38 X 235 @ 600 mm o/c.

OBC References: Clauses 9.8.9.4.(1)(a), (c) & (d) - Div. B

MODULE 7 B

(MODULE 7 B) EXERCISE # 1 - GENERAL REQUIREMENTS AND DIMENSIONS IN A MEANS OF EGRESS

1. A Part 9 hotel has 10 suites on one floor. The suites have one bedroom. What is the total occupant load for the floor area?

   c) 20

OBC Reference: Clause 9.9.1.3.(1)(a) - Div. B

2. An engineering office has an area of 93 m^2. What is the occupant load for this area?

   b) 10

OBC reference: Subclause 9.9.1.3.(1)(b)(ii)→Table 3.1.17.1.

3. An aircraft hangar has an occupant load of 10 people. What is the area which would support this occupant load?

   b) 460 m^2

OBC Reference: Subclause 9.9.1.3.(1)(b)(ii)→Table 3.1.17.1.

4. Fill in the code references to the following chart dealing with Dimensions in a Means of Egress.

TOPIC	VALUE	CODE REF.
General	N/A	9.9.3.1.(1)
Exit Width	900 mm	9.9.3.2.(1)
Access to exit width	1 100 mm	9.9.3.3.(1)
Headroom	2 100 mm	9.9.3.4.(1)
Stair width (2 references)	900 mm	9.9.3.2.(1), 9.8.2.1.(1)
Headroom for exits or access to exits in storage garages	2 000 mm	9.9.3.4.(2)

EXERCISE # 2 - MEANS OF EGRESS

1. A 3 storey office building is required to have floors that are fire separations with a 1 h fire-resistance rating. A fire-resistance rating 30 minutes is required for the roof . What is the required fire-resistance rating for the fire separation of the exit stair shaft from the second to the third floor?

   c) 1 h

OBC References: Sentence 9.9.4.2.(1) - Div. B

2. A 3 storey office building provided with floors which are fire separations with a 1 h fire-resistance rating and a fire-resistance rating of 45 minutes to the roof . What is the required fire-resistance rating for the fire separation of the exit stair shaft from the third floor to the roof?

   b) 45 minutes

OBC Reference: Sentence 9.9.4.2.(2) - Div. B

3. A window is located in an exterior wall of a building adjacent to the only required unenclosed exit stair. This particular window is 4 500 mm above the stair and 3 500 mm away from the stair. This window; (Refer to Figure 7-1.)

   d) requires no special protection

OBC Reference: Sentence 9.9.4.4.(1) - Div. B

4. A window is located in an exterior wall of a building adjacent to an enclosed exit stair which has full height windows in its exterior wall at every landing level. This particular building window is 2 500 mm above the landing and 2 500 mm away from the stair; (Refer to Figures 7-2 & 7-3)

   c) either window must be protected with wired glass in fixed steel frames or glass block

OBC Reference: Sentence 9.9.4.5.(1) - Div. B

5. An exterior exit door is located in an exterior wall at the main floor of a 3 storey building. There is no internal enclosure to the exit stair and the main floor has a single tenancy (i.e., no public corridor). Adjacent to the exit door is a window which is 1 200 mm away from the door. This window;

   d) no window protection is required

OBC Reference: Sentence 9.9.4.6.(1) - Div. B (NOTE: The angle is 180 degrees)

6. An exterior exit door is located in a wall at the main floor of a 3 storey building and faces 90° to the exterior wall. There is no internal enclosure to the exit stair and the main floor has a single tenancy (i.e., no public corridor). Adjacent to the exit door is a window which is 1 200 mm away from the door; this window;

   d) no window protection is required

OBC Reference: Sentence 9.9.4.6.(2) (NOTE: The door and the window are in the same fire compartment.)

7. A doorway within a public corridor on a floor area of a multi-tenant mercantile building is perpendicular to the public corridor and is comprised of two active leafs. This doorway must be 2 030 mm high and not less than;

   d) 1 210 mm wide

Code Reference: Sentence 9.9.6.3.(1) - Div. B

8. A door serving a floor area swings onto a landing. The minimum distance between the path of the door swing and the first riser is;

   b) 300 mm

Code Reference: Sentence 9.9.6.6.(1) - Div. B

9. Complete the following chart.

Subject	Value	Code Reference
Exit doorway width (single leaf)	800	9.9.6.3.(2)(a)
Exit doorway width (multiple leafs, no latching)	1 210	9.9.6.3.(2)(c)
Exit door height	2 030	9.9.6.2.(1)
Minimum headroom clearance for exit doors	1 980	9.9.6.2.(2)
Distance to closest riser	300 or 150	9.9.6.6.(1) & (2)

10. A door with a self-closing device serving a suite in a hotel and opening into a public corridor;

    b) may lock automatically

OBC Reference: Sentence 9.9.6.7.(4) - Div. B (NOTE: The force requirement is not a valid answer since the suite doors are access to exit doors and NOT exit doors. Sentence 9.9.6.10(1) refers only to exit doors.)

11. The maximum force permitted to open an interior exit door in a Barrier-Free path of travel is;

    a) 90 N

OBC References: Sentence 9.9.6.8.(1) - Div. B

EXERCISE # 3 - ACCESS TO EXITS, EXITS FROM FLOOR AREAS, EGRESS FROM DWELLING UNITS, SIGNAGE & LIGHTING.

1. A dead end public corridor exists in a mercantile, multi-tenant floor area. What are the specifics for this dead end?

    d) max. length = 9 m, and not more than 30 people.

OBC Reference: Sentence 9.9.7.3. (1) → Table 9.9.7.3.

2. Office suites open into a dead end public corridor and have other egress doors leading to an exit. What are the specifics for this dead end?

    c) the dead end corridor may be of any length and may serve any number of persons

OBC Reference: Clause 9.9.7.3.(1)(b)

3. A medium hazard industrial occupancy suite has an area of 150 m^2. How many egress doors are required and what is the maximum distance of travel to the nearest egress door?

    b) 1 egress door and max. 25 m

OBC References: Clause 9.9.7.4.(1)(a)

4. A business and personal services occupancy suite has an area of 150 m^2 and the distance to the nearest egress door is 30 m. How many egress doors are required?

   a) 2 minimum

OBC References: Clause 9.9.7.4.(1)(a)

5. What is the maximum distance of travel within a suite to an egress door if the occupancy is a sprinklered business and personal services occupancy in a sprinklered floor area?

   b) 45 m

OBC References: Sentence 9.9.7.6.(1) → 9.9.8.2.(1)

6. What is the maximum distance of travel to the nearest egress door from a suite if the occupancy is mercantile occupancy?

   c) 30 m

OBC References: Sentence 9.9.7.6.(1) → 9.9.8.2.(1)

7. A scissor stair serving a floor area has both exit doors opening onto a lobby in an apartment building. Since the floor is unsprinklered, the lobby is enclosed with a fire separation having a 1 hour fire-resistance rating. The lobby is 2 m above the ground level and the distance of travel from the exits to the outdoors is 12 m.

   c) only one exit is permitted to lead through the lobby

OBC Reference: Sentence 9.9.8.5.(1)

8. An exit opens directly into a lobby in an apartment building. The floor is unsprinklered, the lobby is enclosed with a fire separation having a 1 hour fire-resistance rating. The lobby is 1 m above the ground level and the distance of travel from the exit to the outdoors is 15 m and a suite door opens into a vestibule which in turn opens into the lobby.

   a) the condition complies with the code requirements

OBC Reference: Article 9.9.8.5.

9. A dwelling unit has two storeys and is located above a one storey dwelling unit. The upper unit egress door is located at the ground level. The upper dwelling unit must;

   c) direct access to a balcony at the third floor level

OBC Reference: Sentence 9.9.9.1.(3)

10. The minimum level of lighting in an exit is;

    b) 10 lx

OBC Reference: Sentence 9.9.12.2.(2)

11. Emergency lighting levels are to be measured;

    c) average lighting level at the floor or stair tread level

OBC Reference: Sentence 9.9.12.3.(4)

12. A floor level has an area of 500 m^2. There are 20 evenly distributed incandescent emergency light each producing 20 watts. What is the average lighting level and what is the minimum required by the code?

    a) 0.8, min. 1 W/m^2

OBC Reference: Sentence 9.9.12.3.(6)

MODULE 8 B

(MODULE 8 B) EXERCISE # 1 - GENERAL REQUIREMENTS FOR FIRE PROTECTION, OCCUPANCY CLASSIFICATION, RATINGS & BUILDING SIZE DETERMINATION

1. A sloping roof is considered a wall for the purposes of fire protection if the roof is;

    b) 30° from the vertical

OBC Reference: Sentence 9.10.1.2.(1) - Div.B

2. A floor area has multiple occupancies. One is a Group D and occupies 25% of the area, another is a Group E and occupies 65% of the area and another is a low hazard industrial occupancy which takes up 10% of the area. The floor area should be classified as;

    c) Groups D & E major occupancies

OBC reference: Sentences 9.10.2.4.(1) and 9.10.2.1.(1) - Div.B

3. A floor area has multiple occupancies. One is a Group E and occupies 25% of the area, another is a Group D and occupies 70% of the area and another is a medium hazard industrial occupancy which takes up 5% of the area. The floor area should be classified as;

   d) Groups D, E & F-2 major occupancies

OBC reference: Sentences 9.10.2.4.(1) and 9.10.2.1.(1) - Div.B

4. The standard for the determination of flame-spread ratings for structural lumber is;

   c) CAN/ULC-S102

OBC Reference: Sentence 9.10.3.2.(1) - Div. B → 3.1.12.1.(1) → Table 1.3.1.2.

5. A ceiling assembly required to have a fire-resistance rating is to be tested with the fire exposure from;

   a) the underside

OBC reference: Sentence 9.10.3.3.(1) - Div. B

6. A floor assembly is required to be a fire separation with a 1 hour fire-resistance rating. The assembly is required to be tested with the fire exposure from;

   a) the underside

OBC reference: Sentence 9.10.3.3.(1) - Div. B

7. An interior wall separating different occupancies is determined to be required to be a fire separation with a 45 minute fire-resistance rating. The wall would be required to be exposed from a fire from;

   c) from both sides

OBC reference: Sentence 9.10.3.3.(3) - Div.B

8. An enclosed mezzanine is located in a suite on a floor area. The area of the mezzanine is 15% of the suite in which it is located and is in turn 9% of the area of the storey. This mezzanine is;

   a) considered a storey in calculating building height

OBC reference: Clause 9.10.4.1.(1)(a) - Div.B

EXERCISE # 2 - PERMITTED OPENINGS IN WALL & CEILING ASSEMBLIES, CONSTRUCTION TYPES, STEEL MEMBERS, FIRE RESISTANCE IN RELATION TO OCCUPANCY AND HEIGHT, FIRE SEPARATIONS BETWEEN ROOMS AND SPACES WITHIN BUILDINGS.

1. Which of the following combustible elements would be permitted in construction required to be of noncombustible construction?

   b) wood frame partitions between offices in a 2 storey office building

OBC Reference: Sentence 9.10.6.1.(1) - Div.B → Sentence 3.1.5.13.(1)

2. What is the required fire-resistance rating for a floor in a two storey Group D occupancy?

   a) 45 minutes

OBC Reference: Table 9.10.8.1. - Div.B

3. What is the required fire-resistance rating for a 50 % open mezzanine (i.e., 50% open to the storey below) in a two storey Group E occupancy?

   a) 45 minutes

OBC Reference: Table 9.10.8.1. - Div.B (NOTE: A 50% open mezzanine is considered a storey for calculating building height and therefore must be rated as a floor. Note that this is a fire-resistance rating and NOT a fire separation.)

4. What would be the required fire-resistance rating to the roof of a three storey Group F-2 supervised sprinklered building?

   a) no rating required

OBC Reference: Sentence 9.10.8.2.(1) - Div.B (NOTE: No fire-resistance rating is required to the roof because the building is sprinklered.)

5. What is the required fire-resistance rating for an unenclosed noncombustible exterior exit passageway serving a two storey motel?

   a) no fire-resistance rating is required

OBC Reference: Sentence 9.10.8.8.(1) - Div.B (NOTE: No FRR is required because the passageway is noncombustible construction.)

6. What is the required fire-resistance rating for an unenclosed combustible exterior exit passageway serving a two storey office building?

   a) no fire-resistance rating is required

OBC Reference: Sentence 9.10.8.8.(2) - Div.B (NOTE: No FRR is required because the building is a 2 storey Group D occupancy.)

7. Combustible electrical wiring that penetrates the membrane of a fire separation without a fire-resistance rating is;

   d) permitted

OBC Reference: Sentence 9.10.9.6.(5) - Div.B

8. Combustible sprinkler piping that penetrates a fire separation without a fire-resistance rating is;

   c) permitted if both sides of the fire separation are sprinklered

OBC Reference: Sentence 9.10.9.6.(10) - Div.B

9. Combustible piping that penetrates a fire separation required to have a fire-resistance rating is;

   d) permitted if the rating is an F rating based on the CAN4-S115 standard with a 50 Pa pressure differential on the fire exposed side

OBC Reference: Sentence 9.10.9.7.(3) - Div.B

10. A solid masonry party wall with a 1 hour fire-resistance rating has 2 wood beams bearing on it. The beams line up with each other, in other words, the beams are not staggered. Assuming 90 mm minimum bearing is required for each beam, what is the minimum overall thickness of masonry wall required to maintain the fire separation?

    d) 290 mm

OBC Reference: Clause 9.10.9.9.(1) - Div.B

11. Complete the following chart for the fire separations between major occupancies.

Major Occupancy	Adjoining Major Occupancy	Fire-Resistance Rating	Code Reference
C	C,D	1 h	9.10.9.11.(1)
C	E, F-2	2 h	9.10.9.11.(2)
E	2 Dwelling units or Live/Work Units	1 h	9.10.9.11.(3)
D Suites	D, E, F-2, F-3	0	9.10.9.13.(1)
E Suites	E, F-2, F-3	45 min	9.10.9.13.(1)
F-2 Suites	E, F-2, F-3	45 min	9.10.9.13.(1)
F-3 Suites	E, F-2, F-3	45 min	9.10.9.13.(1)

12. In a three storey hotel, what is the required degree of fire-resistance rating for the fire separation between the suites?

    c) 45 minutes

OBC Reference: Sentence 9.10.9.14.(1) - Div.B

13. What are the requirements for a 6 m wide public corridor in a sprinklered mall? (Assume the sprinkler system is electrically supervised and directly connected to the fire department.)

    c) no fire separation is required

OBC Reference: Sentence 9.10.9.15.(3) - Div.B (NOTE: No FRR is required because the area is sprinklered.)

14. An apartment building with 12 suites has an attached enclosed parking structure. Assuming each suite has 1 parking space, what is the required fire-resistance rating for the fire separation between the garage and the apartment building?

    c) 1 ½ hour

OBC Reference: Sentence 9.10.9.16.(1) - Div.B

15. A repair garage is adjacent to a furniture store. The fire separation between the garage and the store is required to have a fire-resistance rating of at least;

    a) 2 hours

OBC Reference: Sentence 9.10.9.17.(1) - Div.B

EXERCISE # 3 - SERVICE ROOMS, FIREWALLS, PREVENTION OF FIRE SPREAD AT EXTERIOR WALLS AND BETWEEN STOREYS, AND DOORS, DAMPERS AND OTHER CLOSURES IN FIRE SEPARATIONS

1. A sprinklered floor area containing a service room containing a natural gas- fired furnace is required to be separated form the remainder of the building with;

   d) an enclosure which is not required to be a fire separation.

OBC Reference: Sentence 9.10.10.3.(1) - Div.B

2. An unsprinklered service room containing a telephone switching panel and a fuse panel is required to be separated from the remainder of the building with;

   d) an enclosure which is not required to be a fire separation.

OBC Reference: Sentence 9.10.10.3.(2) - Div.B

3. A room containing an incinerator is required to be enclosed with a fire separation having a fire-resistance rating of;

   d) 2 hours

OBC Reference: Sentence 9.10.10.5.(1) - Div.B

4. An enclosure for a room for the temporary storage of refuse is required to be separated from the floor area with a fire separation with a fire-resistance rating of;

   b) 45 minutes if the room is sprinklered

OBC Reference: Sentence 9.10.10.6.(1) - Div.B

5. The party wall on a property line between dwelling units is permitted to have a fire-resistance rating of;

   b) 1 hour

OBC Reference: Sentence 9.10.11.2.(1) - Div.B

6. A firewall in a building classified as Group D major occupancy is required to have a fire-resistance rating of;

   c) 2 hours

OBC References: Sentence 9.10.11.3.(1) - Div. B→ Sentence 3.1.10.2.(2)

2. An unsprinklered building of Group D occupancy has an exposing building face area measuring 50 m by 3 m with a limiting distance of 3.0 m. What is the maximum percentage of unprotected openings permitted using Part 3?

   d) 17%

OBC Reference: Sentence 9.10.14.4.(1) - Div. B → Table 3.2.3.1.A.

3. A building of Group F-2 occupancy is located in an area where fire department services are volunteer and the response time is undeterminable. The exposing building face has an area of 150 m^2 and has 15 m^2 of unprotected openings. Using Table 9.10.14.4. what is the minimum limiting distance required for this situation?

   c) 12 m

OBC Reference: Sentence 9.10.14.3.(1) - Div.B → Table 9.10.14.4.

4. A building of Group D major occupancy is not sprinklered and located on the adjacent property to the building described in Question #3. The exposing building face has an area of 100 m^2 and contains 5 m^2 of unprotected openings. Using Table 9.10.14.4.what is the minimum limiting distance required for this building?

   b) 2.4 m

OBC Reference: Sentence 9.10.14.3.(1)- Div.B → Table 9.10.14.4.

5. An exposing building face of a Group F-2 occupancy is determined to have a maximum permitted percentage of unprotected openings of 75%. What is the fire-resistance required in this situation?

   c) 1 hour

OBC Reference: Sentence 9.10.14.5.(1) - Div.B → Table 9.10.14.5.

6. An exposing building face of a Group C occupancy is determined to have a 1 h fire-resistance rating. The maximum percentage of allowable unprotected openings has been established to be 9%. What are the conditions required for the construction of the exterior wall?

   d) noncombustible and noncombustible cladding

OBC Reference: Sentence 9.10.14.5.(1) - Div.B → Table 9.10.14.5.

EXERCISE # 5 - FIRE BLOCKS AND FLAME SPREAD LIMITS

1. An unsprinklered building of wood construction has an attic space of 600 m^2 between firewalls. Firestopping is;

   c) required to create compartments not exceeding 300 m^2

OBC Reference: Sentence 9.10.16.1.(4) - Div.B

2. A combustible canopy extends along the face of a building. If there are no required interior vertical fire separations, at what spacing would the fire blocking be required within the canopy?

   b) 20 m horizontally

OBC Reference: Sentence 9.10.16.1.(6). - Div.B

3. Fill in the missing information in the following table dealing with flame-spread limits.

LOCATION	MAX. FLAME-SPREAD RATING (FSR)	SURFACE FSR or FSR	CODE REF. Div. B
Interior wall	150	Surface FSR	9.10.17.1.(1)
Ceilings	150	Surface FSR	9.10.17.1.(1)
Doors	200	Surface FSR	9.10.17.1.(2)
Doors in Dwelling Units	N/A	N/A	9.10.17.1.(2)
Residential Bathrooms	200	Surface FSR	9.10.17.11.(1)
Exit Walls	25	Surface FSR	9.10.17.3.(1)
Exit Ceilings	25	Surface FSR	9.10.17.2.(1)
Exit Lobby	25	Surface FSR	9.10.17.3.(2)
Exterior Exit Passageway	25 up to 10% of walls and ceiling 150	Surface FSR	9.10.17.4.(1)
Public Corridor Walls	75 or 25 over 90% of upper half of walls	Surface FSR	9.10.17.5.(1)
Unsprinklered Public Corridor Ceiling	25	Surface FSR	9.10.17.2.(1)
Sprinklered Public Corridor Ceiling	150	Surface FSR	9.10.17.1.(1)

Column (b)

M = 113 kg/m
D = 2(B + H)
= 2(.305 + .305)
= 1.22 m

M/D = (113 kg/m) / 1.22 m = 92.6 (kg/m)/m

Maximum FRR = 2 h [Table 2.6.1.F]

EXERCISE # 11 - FLAME-SPREAD RATINGS AND SMOKE DEVELOPED CLASSIFICATION

1. What is the flame spread rating of 6 mm thick Type 1 Standard hardboard? Give material Standard in your answer.

150 (CAN/CGSB-11-3)

2. What is the smoke developed classification of woven wool carpet, with a pile weight of 1500 g/m^2, applied without felt underlay? Give material Standard in your answer.

300 (CAN/CGSB-4.129)

EXERCISE # 12 - SOUND TRANSMISSION RATINGS

Using Tables 1 and 2, identify assemblies that comply with the following descriptions:

1. Wall assembly, with wood studs @ 406 mm o/c in a single row, using two layers of 15.9 mm Type X gypsum board on each side, with the following ratings.

FRR		Sound Transmission Class (STC)
Loadbearing	Non-loadbearing	
1.5 h	2 h	38

W2a

2. Wall assembly with non-loadbearing steel studs (25 gauge) @ 610 mm o/c incorporating 15 mm thick Type X gypsum board with the following ratings:

FRR		Sound Transmission Class (STC)
Loadbearing	Non-loadbearing	
--	1 h	50

S2c (Note: 1 layer of gypsum board on one side and 2 layers of gypsum board on the other side).

3. Wall assembly with hollow concrete block normal weight aggregate, with two layers 15.9 mm Type X gypsum board on one side only with the following rating:

FRR		Sound Transmission Class (STC)
Loadbearing	Non-loadbearing	
3 h	3 h	56

B10a

4. Floor assembly incorporating wood joists @ 610 mm o/c, 15.5 mm plywood subfloor, no absorptive material, and one layer 15.9 mm Type X gypsum board with the following rating:

STC	TYPICAL IMPACT INSULATION CLASS
29	27

F3a

MODULE 14 B

(MODULE 14 B) EXERCISE # 1 - FLOORS-ON-GROUND

1. A floorslab-on-ground, not serving a garage, has a thickened perimeter such that the overall slab thickness is twice the actual thickness of the slab and the thickened portion extends the thickness of the exterior frame wall it supports. This exterior wall supports only roof trusses. The floor-on-ground is;

   b) not permitted as described

OBC Reference: Sentence 9.16.1.2.(1) - Div.B

5. A stairway provided with fluorescent lighting is to have a minimum lighting level of;

   d) 50 lx

OBC reference: Sentence 9.34.2.7.(3) - Div.B → Table 9.34.2.7.

MODULE 36 B

(MODULE 36 B) EXERCISE # 1 - ENERGY EFFICIENCY FOR ALL BUILDINGS AND RESIDENTIAL OCCUPANCY

1. A Part 9 building, other than residential occupancy must conform to SB-10 if the permit was applied for;

   b) before January 1, 2017

OBC Reference: Sentence 12.2.1.1.(1) - Div. B

2. The Energy Efficiency provisions of Part 12;

   d) do not apply to farm buildings.

OBC Reference: Sentence 12.2.1.1.(4) & 12.2.1.2.(4)

3. Required lighting may be controlled by a motion detector, EXCEPT for lighting serving;

   d) all of the above.

OBC Reference: Article 12.2.4.1.

4. For a building in which a permit is applied for after December 31, 2016, the energy efficiency must be designed to exceed to not less than what energy efficiency levels as required by Sentence 12.2.1.1.(2)

   a) 13%

OBC Reference: Clause 12.2.1.2.(2)(a).

5. The energy efficiency of a Part 9, continuously occupied residential building where a permit has been applied for after December 31, 2016 may conform to Chapters 1 and 3 of;

   d) SB-12

OBC Reference: Clause 12.2.1.2.(3)(b)

6. Carbon dioxide equivalents and their emission requirements apply to;

   c) all buildings

OBC Reference: Sentence 12.2.2.1.(1)

7. The energy rating for a fixed window in a dwelling unit is;

   d) determined by Standard

OBC Reference: Sentence 12.3.1.2.(1)

8. The overall coefficient of heat transfer for exterior sliding glass door in a dwelling unit is

   a) determined by CAN/CSA-A440.2

OBC Reference: Sentence 12.3.1.2.(1)

9. At least one programable thermostatic control device in a dwelling unit must allow the setting of air temperature when air-conditioning is provided of;

   d) 29 degrees C or higher in cooling mode

OBC References: Subclause 12.3.1.3.(2)(c)(ii) - Div. B

10. Hot water pipes connected to a hot water storage tank must have heat traps on both the inlet and outlet piping;

    b) as close as practical

OBC Reference: Sentence 12.3.1.4.(1) - Div. B

11. Furnaces serving a commercial occupancy where a permit has been applied for after December 31, 2014 must be equipped with a brushless direct current motor in;

    c) furnaces serving a dwelling unit

OBC Reference: Sentence 12.3.1.5.(2) - Div. B

12. A clothes dryer supplied energy must be provided with which of the following in the laundry space?

    b) a propane line

OBC Reference: Clause 12.3.1.6.(2)(c) - Div. B

