



First Responder Inspector

CHAPTER THREE TYPES OF OCCUPANCIES



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Welcome to Chapter 3 Types of Occupancies.

In this chapter we will discuss:

- Why occupancy classifications are important
- How occupancy classification differ between the US and Canada
- Canadian occupancy classifications for Group A through Group G and their subclassification
- Fire separation between occupancy classifications
- Changing occupancy classifications

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Occupancy classification is the formal designation of the primary purpose of the building, structure or portion thereof. Structures are classified in one or more classification groups based on the hazards and risks to the building and occupants created by using the building. For example, you would not want a high hazard industrial operation like a distillery or drug manufacturing process taking place in the mixed-use building shown in this photo.

An occupancy classification must be assigned to every building or significant space within a building and should be the first thing determined in the design or change of use process since virtually every building code and regulation is based in part on the use of the building. The occupancy classification must be known, to determine the building code requirements for the structure.

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In Canada, the Building Code identifies every building alphabetically by an occupancy classification from A to G based on it's intended use. Groups A, B, F and G are further divided into subgroups: Group A Division 1, 2, 3 and 4, Group B Division 1, 2, 3 & 4 and Group F Division 1, 2 and 3 as can be seen in this chart. The 2020 NBC adds several new classifications: Group B4 Home type care Occupancies and Group G 1 through 4 which deals with Agricultural occupancies.

Reference:
NBC 2020 Article 1.4.1.2.

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Group A buildings are for assembly use such as theatres, art galleries, pubs, restaurants, night clubs and even outdoor stadiums with bleachers.

Group B is for institutional use where there are contained use areas like prisons and mental institutions. Group B also includes hospitals and care facilities where people can have difficulty exiting the building on their own. The new Group B-4 provides for home type care occupancies which is a growing use due to the aging population.

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Group C is residential like apartments, hotels, houses and places where lodging is offered.

Group D is business and personal services like doctors' offices, banks, insurance companies and beauty salons.

Group E are mercantile like shops, supermarkets and department stores.

Group F are industrial occupancies like bulk plants, fueling stations, repair garages and warehouses.

Group G are large farm buildings, like feed mills and storage bins, grain elevators, and greenhouses.

We will now take a closer look at each of these classifications.

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Group A Division 1 is for assembly occupancies for the production and viewing of the performing arts. Some of the consideration for the First Responder Inspector include the numerous phases of productions including design, set construction, props, special effects, costumes, and electrical needs.

Performing arts theatres also involve traveling shows including plays, concerts, and other events. These present the challenge of different set ups, significant material handling considerations, both inside and outside the building and the risks associated with them.

Beyond the great diversity of hazards in performing arts theatres, are the challenges associated with evacuating the building in case of emergency. Fire safety plans must be developed, reviewed regularly, and training provided to those responsible to carry out the plan. Often this includes volunteers who may change frequently complicating the emergency training process.

References: NBC 3.1.
NBC Table 3.1.2.1

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Group A Division 2 is described by the building code as assembly occupancies not elsewhere classified in Group A. This classification covers most assembly occupancy buildings from art galleries to undertaking premises. Things like bowling alleys, churches, clubs, community halls, courtrooms, gymnasiums, libraries, museums, pubs, restaurants and schools are included.

Buildings like the hotel seen in this photo that rent sleeping rooms but also have restaurant facilities and banquet rooms are mixed occupancies having both Group A Division 2 assembly and Group C residential classifications. These facilities present a diverse range of fire and life safety issues which will be discussed in greater detail later in this course.

References

NFC 2.8.1.
BCBC 3.1.
BCBC Table 3.1.2.1

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Where the occupancy classes are fire-separated and have their own egress facilities they can be treated as separate occupancies but if they share egress facilities, the required fire protection systems will be based on the most restrictive requirements of the building code.

All Assembly occupancy buildings with an occupant load greater than 30 people are required by the fire code to have a fire safety plan. An exception to this is that all schools, colleges, universities, day cares, and licensed restaurants and beverage establishments are required to have a fire safety plan.

References: BCBC 3.1
BCBC Table 3.1.2.1

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Group A Division 3 applies to arena type buildings. This includes sports arenas, indoor swimming pools and skating rinks.

From time to time arena type buildings are used for trade fairs and other exhibits that were not necessarily considered in the original design of the building. One of the main concerns is exiting, and another is the added fuel load in the building. First Responder Inspectors will have to consider the hazards created by the contents and operations temporarily introduced into the building and necessary control measures.

Some of those considerations include:

- Size, spacing, and combustibility of display booths
- Interior finishes and furnishings
- Electrical equipment, connections and alternate power supplies

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- Propane or LNG fired equipment
- Operation of open flame devices
- Pressure vessels like compressed gas cylinders
- Obstructions
- Exits and access to exits
- Fire Department access

The items listed here are in no way a complete list of the things that must be considered. You should check and see what documentation has previously been done and if your agency has any operational guidelines or use agreements prepared for temporary use of your arena type facilities.

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Group A Division 4 addresses occupancies in which people gather in the open air. It covers amusement park structures, bleachers and grandstands. The building code requires that each tier or balcony that has a capacity of more than 1,000 people, have at least 3 separate exits and, for 4,000 people there must be at least 4 separate exits.

Every seat must be located so that the travel distance is not more than 45m measured along the path of travel from the seat to the ground, an exit, a passageway, vomitory or other opening through the seating deck structure. Exits must also be located so they are not more than 25m apart.

Aisles in a Group A, Division 4 occupancy must be located so that there are not more than 20 seats between any seat and the nearest aisle which must be at least 1200mm wide, except that an aisle serving less than 60 people is permitted to be 750 mm wide.

Fires rarely occur in the seating area but are more likely to originate in concealed spaces under the stands or in food and beverage outlets associated with the venue.

References: BCBC 3.1.

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Group B Division 1 deals with institutional occupancies where people are detained. This includes jails, penitentiaries, and other places with detention quarters like police stations, psychiatric hospitals, and reformatories. Detention and correctional facilities present unique and challenging fire and life safety issues. Maintenance of security is essential so supervisory personnel may be reluctant to initiate any evacuation procedures that could compromise security. Life safety in these situations relies almost completely on passive and active fire protection systems and the preparedness of the staff to execute emergency plans based on their training.

Elements that must be considered when inspecting a Group B Division one property include construction type, means of egress, interior fuel load and the extent and maintenance of passive and active fire protection systems like fire separations, early detection, and fire suppression systems.

References: BCBC 3.1.

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Group B Division 2 deals with institutional occupancies where treatments are provided. It covers care facilities with treatment, hospitals, nursing homes, psychiatric hospitals without detention quarters, and hospice facilities with treatment.

Sometimes occupancy classifications can be ambiguous. For example, In March 2018, the BC Building Code Interpretation Committee was asked “What is the occupancy classification of a sleep disorder clinic that provides supervised sleeping accommodation?” For this interpretation, a sleep disorder clinic was understood to be a facility where clients are provided with sleeping accommodations to allow trained medical staff to observe and monitor them for the time they slept. Clients do not receive any services or treatment that would render them incapable of self-preservation.

The Committee’s interpretation was that Group B, Division 2 Treatment occupancy means the occupancy or use of a building or part thereof for the provision of treatment, and where overnight accommodation is available to facilitate the treatment. Treatment means the provision of medical or other health related intervention to persons, where the administration or lack of administration of these interventions may render the client incapable of evacuating to a safe location without assistance from another person.

In this case the committee determined the appropriate occupancy classification for a sleep clinic would be to be Group D - Business and Personal Services.

References:

BC Building Code Interpretation Committee File # 12-0105 <https://boabc.org/wp-content/uploads/2018/04/12-0105-Mar-2018.pdf>

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Group B Division 3 deals with care facilities and covers facilities where treatment is not provided. It includes:

- Assisted/supportive living facilities

- Care facilities
- Children's custodial homes
- Convalescent/recovery/rehabilitation centres without treatment
- Group homes
- Hospices
- Nursing homes without treatment
- Reformatories without detention quarters
- Respite centres without treatment

The code interpretation committee stated that a Group B Division 3 means "the occupancy or use of a building or part thereof where care is provided to residents. Care means the provision of services other than treatment by or through care facility management to residents who require these services because of cognitive, physical or behavioural limitations."

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Group B Division 4 is an occupant type added to the 2020 edition of the National Building code and deals with home-type care occupancies where the use of a building consists of a single detached housekeeping unit where support services are provided to residents and may include the living space of a paid caregiver and their family. Its introduction to the code was to allow safe and affordable care in a home-type setting.

Support services rendered to the residents of a home-type care occupancy refer to services provided, at a cost, by caregivers who are responsible for the care for a period exceeding 24 consecutive hours. They do not refer to services provided by family members of the residents, or to services arranged directly by residents with outside agencies.

References:

2020 NBC Div A: A-1.4.1.2.(1)

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In the context of home-type care occupancies, services may include a daily assessment of the resident's functioning, awareness of their whereabouts, the making of appointments for residents and reminding them of those appointments, the ability and readiness to intervene if a crisis arises for a resident, supervision in areas of nutrition or medication, and provision of transient medical services. Services may also include activities of daily living such as bathing, dressing, feeding, and assistance in the use of washroom facilities, etc.

In these types of occupancies, no actual treatment is provided by the caregivers.

References

2020 NBC Div A: A-1.4.1.2.(1)

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The building code defines residential to mean "the occupancy or use of a building or part thereof by persons for whom sleeping accommodation is provided but who are not harboured for the purpose of receiving care and are not involuntarily detained." There are many different forms of residential occupancies including:

- Apartments
- Boarding houses

- Clubs, residential
- Colleges, residential
- Convents
- Dormitories
- Hotels
- Houses
- Lodging houses
- Monasteries
- Motels
- Schools, residential

The majority of fires and fire deaths occur in group C occupancies because of the large number buildings, people spend most of their time there, and people are sleeping. The leading cause of fires in this occupancy classification is from cooking incidents. Up to date fire statistics in Canada are hard to find but Statistics Canada reported that during the five-year period between 2010 and 2014 there were an average of 135 fire deaths per year of which 125 occurred in residential occupancies.

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The building code states, "Business and personal services occupancy means the occupancy or use of a building or part thereof for the transaction of business or the rendering or receiving of professional or personal services."

Group D includes things like banks, barber and hairdressing shops, dental offices, dry cleaning establishments that do not use flammable or explosive solvents or cleaners, laundries that are self-service, medical offices, offices, police stations without detention quarters, radio stations, and small tool and appliance rental and service establishments to name a few.

Generally speaking, Group D consists of low-hazard, low-occupant-load facilities that do not present a significant hazard to the community.

References:

BC Building Code Section 1.4.1.2. Defined Terms

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The building code defines Group E Mercantile occupancies this way - Mercantile occupancy means the occupancy or use of a building or part thereof for the displaying or selling of retail goods, wares, or merchandise. Included in this category are shopping centres, supermarkets, drug stores, department stores, down to and including the corner store. Obviously, the hazards associated with these types of occupancies vary depending on a number of things including:

- The number of people in the building
- Quantities of combustible products
- Access to exits which may be deliberately arranged to force occupants around merchandise displays

When performing a fire inspection, you should consider things like the occupant load, means of egress, interior finish and flame spread ratings, and protection of opening in fire separations. Of critical importance is the provision and maintenance of fire protection systems.

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The building code defines Group F Division 1 - High-hazard industrial occupancy as; “an industrial occupancy containing sufficient quantities of highly combustible and flammable or explosive materials which, because of their inherent characteristics, constitute a special fire hazard.

This category includes bulk plants for flammable liquids, bulk storage warehouses for hazardous substances, cereal mills, chemical manufacturing or processing plants, distilleries, dry cleaning plants, feed mills, flour mills, grain elevators, lacquer factories, mattress factories, paint, varnish and pyroxylin product factories, rubber processing plants, spray painting operations, and wastepaper processing plants.

BC Building Code Section 1.4.1.2. Defined Terms

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First Responder Inspectors should evaluate the structure based on its use. For example, the major use is high-hazard industrial, but the First Responder Inspector cannot be expected to understand the intricacies of all high-hazard industrial operations. That is why they are advised to work with the building owners, managers and professional staff, including members of the occupational health and safety committees, when inspecting the major occupancy to ensure that an acceptable level of life safety is provided. The administration offices should be considered subsidiary occupancies and be inspected as Group D keeping in mind that the stricter code requirements for the high hazard apply to the whole building.

References:

BC Building Code Section 1.4.1.2. Defined Terms

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In 2008 fourteen people were killed and forty injured when a dust explosion occurred at a sugar refinery in Georgia. Dust explosions were a concern for authorities since three fatal accidents occurred in 2003 and efforts were being made to improve safety and reduce the risk of recurrence.

The refinery was large and old, featuring outdated construction methods, and these factors are believed to have contributed to the fire's severity. The origin of the explosion was narrowed down to the center of the factory.

Investigations conducted by the Department of Justice ruled out deliberate criminal activity.

The U.S. Chemical Safety Board released its report on the incident in 2009, saying that the explosion had been "entirely preventable". Investigations by Occupational Safety and Health Administration (OSHA) and the Bureau of Alcohol, Tobacco, Firearms and Explosives also concluded that sugar dust was the fuel for an explosion that could have been prevented.

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The building code defines Group F Division 2 Medium-hazard industrial occupancies as “an industrial occupancy in which the combustible content is more than 50 kg/m² or 1200 MJ/m² of floor area and not classified as a high- hazard industrial occupancy”.

Group F Division 2 includes aircraft hangars, box factories, candy plants, cold storage plants, dry cleaning establishments not using flammable or explosive solvents or cleaners, electrical substations, factories, freight depots, helicopter landing areas on roofs, laboratories, laundries except self-service, mattress factories, planning mills, printing plants, repair garages, salesrooms,

service stations, storage rooms, television studios not admitting a viewing audience, warehouses, wholesale rooms, woodworking factories, and workshops.

Code classifications often have overlapping characteristics, which can make it difficult to decide which classification is appropriate.

BC Building Code Section 1.4.1.2. Defined Terms

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The building code defines Group F Division 3 Low-hazard industrial occupancy as “an industrial occupancy in which the combustible content is not more than 50 kg/m² or 1200 MJ/m² of floor area.”

Light Hazard industrial occupancies include creameries, factories, laboratories, light-aircraft hangars (storage only), power plants, salesrooms, sample display rooms, storage garages including open-air parking garages, storage rooms, warehouses, and workshops.

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A new Part to the 2020 NBC has been added to introduce technical requirements for large farm buildings. Farm buildings are those that contain an agricultural occupancy. The new requirements for farm buildings include those related to fire protection and occupant safety, structural loads, processes and operations carried out within the building, and requirements regulating the farm building's HVAC system.

The new requirements have been added to the NBC because farm buildings have distinct characteristics compared to other types of buildings: they have low occupant loads, they are typically located in rural settings, and they include unique activities and contents.

2020 NBC - Division B – Notes to Part 2

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Farm buildings may be classified as low or high human occupancy, depending on the occupant load.

Low human occupancy, have an occupant load of not more than 1 person per 40 m² of floor area. Examples of farm buildings with low human occupancy are livestock and poultry housing, manure and machinery storage facilities and horse exercise and training facilities where no bleachers or viewing areas are provided.

Examples of farm buildings classified as high human occupancy meaning more than 1 person per 40 square meters, include farm retail centres for feeds, horticultural and livestock produce, auction barns, and show areas where bleachers or other public facilities are provided. Farm work centres where the number of workers frequently exceeds the limit for low human occupancy will also be in this category. It is possible to have areas of both high and low human occupancy in the same building, provided that the structural safety and fire separation requirements for high human occupancy are met in the part designated as high human occupancy.

NBC Notes to Part 2 Farm Buildings A-2

NFC Division A 1.4.1.2 Definitions

1.4.1.2.(1) – Farm building

A-1.4.1.2.(1)

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The Building Code Defines Group G Division 1 High Hazard Agricultural Occupancies as agricultural occupancies that contain sufficient quantities of highly combustible and flammable or explosive materials which, because of their inherent characteristics, constitute a special fire hazard.

Examples of High Hazard Agricultural Occupancies include: Farm buildings housing livestock with a below-floor storage area for liquid manure, feed mills, Grain elevators, rooms for the bulk storage of dangerous goods classified as flammable gases or compressed gases, rooms for the bulk storage of flammable liquids, and rooms for the bulk storage of reactive materials.

2020 NBC Div A Section 1.4.
2020 NBC Div B Table 2.1.4.1.
2020 NBC Div B A-2.1.4.1.

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Group G Division 2 includes agricultural Occupancies that are not elsewhere classified, and include: Animal exercise facilities, animal housing facilities, facilities for livestock, facilities for alternative livestock and game animals, facilities for fur-bearing animals, facilities for cultured fish and shellfish, animal training facilities, facilities for the packaging and processing of agricultural products, facilities for the production of plants and fungi (excluding greenhouses), farm workshops, feed preparation centres, feed storage facilities, fruit and vegetable storage facilities, grain, forage, and feed structures, milking facilities, storage facilities for farming equipment and machinery, and viniculture facilities.

2020 NBC Div A Section 1.4 .
2020 NBC Div B Table 2.1.4.1.
2020 NBC Div B A-2.1.4.1.

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The Building Code defines Group G Division 3 Greenhouse Agricultural Occupancies as agricultural occupancies where plants are grown in a building or part thereof, that is primarily constructed of roofs and walls designed to transmit natural light. This Major Occupancy classification is exclusive to greenhouses.

2020 NBC Div A Section 1.4.
2020 NBC Div B Table 2.1.4.1.
2020 NBC Div B A-2.1.4.1.

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The Building Code defines Group G Division 4 Agricultural Occupancies with no human occupants as occupancies that are not intended to be occupied by persons under normal use and are generally used for the storage of agricultural materials and by-products.

Examples include Biomass facilities, by-product facilities, digesters, grain bins, horizontal silos, storage bins, and vertical silos.

2020 NBC Div A Section 1.4.

2020 NBC Div B Table 2.1.4.1.
2020 NBC Div B A-2.1.4.1.

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Code classifications often have overlapping characteristics, which can make it difficult to decide which classification is appropriate. For example, warehouses and workshops appear in both Group F2 and Group F3. Often the First Responder Inspector will have to rely on a reasonable evaluation of what the hazard is in order to classify the building.

What classification would you assign to this gas station and convenience store?

Because it is selling merchandise it could be considered a Group E Mercantile occupancy, but Group F Division 2 also lists service stations. So, is the corner store a service station or a mercantile?

References:
BCBC 3.1.2.1..

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Most jurisdictions classify stores that sell gas as Mercantile, but if there are auto repair service bays, as shown in this picture, then they are more likely to classify it as an F-2 Medium Hazard Industrial occupancy. In this case the building had two residential suites above the convenience store. The suites are classified as Group C residential and are a subsidiary occupancy to the store and service station. The service station is the higher hazard, so the building is classified as Group F Division 2.

Because the building is classified as F -2 the building code states that “Not more than one suite of residential occupancy shall be contained within a building classified as a Group F, Division 2 major occupancy.

The AHJ issued a fire Order to change the use of the building. The owner appealed the Order and the Fire Commissioners Appeal Decision required them to discontinue use of one of the suites for Group C residential occupancy. The building owner changed one residential suite to an office to comply with the building code and the Fire Commissioners Appeal Decision.

So, in this case, the number of suites permitted hinges on the occupancy classification given to the building.

References:
BCBC 3.1.2.1..

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The building code also establishes the requirements for fire separation between major occupancies as can be seen in this table. The major occupancy classifications are listed down the first column and the adjoining major occupancy is listed across the top. So, if you look at the first row which contains A-1 and go across that row, no separation is required between an A-1 and an A-1, but one or two hour fire separation is required between the other major occupancies with the exception that an A-1 cannot be located with a Group F Division 1 occupancy. In the column marked F-1 you see a small number 2 in brackets. That means you have to look at sentence 2 in the Notes

to the Table. Sentence 2 says “See Sentence 3.1.3.2.(1)” which says “No major occupancy of Group F, Division 1 shall be contained within a building with any occupancy classified as Group A, B or C.”

References:

BC Building Code Section 3.1.3.2 Prohibition of Occupancy Combinations
BCBC 3.1.3.1.

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The building in this photograph is of a Group F Division 1 distillery. The building code establishes the compatibility of major occupancies. It states that “No major occupancy of Group F, Division 1 shall be contained within a building with any occupancy classified as Group A, B or C.” So, there could be subsidiary occupancies in this building like offices or a mercantile like a small confectionary but there can’t be any assembly, institutional or residential use. The office and confectionary are considered subsidiary occupancies to the major occupancy. Major occupancy means the principal occupancy for which a building or part thereof is used or intended to be used and shall be deemed to include the subsidiary occupancies that are an integral part of the principal occupancy. The code requirements for the major occupancy apply to the subsidiary occupancies as well.

References:

National Building Code Section 3.1.3.2 Prohibition of Occupancy Combinations

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The use of buildings differ as do the Building and Fire Code requirements for those buildings. A 3-story residential apartment building for example will be built and maintained to a different standard than a high-rise apartment building even though they are the same occupancy classification. Building occupancy classifications are primarily used for building and fire code enforcement. Many buildings may have multiple occupancies. These are referred to as “mixed occupancies” and the different parts will be required to meet different parts of the codes. An example of this is a multiple story building with retail space on the ground floor, office space on the second floor and residential suites above. The shopping area itself is Group E (mercantile), the offices are group D and the residential area is Group C. In buildings where more than one occupancy exists the stricter code requirements usually apply to the whole building.

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In this chapter we discussed:

- That occupancy classification is the formal designation of the primary purpose of the building
- That an occupancy classification must be assigned to every building or significant space within a building
- Occupancy classification differs between the US and Canada
- In Canada, occupancy classification is alphabetical from Group A through Group G
- Group A is assembly and there are 4 categories
- Group B is Institutional and there are 3 categories
- Group C is residential

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- Group D is Business and Personal Services
- Group E is Mercantile
- Group F is Industrial with three subgroups F-1 High Hazard F-2 Medium Hazard and F-3 is Low Hazard
- Group G is Large Farm Buildings and there are 4 categories
- We looked at the building code requirements for fire separation between occupancy classifications
- The compatibility between occupancies like the fact that the building code does not permit a Group F Division 1 High hazard industrial occupancy to be contained in a building with Group A, B or C occupancies.