



FARM BUILDING USER GUIDE:

UPDATES TO THE MANITOBA BUILDING CODE

Updated January 25, 2017

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INTRODUCTION:

On January 25, 2017, new building and fire safety provisions/requirements for farm buildings came into effect in Manitoba through [Manitoba Regulation 5/2017](#). While previous farm building requirements were in a separate Manitoba Farm Building Code Regulation, the new provisions are contained in the Manitoba Building Code Regulation.

The purpose of this user guide is to help building code officials, engineers, architects, contractors, farm owners and others in the design community understand the new requirements¹.

To assist in reading the guide, some questions and answers and preliminary concepts are given below.

1.1 WHICH FACILITIES DO THE NEW REQUIREMENTS APPLY TO?

The new requirements apply to farm buildings over 600m² of “low human occupancy”. Please note that farm buildings below 600 m² are not regulated by any building code requirements in Manitoba.

- A farm building is defined in the Manitoba Building Code (MBC) as “a building or part thereof that does not contain a residential occupancy and that is associated with and located on land devoted to the practice of farming, and used essentially for the housing of equipment or livestock, or the production, storage or processing of agricultural and horticultural produce or feeds”, but does not include a building that is classified as a high-hazard industrial occupancy.
- Farm buildings may include but, are not limited to, produce storage and packing facilities, livestock and poultry housing, milking centres, feed preparation centres, farm workshops, greenhouses, farm retail centres, and horse riding, exercise and training facilities.
- Low human occupancy, in respect to farm buildings means “an occupancy with an occupant load of not more than one person per 40 m² during normal use”.

Unenclosed and unconditioned² shelters for animals or storage of fiber and forage and solid manure storage facilities with roofs are only subject to the structural requirements of the MBC. A farm building that is not of low human occupancy is subject to the requirements of the MBC but is still considered a “farm building”.

¹ This User’s Guide sets out practical guidelines for users. It must be used in conjunction with the Manitoba Building Code; an excerpt is provided as an appendix to this document. This User’s Guide is not intended as a design manual.

² Unenclosed and unconditioned space any space within a building the temperature of which is not controlled to limit variation in response to the exterior ambient temperature by the provision, either directly or indirectly, of heating or cooling over substantial portions of the year.

1.2 HOW DO I KNOW IF MY FARM BUILDING IS A LOW HUMAN OCCUPANCY FARM BUILDING?

Take the total building area (in m²) and divide it by 40 m² to determine how many human occupants are permitted to occupy the building during normal use and still have the building be considered a low human occupancy farm building. If that number is exceeded during normal building use, then the farm building would be considered as, an “other than low human occupancy farm building” and subject to the regular requirements of the MBC. If that number is not exceeded during normal use, then it is a “farm building of low human occupancy” and subject to the special requirements for low human occupancy farm buildings under Section 3.10 of the MBC.

For example, a farm building with an area of 600 m² (divided by 40 m²) has a maximum human occupancy of 15 to be considered low human occupancy. The designer can also state the occupant load the farm building is designed for (e.g. 4-5 persons), but it must be not greater than the calculated occupant load of 15.

1.3 WHO IS THE PERMITTING AUTHORITY FOR FARM BUILDINGS?

Manitoba Building Code

The Inspection and Technical Services (ITS) is the permitting authority under the MBC for farm buildings in Manitoba. This is to ensure a consistent application of requirements across Manitoba. This applies to both farm buildings of low human occupancy and farm buildings deemed to be other than low human occupancy. Questions regarding farm building permitting may be directed to the ITS. For further information, see page 21 of this Guide.

Manitoba Electrical Code

Manitoba Hydro is responsible for administering the Manitoba Electrical Code and issuing electrical permits for property outside the City of Winnipeg. For property within the City of Winnipeg, the City of Winnipeg Planning, Property and Development is responsible for issuing electrical permits. Electrical installations must comply with the Manitoba Electrical Code.

Livestock Manure and Mortalities Management Regulation

Manitoba Conversation and Climate is responsible for issuing permits for manure storage facilities under the Livestock Manure and Mortalities Management Regulation. Structural requirements of the MBC apply to solid manure storage facilities with roofs.

1.4 WHAT ARE THE REQUIREMENTS FOR FARM BUILDINGS OF LOW HUMAN OCCUPANCY?

Farm buildings of low human occupancy do not need to comply with the requirements of Part 3 of the MBC that would normally apply to buildings over 600 m². Instead they are subject to specific requirements under Section 3.10 of the MBC. The requirements for farm buildings of low human occupancy are intended to reflect the lower risk that comes from these facilities being occupied by a low number of workers who are familiar with their

environment. The requirements of Section 3.10 are also consistent with current farm building practices which need to accommodate high humidity environments and the need for relatively free movement across the facilities. The following is a summary of the requirements for farm buildings of low human occupancy in the MBC.

REQUIREMENTS FOR FARM BUILDINGS OF LOW HUMAN OCCUPANCY:

2.1 CONSTRUCTION REQUIREMENTS

Article 3.10.1.2. Floor Areas

This Article requires that each storey of a farm building, other than a greenhouse, must be separated into fire compartments by vertical fire separations having a fire-resistance rating of at least 2 h (hours), so that each separated portion has a floor area that is less than the maximum floor area indicated in Table 3.10.1.2. Fire separations limit a fire to a section of a farm building to permit the safe evacuation of the occupants from the building, and to allow firefighting to commence before the fire spreads to other areas. Farm buildings must also be separated from occupancies that conform to Part 3 or 9 of the MBC by a 1 h fire separation. One of the fundamental concepts of fire safety in all buildings, including farm buildings, is to contain the spread of fire throughout a building with a physical barrier, known as a fire separation. A fire separation can be a wall, ceiling or floor assembly of a building. Numerous fire separations are frequently used in combination to enclose a given space and control fire spread within it; this space is termed a “fire compartment”.

Table 3.10.1.2.
Maximum Floor Areas for Farm Buildings of Low Human Occupancy
Forming Part of Article 3.10.1.2.

Number of Storeys	Maximum Floor Area per Storey
1	4800 m ²
2	2400 m ²
3	1600 m ²

Designers should take into account the required maximum floor areas indicated in Table 3.10.1.2. when designing new farm buildings. For example, in a one storey barn, the MBC allows a maximum compartment size of 4,800 m². If the building footprint is greater than 4,800 m², the challenge to the designer is to optimize the overall efficiency of the layout while achieving all the safety objectives of compartmentalization.

For example, splitting a large free stall dairy barn, 33 m wide x 198 m long (6,534 m²), into two compartments (each less than 4,800 m²) to comply with the compartment size requirement would involve constructing a fire separation wall near the midpoint of the 198 m length (Figure 2.1.1). Since the cow alleyways and the central feed alleyway run on the long axis of the building, this would require five large door openings in the fire separation equipped with closure devices (fire doors). This kind of layout could adversely impact equipment and animal traffic, and air ventilation in the barn.

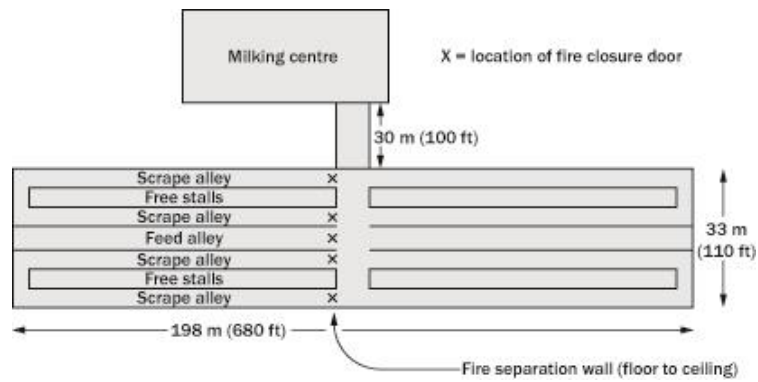


Figure 2.1.1. A large free stall dairy barn with fire separation wall at the midpoint. ³

From a fire separation stand point, it is more effective to construct several free stall barns that each measure less than 4,800 m², each spaced at least 30 m apart and interconnected with hallways to house the animals (Figure 2.1.2.). One closure device (fire door) situated in the middle of each connecting hallway allows the design to meet the requirements for maximum floor area, as well as minimize flow issues associated with cow and equipment traffic and air movement.

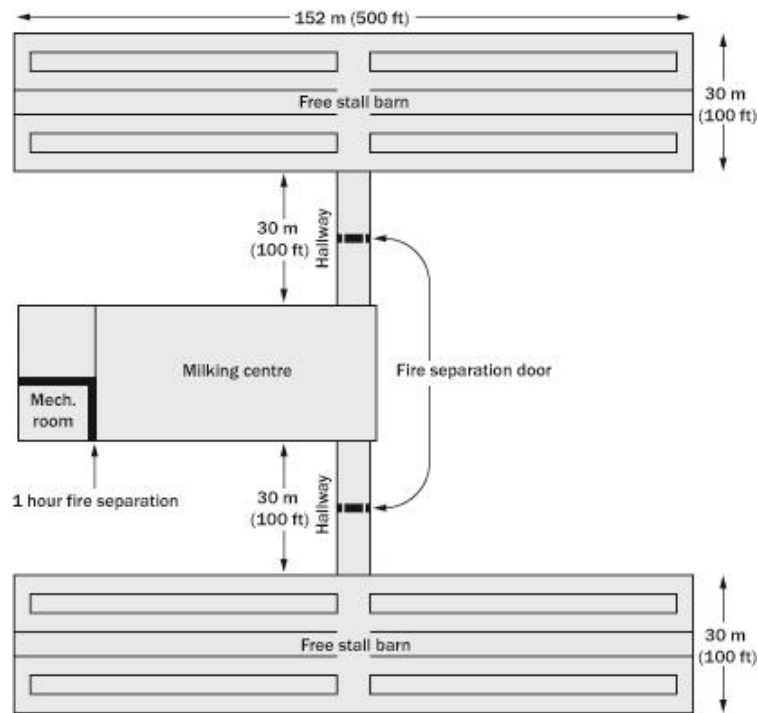


Figure 2.1.2. The fire compartments formed by several fire separations will slow the spread of fire and provide a better opportunity to fight a fire in this large building complex. ⁴

³ From *Reducing the Risk of Fire on Your Farm*. 2011. Ontario Ministry of Agriculture, Food and Rural Affairs. p. 17

⁴ From *Reducing the Risk of Fire on Your Farm*. 2011. Ontario Ministry of Agriculture, Food and Rural Affairs. p. 18

Wall, floor and ceiling assemblies of buildings can be built in various ways utilizing a variety of construction materials. The way these assemblies are built affects the time it takes for fire to burn through the assembly and spread from one fire compartment to another. Fire separations should be continuous to maintain their integrity by having smoke-tight joints where they abut on or intersects with floors, roof slabs, or roof decks. Except for openings in the outside face of a building, openings in fire separations around a fire compartment must have properly rated closures. Use appropriate fire stopping materials to seal all penetrations and gaps through fire separation assemblies.

A mezzanine is any intermediate floor assembly within a storey, and can range from small balconies to sizeable storage areas. A mezzanine is not considered a storey if the area of the mezzanine does not exceed 10% of the floor area in which it is located, and if the aggregate area of all the mezzanines occupies less than 10% of the floor area of the farm buildings in which they are located.

2.2 SPATIAL SEPARATION REQUIREMENTS

Article 3.10.2.1. General, Spatial Separations

The intent of this Article is to minimize the risk of fire spread from one farm building to another building other than a farm building of low human occupancy. Since most farm buildings and their contents are highly combustible, separating it from other buildings reduces losses due to fire. Subsection 9.10.14 minimizes the risk of fire spreading between a farm building and another building that is not a farm building of low human occupancy by:

- Using the limiting distance, the distance of a building from a property line or an imaginary line between two buildings located on the same property, to determine requirements of the exposing building face;
- limiting the number and area of unprotected openings, on an exposing building face, such as windows, doors, vents and other openings through which flames and radiation can affect adjacent buildings;
- designing exterior wall constructions of exposing building face with appropriate fire-resistance ratings, combustible/non-combustible construction and cladding to minimize the risk of walls becoming a radiant heat threat to adjacent buildings; and
- designing interior spaces as fire compartments with appropriate rated fire separations to decrease the area of exposing building faces.

2.3 FIRE BLOCK REQUIREMENTS

Article 3.10.3.1. Location, Fire Blocks in Concealed Spaces

This Article determines where fire blocks are required to be installed within concealed spaces. The purpose of fire blocks is to minimize the likelihood of fire spread in buildings until evacuation can be safely carried out, and to permit firefighting activities to start before damage to a building becomes widespread.

Fires initiating in concealed spaces, or that pass through openings in enclosing membranes, can traverse unnoticed from one area of the building to another. This may put the occupants' escape at risk, and make firefighting very challenging. It may also counteract the effectiveness of fire compartments in controlling the extent of fire damage. Hence, such concealed spaces must be completely filled with insulation or be made from material that will limit flame travel (flame spread rating less than 25). Fire blocking must be provided at various strategic locations to restrict the spread of fire.

In stud, joist and furring spaces, where spaces are tight and small, fire blocking usually consists of the same material as the framing and furring. In larger spaces, such as attics and soffits, sheet material such as gypsum wallboard, plywood, oriented strandboard (OSB) or waferboard, or sheet metal is normally used. A double layer of board lumber is also allowed if the joints are staggered between layers. Fire blocks can be pierced by piping, wiring or ducts, as long as the gaps and openings around the insertion points are tight-fitted or sealed with a fire-resisting material called fire stops.

Article 3.10.3.2. Concealed Spaces in Walls or Partitions

This Article determines where fire blocking is required in walls or partitions. Wall assemblies that have concealed spaces greater than 25 mm in depth require fire blocks every 3 m vertically and every 6 m horizontally, except if the exposed construction material within the space are non-combustible, have a flame-spread rating of not more than 25, or are filled with insulation. The flame-spread rating of the combustible materials determines the allowable size of the concealed space between fire blocks. The materials to be considered include all construction materials, including the framing and building services within the concealed spaces. In platform frame construction, many of these requirements are satisfied as a result of normal framing practices as shown in the figure below.

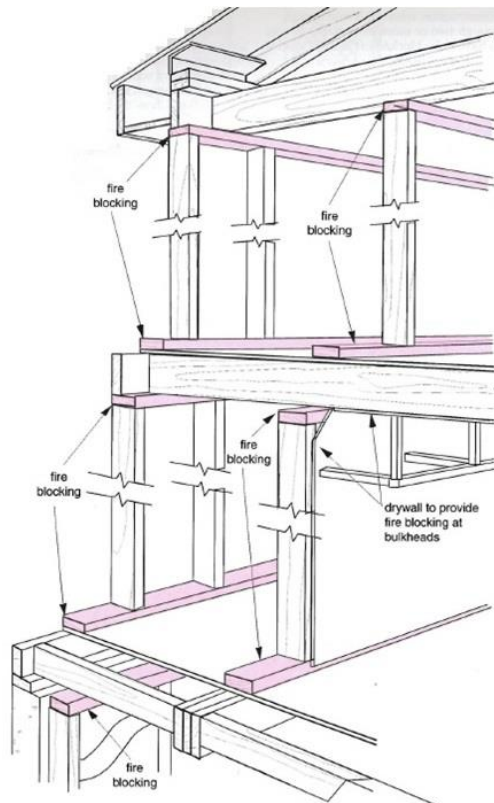


Figure 2.3.1. Fire blocking in concealed spaces in walls or partitions.⁵

In balloon frame construction, the stud spaces are continuous through two or more storeys. Hence, these spaces have to be blocked off at each level to restrict fire spread. Concealed spaces within walls should not interconnect with other concealed spaces above or below them.

⁵ From *The National Building Code, Illustrated User's Guide*. 2014. The National Research Council of Canada. p. 175

Article 3.10.3.3. Fire Blocks in Horizontal Concealed Spaces

This Article determines where fire blocks are required in horizontal concealed spaces (also known as attics). Horizontal concealed spaces are susceptible to fire spread. Fire can penetrate such spaces through the openings in the attic ceiling or from the overhanging soffits. Fire can also start within the attic as a result of improper electrical installations (ex: overheated recessed lights or loose electrical connections).

A flame-spread rating is an index or classification representing the degree of spread-of-flame on the surface of a material or an assembly of materials. This rating is determined in a standard fire test as prescribed by the National Building Code (NBC). Flame-spread ratings are used by designers to select appropriate construction materials to prevent the rapid spread of fire.

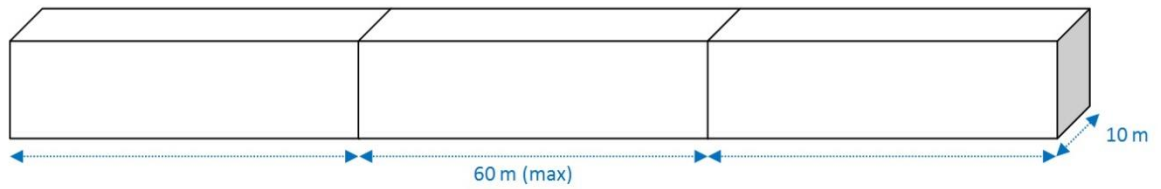
To minimize the speed of fire travel through large unoccupied roof spaces and attic areas, this article requires fire blocking at appropriate intervals, so that the individual fire compartments are kept practically small (no more than 300 m²). For roof trusses, sheathing materials are usually installed on one side of trusses at appropriate intervals. Moreover, the joints must be sealed and be backed with similar material to create a draft-tight barrier to control the passage of smoke and flame.



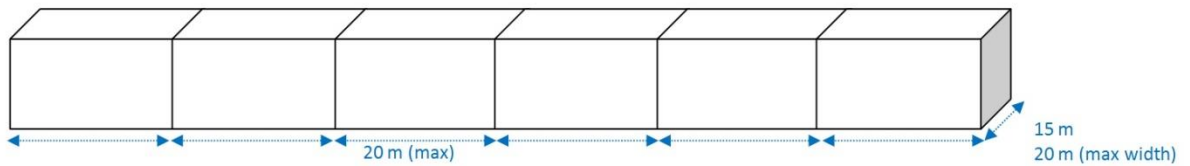
Figure 2.3.2. Example of an attic fire stop under construction in a new calf barn. ⁶

⁶ From *Reducing the Risk of Fire on Your Farm*. 2011. Ontario Ministry of Agriculture, Food and Rural Affairs. p. 20

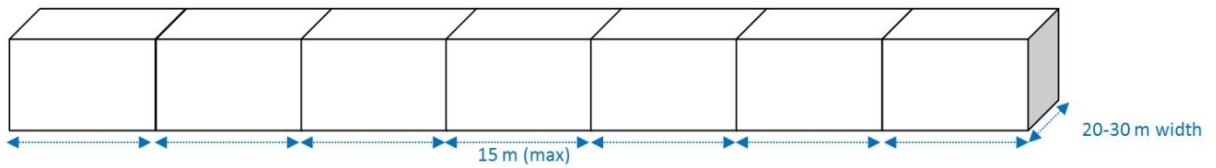
- a) Flame-spread rating not more than 25
 Every 600 m²
 No dimension more than 60 m



- b) Flame-spread rating more than 25
 Every 300 m²
 No dimension more than 20 m
 Maximum building width of 20 m



- c) Flame-spread rating more than 25
 Every 300 m²
 No longitudinal dimension more than 15 m.
 Width range of 20-30 m



- d) Flame-spread rating more than 25
 Every 10 m in longitudinal direction
 No dimension more than 15 m
 Building width of 30 m or greater

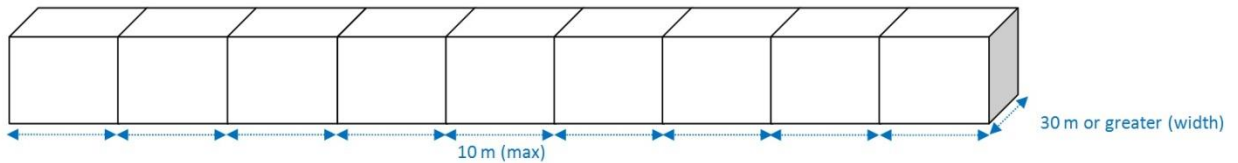


Figure 2.2.7. Separation of attic or roof assembly into fire compartments.

Article 3.10.3.4. Fire Block Materials

This Article sets acceptable materials that are capable of resisting the spread of fire within a concealed space in order to have sufficient time to permit the safe evacuation of the occupants, and to permit firefighting activities to start before significant damage has occurred. Acceptable materials for fire blocking include:

- a) solid lumber at least 38 mm thick,
- b) two layers of lumber, each at least 19 mm thick with joints staggered, where the width or height of the concealed space requires more than one piece of lumber to block off the space, or
- c) phenolic bonded plywood, waferboard or strandboard at least 11 mm thick with joints supported.

All permanent openings through a fire separation, like a doorway, window, or hatch must also be protected to maintain the integrity of the construction. If the firestop is pierced with building services such as wiring, plumbing or ductwork, the gaps must be sealed and caulked with fire-rated material to slow down the fire buildup by at least 15 minutes.

This Article also aims to ensure that the integrity of fire blocks is maintained at locations where they are penetrated or pierced. This requirement can be met by the use of common fire stops such as mineral wool, gypsum plaster or portland cement mortar, in conjunction with rated fire stops.

2.4 FUEL STORAGE TANKS

Article 3.10.4.1. Fuel Storage

This Article requires that fuels in a farm building be stored in conformance with the Manitoba Fire Code (MFC). Fertilizers, particularly nitrate fertilizers, are explosive chemicals when mixed with petroleum fuels. Therefore, fertilizers, fuels, and other farm chemicals must be stored far from each other and from other buildings.

2.5 FIRE SEPARATIONS

Article 3.10.5.1. Fire Resistance Ratings

This Article requires that fuel-fired appliances be situated inside service rooms that are isolated from the remainder of a building. Fuel-fired appliances are a possible fire source and can expose a building to fire risk unless they are situated in service rooms separated from the rest of the building with fire separations. These separations will allow the rest of the building to be evacuated in the event of a fire and permit firefighting to commence before it can travel to other sections of the building.

Fuel-fired appliances should be situated in a service room that is isolated from the rest of the building by a fire separation with a fire-resistance rating not less than 1 h. Portable fuel-fired space-heating appliances, space-cooling appliances, and service water heaters do not

need to be separated from the remainder of the building if they serve only one room or suite.

This Article also requires that incinerators inside a service room be separated from a building by a fire separation with a fire-resistance rating of at least 1 h. The likelihood of catching fire from incinerators is high enough to rationalize isolating this operation from the remainder of a building with a 1 h fire separation to contain a fire. Other fuel-fired appliances not related to the incineration operation can increase the fire risk by providing another ignition source, and should therefore be situated somewhere else.

2.6 EXPOSED FOAM PLASTIC INSULATION

Article 3.10.6.1. Combustible Insulation and its Protection

This Article stipulates that exposed foamed plastic material must be protected on the interior surfaces in conformance with Article 9.10.17.10. of the NBC. The two most commonly-used insulation materials are polystyrene (flat board stock) and polyurethane (foamed-in-place). The foamed-in-place polyurethane is particularly popular for remodelling older farm buildings as it binds well to almost any solid surface, provides good thermal barrier and seals all gaps and cracks against air leaks and intrusion.

Article 9.10.17.10 of the NBC specifies a list of acceptable sheathing materials that includes plaster, gypsum, plywood, hardboard, insulating fibreboard, particleboard, oriented strandboard, waferboard, and sheet metal at least 0.38mm thick. To meet the requirements of this Article, there must be no exposed foamed plastic in the spaces occupied by humans and livestock. One method to attain this requirement is to use “inside-out construction”, wherein the inside cladding material (plywood or steel) is installed first to the inside of the framing. Then, insulation is foamed in place or placed to the framing and interior cladding from the outside prior to final closing of the wall by exterior siding.

For unoccupied areas where potato or vegetable products are stored, the humidity is extremely high which can cause the product to deteriorate and be destroyed prematurely. Hence, such facilities are excluded from the requirements of this Article.

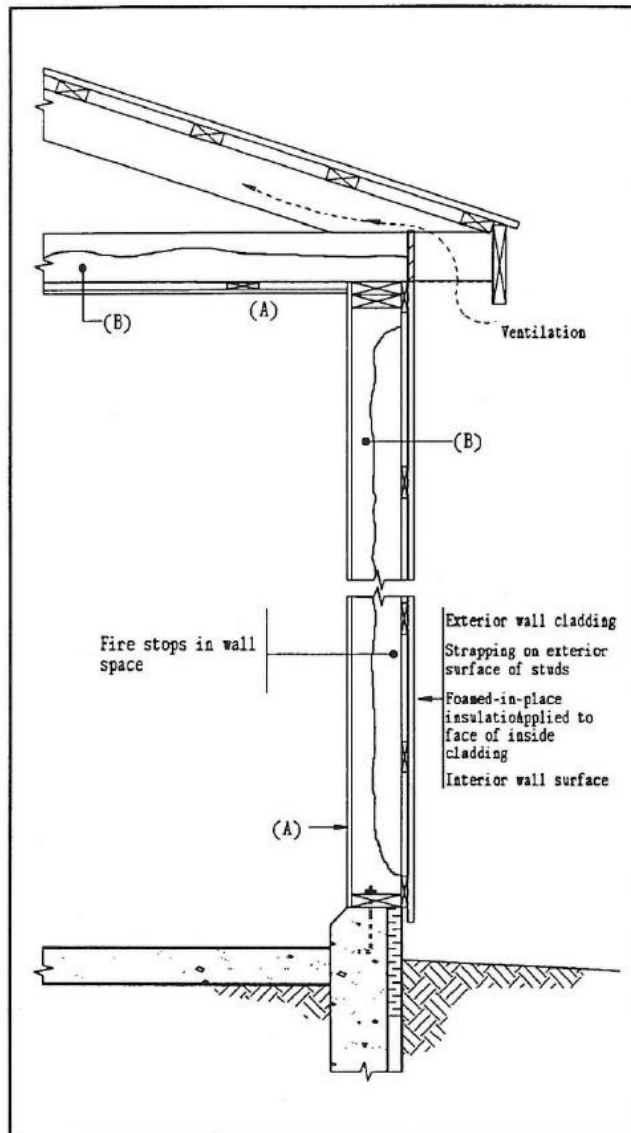


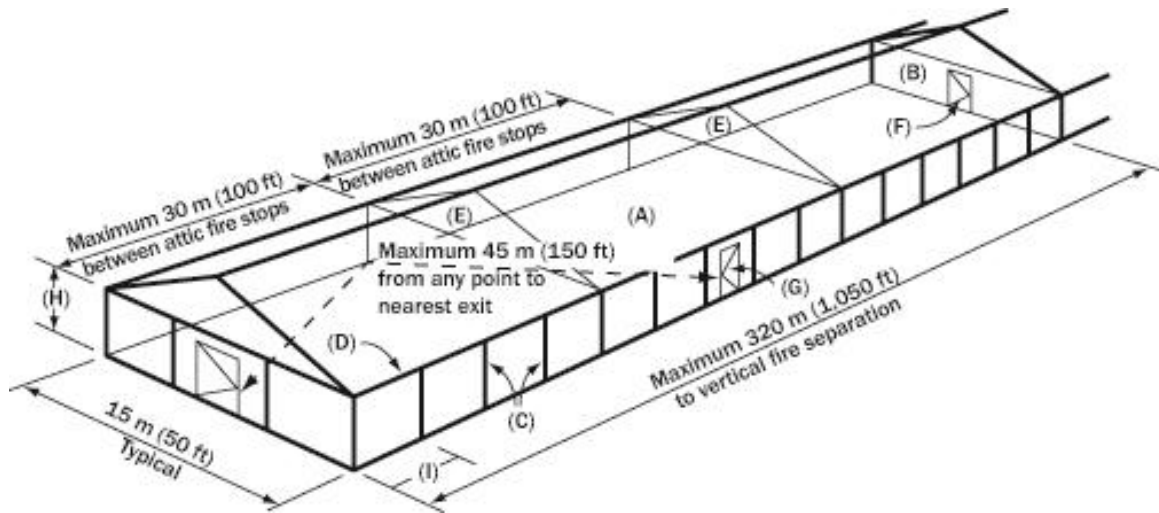
Figure 2.6.1. Foamed plastic insulation, protected on the interior surface and installed by "inside-out construction" technique.⁷

⁷ From *Construction Guide for Farm Buildings*. 1995. Ontario Ministry of Housing and Ministry of Agriculture, Food and Rural Affairs. p. 3-9

2.7 EGRESS AND EXITS

Article 3.10.7.1. Number of Exits

This Article establishes that a farm building of low human occupancy must have at least two exits per storey consisting of exterior exit doorways spaced remotely from each other at opposite ends of the building as an exit may become inaccessible as the result of fire or smoke. By allowing for an alternative escape route, occupants can evacuate safely and quickly in the event of fire. Figure 2.7.1. shows the exit locations in a single storey farm building.



Notes:

- (A) Maximum floor area per fire compartment is 4,800 m² (51,600 ft²).
- (B) 2 h fire separation if floor area exceeds 4,800 m² (51,600 ft²).
- (C) Vertical fire stops in walls.
- (D) Horizontal fire stops between walls and attic.
- (E) Attic fire stops.
- (F) Exit doors at opposite ends of area.
- (G) Additional exits in sidewall, not over 45 m from any point.
- (H) The maximum vertical dimension of any concealed space in a wall or partition of combustible construction cannot exceed 3 m.
- (I) The maximum horizontal dimension of any concealed space in a wall or partition of combustible construction cannot exceed 6 m.

Figure 2.7.1. The requirements for fire safety in a single storey farm building. ⁸

⁸ From *Reducing the Risk of Fire on Your Farm*. 2011. Ontario Ministry of Agriculture, Food and Rural Affairs. p. 37

Article 3.10.7.2. Type of Exits

This Article specifies the acceptable exit facilities for a farm building of low human occupancy. Article 3.10.7.1. requires a farm building of low human occupancy to have at least two primary exits per storey consisting of exterior exit doorways spaced remotely from each other at opposite ends of the building. However, all other exits may consist of:

- a) an exterior doorway,
- b) subject to Article 3.10.7.3, an exterior exit passageway,
- c) an exterior ramp,
- d) an exterior stairway,
- e) a fire escape conforming to Subsection 3.4.7.,
- f) subject to Article 3.10.7.4., a horizontal exit, or
- g) an openable window or panel providing an opening measuring not less than 900 mm by 900 mm with the bottom of the opening no more than 1.5 m above the adjacent floor level.

A permanent exterior ladder at the edge of the egress opening provides access down to the ground level. The escape ladder should be located at the side opposite to the hinges of the door, window or panel that swing inward or outward, and should include hardware that is easy to open from inside.



Figure 2.7.2. An example of a fire exit ladder located beside exit doors on a two storey broiler barn.⁹

⁹ From *Reducing the Risk of Fire on Your Farm*. 2011. Ontario Ministry of Agriculture, Food and Rural Affairs. p. 39

Article 3.10.7.3. Exterior Exit Passageways

This Article requires that exterior exit passageway from a farm building must be through exit doors at the floor level. Exit doors are not allowed to be used for any function other than for access to, and egress from, a floor area. Exit doors are intended to be kept free of all obstructions and equipment that could block traffic flow.

Article 3.10.7.4. Restricted Use of Horizontal Exits

This Article requires that horizontal exits must not comprise more than half the required number of exits from a farm building. The MBC defines a horizontal exit as an exit from one building to another by means of a doorway, vestibule, walkway, bridge or balcony.

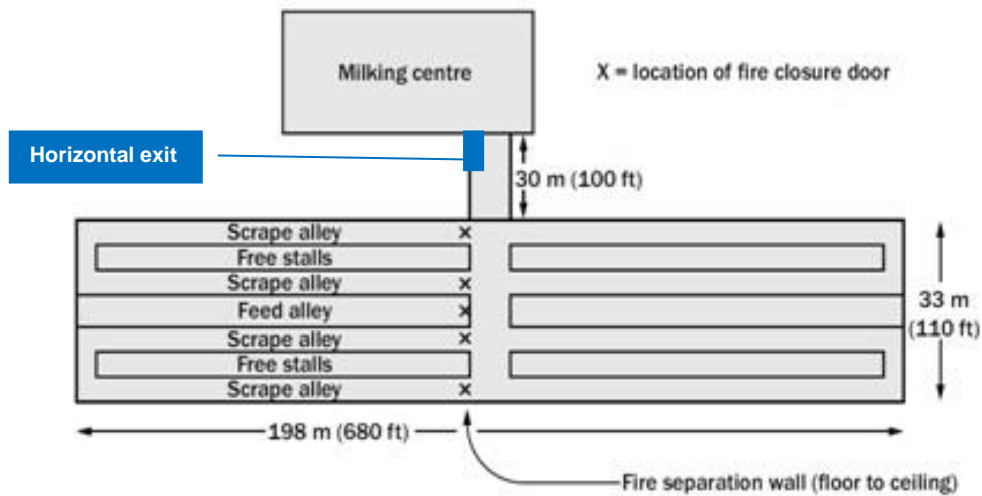


Figure 2.7.3. Horizontal exit along a connecting hallway. ¹⁰

Article 3.10.7.5. Location of Exits

This Article requires that all exits be clearly visible or that their locations be indicated by signage where they are not noticeable to the occupants. In situations where occupants may not be familiar with the egress routes, confusion and panic can set in under emergency conditions. Hence, all escape routes must be clearly marked.

During emergency situations, means of egress are needed to provide occupants with a safe and quick means of evacuation. Egress facilities must be wide enough to permit smooth unobstructed traffic flow so that occupants can quickly escape from the building. Escape routes have to be clearly designated, and must not contain any activity or items that could create a fire hazard or hinder evacuation. Egress facilities should not only permit fast evacuation in a fire or any other emergency situation, but should also be serviceable and accessible at all times in the normal daily use of buildings.

¹⁰ From *Reducing the Risk of Fire on Your Farm*. 2011. Ontario Ministry of Agriculture, Food and Rural Affairs. p. 17

A means of egress system is considered to have two distinctive components:

- access to an exit, and
- exit.

The access to an exit is considered to start at any occupied location and ends at the exit facility through which occupants leave a storey. This means the access to an exit is the total path of travel to arrive at the exit facility on a given storey, as well as the room or occupancy and any intervening access corridor.

Article 3.10.7.6. Travel Distance to an Exit

This Article establishes safe escape passageways in a farm building in the event of a fire by prescribing the maximum distance (and consequently time) required to reach an exit from that space. The first option is for travel distances from anywhere in the farm building of low human occupancy to not exceed 45 m from any point in the building. The second option is for exits to be placed along the perimeter of the building every 60 m.

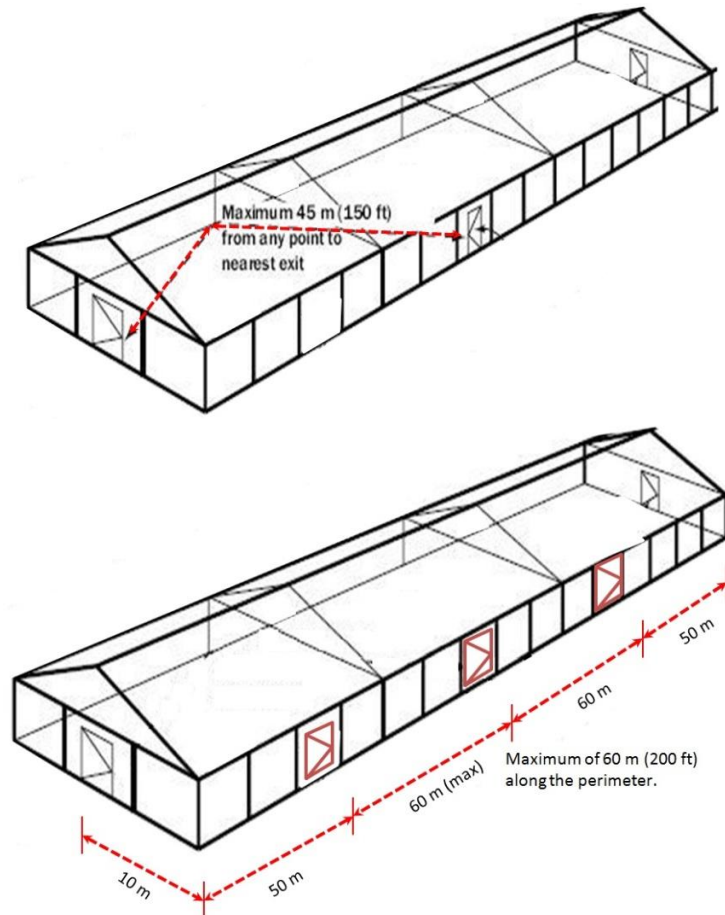


Figure 2.7.4. Two options in meeting travel distance requirements. ¹¹

¹¹ From *The National Building Code, Illustrated User's Guide*. 2014. The National Research Council of Canada. p. 95

Article 3.10.7.7. Direction of Door Swing

This Article requires that an exit door in a farm building that swings inward on its axis must have a sign affixed to it that is no higher than 1.5 m from the floor level and that indicates the direction of door swing.

The door swing in a farm building is allowed to swing inward on the basis of both low occupant load and familiarity of occupants to the escape routes. Also, outward swinging doors may pose a concern for the animals as larger animals can easily push open these types of doors. Furthermore, the air pressure in some agricultural facilities could cause an outward swinging door to be pushed open.

Article 3.10.7.8. Stairs and Ladders for Exits above Ground Level or Floor Level

Primary exit doorways required under Article 3.10.7.1 require a stair for the exterior doorway where a doorway is more than 300 mm above the adjacent ground or floor level.

This Article requires a stair for exterior doorways be provided where a doorway is more than 600 mm above the adjacent ground or floor level; the ground level is on the outside facing side of the wall, while the floor level is on the inside facing portion of the wall.

Where an openable window or panel is used as an exit it is required that the window sill be no higher than 1.5 m above the adjacent floor level (the side facing inside the building). On the outside of the building, it must be served by a stair where the opening is more than 600 mm above the adjacent ground level, or an exit ladder conforming to Subsection 3.10.8. if the window sill is more than 2.5 m above the ground.

2.8 LADDERS

Article 3.10.8.1. Design Load for Ladders

This Article prescribes that the required load for any permanently installed ladder and its fastenings, on any farm structure, be designed for a concentrated load of 1.0 kN (kilonewtons), applied so as to produce the most critical stress in the member concerned. The most critical area is usually at the mid-span of rungs and the ladder fastenings. Ladders are typically not subject to complicated engineering analyses but its design has evolved over the years through common industry best practices. In situations where unusual loads may be expected or where the ladder is made of steel, the design procedures in Part 4 of NBC apply.

Article 3.10.8.2. Termination above Ground Level

This Article requires that ladders serving required exits terminate between 1.0 m and 1.5 m above ground level. The bottom of the ladder should terminate 1.0 m to 1.5 m above grade to prevent small children from climbing.

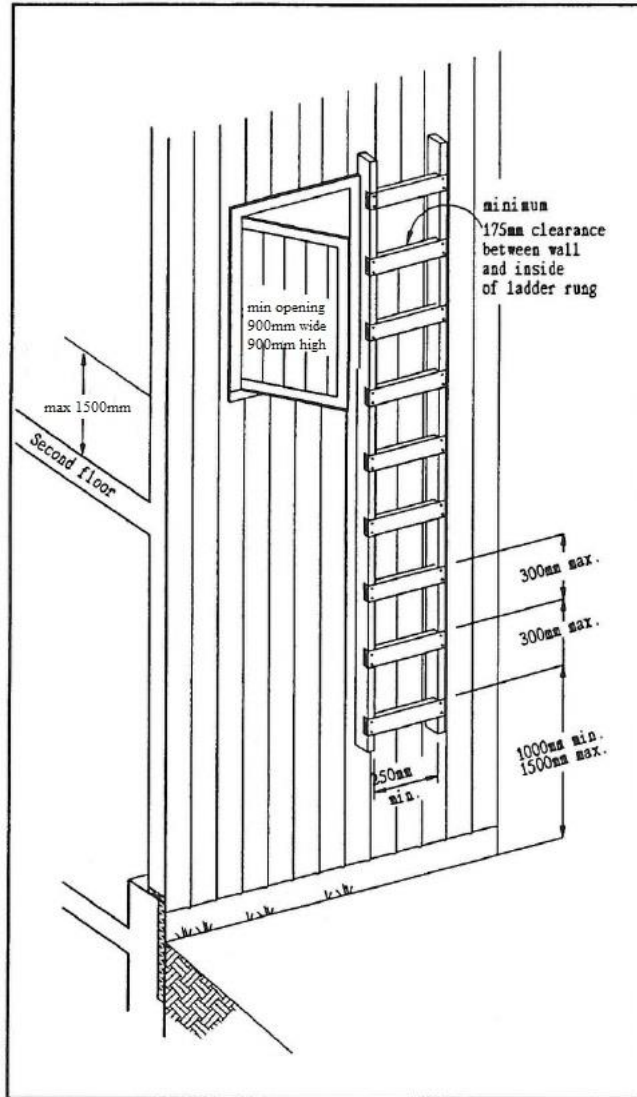


Figure 2.8.1. Minimum exit requirements from a second storey to outside grade.¹²

Article 3.10.8.3. Clear Space behind Rungs, Steps or Cleats

This Article requires a clear space of 175 mm between the ladder rungs, steps or cleats and the wall to allow for adequate footing support when used.

¹² From *Construction Guide for Farm Buildings*. 1995. Ontario Ministry of Housing and Ministry of Agriculture, Food and Rural Affairs. p. 3-9

Article 3.10.8.4. Spacing of Rungs, Steps or Cleats

This Article establishes that ladder rungs, steps or cleats must be uniformly spaced and the spacing between rungs, steps or cleats on a ladder must not exceed 300 mm.

Article 3.10.8.5. Distance between Side Rails

This Article establishes that the distance between the side rails of a ladder must be not less than 250 mm.

Article 3.10.8.6. Safety Cages

This Article requires safety cages on outside and inside ladders wherever a ladder extends to more than 6 m above ground or floor level. The cages must start no higher than 3 m from the bottom of the ladder.

2.9 BUILDING FIRE SAFETY

Article 3.10.9.1. Emergency Lighting

This Article determines where emergency lighting is required and the minimum illumination levels for egress facilities to help occupants escape in the event of a fire, as well as avoid accidents in the normal daily use of egress facilities. Emergency lighting is required at exits, principal routes providing access to exits and in service rooms. The Article exempts areas intended for poultry or egg production from having emergency lighting because of the negative impact to the birds when emergency lighting power goes on.

Article 3.10.9.2. Backup Power for Emergency Lighting

This Article determines how emergency lighting must be powered. These provisions aim to aid escape in the event of a fire if the normal electrical supply is interrupted, by providing backup means for illuminating principal escape routes. Power failure, whether induced by fire or other natural events, can dangerously impede emergency egress and access to exits. Emergency lighting should be automatically actuated when power fails, and have sufficient power to light the egress routes for a minimum of 30 mins to ensure the safe egress of occupants.

Article 3.10.10.1. Access Route

This Article requires that a farm building be provided with an all weather access road leading to the building to ensure access for firefighting. Firefighters and their vehicles should have clear access to every building so that firefighting activities can commence without delay upon arrival. Every farm building must be easily accessible to fire department vehicles in all seasons.

Article 3.10.10.2. Portable Fire Extinguishers

This Article requires that portable fire extinguishers be provided and installed in each farm building to minimize the amount of fire damage by enabling occupants to control or extinguish minor fires before fire department firefighting team arrives.

Portable fire extinguishers are the first line of fire suppression. Portable fire extinguishers are to be installed in all farm buildings. The size and spacing of extinguishers must conform with the Manitoba Fire Code (MFC).

APPLICATIONS AND FURTHER INFORMATION:

3.1 ITS AS PERMITTING AUTHORITY

The ITS is the authority having jurisdiction for all farm buildings with an area greater than 600m²; farm buildings less than 600m² are not regulated by any building code requirements in Manitoba. All building permits for farm buildings greater than 600m² will be issued by the ITS.

For building permits, the applicant must have their application signed by the municipal authority to ensure compliance with local zoning and development requirements. It is the applicant's responsibility to obtain municipal authorization prior to making an application to the ITS. A development permit or development letter from the municipality may also be acceptable.

You can obtain a permit application by emailing TechnicalServices@gov.mb.ca or from the following:

- a. The ITS website <https://www.gov.mb.ca/mr/its>
- b. By calling 1-800-282-8069 or 1-204-945-3373 in Winnipeg
- c. By calling 1-888-253-1488 or 1-204-726-6855 in Brandon/Dauphin

Documentation of Alternative Solutions

4.1 ALTERNATIVE SOLUTION PROCESS

There are two permitted options for conformance with the Manitoba Building Code. The first being the prescriptive approach as laid out in Division B and the second option is to propose an Alternative Solution as per Section 2.3 of Division C of the Code.

Some important facts regarding Alternative Solutions include:

- a) An Alternative Solution is specific to a project and cannot arbitrarily be transferred or applied to other designs or projects.
- b) Each Alternative Solution must be demonstrated as meeting the level of performance required by the objective, intent and function statements of the Code article. Every effort must be made to demonstrate that an alternative solution will perform as well as a design that would satisfy the applicable acceptable solution in Division B – not “well enough” but “as well as”.
- c) All proposals for an Alternative Solution are to be made by a registered professional, skilled and experienced in the matter.
- d) A proposed Alternative Solution is proprietary to that registered professional.

Acceptance of an Alternative Solution is based on satisfactory documentation submitted to the Authority Having Jurisdiction to justify the proposal and not to an existing condition or approval from other projects.

Various strategies and risk mitigation measures can be incorporated in the design and construction of farm buildings. When used collectively, these strategies minimize the damage from fire or describe actions to take in the event of a fire. Proposed Alternative Solutions will be evaluated based on how they meet or exceed the level of performance (e.g. reduce fire spread) required by the MBC. The design professional must provide narrative how the strategy meets or exceeds the intent of the prescriptive requirements being substituted.

Design professionals preparing Alternative Solutions proposals may use various engineering tools to demonstrate equivalent level of performance, such as:

- Fire and smoke modelling
- Timed exit analysis
- Fire zone analysis
- Fire performance assessment of assemblies
- Fire hazard analysis

Alternative Solution designs may address, but are not limited to:

Segmentation and Interconnections

- Use of links to connect buildings and limit fire spread.
- Installation of fire-rated doors designed to close automatically in the event of a fire or alarm event.



Figure 4.1.1. This roll-up door protects an adjoining compartment by automatically closing in a fire.¹³
(Photo credit: Cornell Iron Works Inc., Pennsylvania)

Water supply

- Construction of ponds, complete with dry hydrant for fire department connections.
- Installation of water tanks.
- Installation of fire cisterns.

Automatic Sprinkler System

- Installation of dry-pipe sprinkler system suitable for farm buildings.

Choice of construction materials

- Using noncombustible construction articles from the National Building Code of Canada
- Specifying fire-rated wood coated with fire resistant paint for framing components (ceilings, walls, and attics).
- Specifying interior finish materials with low flame spread ratings that do not support combustion, for example, concrete or tile surfaces and to a lesser extent steel sheathing.

Fire Load Calculations

- Restricted fire loads in combination with building design solutions

Fire Alarm System

- Installation of fire-detection and notification systems suitable for farm buildings.

¹³ From *Reducing the Risk of Fire on Your Farm*. 2011. Ontario Ministry of Agriculture, Food and Rural Affairs. p. 21

- Install additional fire-detection and notification systems in concealed spaces.

Enhanced Access Route

- Design and construct fire department access route as per MBC 3.2.5.6.(1)
- Additional access routes

Fire Fighter Response Time

- Letter from the local fire department that the typical fire fighter response time is no more than 10 minutes.
- Other information should include the average number of trained fire fighters upon initial arrival and the fire departments water tender and pumping capacity.

Other Strategies

- Other innovative or proprietary measures not listed above.

REFERENCES

Canadian Farm Buildings Handbook. 1998. Publication 1822E. Research Branch, Agriculture Canada.

Canadian Wood-Frame House Construction. 2014. Canada Mortgage and Housing Corporation.

Construction Guide for Farm Buildings. 1995. Ontario Ministry of Housing and Ministry of Agriculture, Food and Rural Affairs.

National Building Code. 2015. National Research Council Canada.

National Building Code, Illustrated User's Guide. 2014. National Research Council Canada.

National Farm Building Code. 1995. National Research Council Canada.

Reducing the Risk of Fire on Your Farm. 2011. Ontario Ministry of Agriculture, Food and Rural Affairs.

APPENDIX A

Manitoba Building Code Excerpts for Farm Buildings of Low Human Occupancy

Definitions:

Farm building means a *building* or part thereof that does not contain a *residential occupancy* and that is associated with and located on land devoted to the practice of farming, and used essentially for the housing of equipment or livestock, or the production, storage or processing of agricultural and horticultural produce or feeds, but does not include a *building* that falls within the definition of a Group F, Division 1 - *High-hazard industrial occupancy*.

Low human occupancy means, in respect of a *farm building*, an *occupancy* having an *occupant load* of not more than one person per 40 m² during normal use.

Fire Safety Requirements:

Section 3.10. Fire Safety Requirements for Low Human Occupancy Farm Buildings

3.10.1. Scope

3.10.1.1. Scope

1) This section applies to a *farm building*, or a part of a *farm building*, of *low human occupancy*.

3.10.1.2. Floor Areas

1) When a *farm building*, other than a greenhouse, of the number of *storeys* in the first column of Table 3.10.1.2. has a *floor area* on any one *storey* that exceeds the *floor area* listed opposite in the second column, the *farm building* must be separated into *fire compartments* by vertical *fire separations* having a *fire-resistance rating* of at least 2 h, so that each separated portion has a *floor area* on any one *storey* that is less than the maximum *floor area* listed in the second column of the Table.

Maximum Floor Areas for Farm Buildings of Low Human Occupancy
Forming Part of Article 3.10.1.2.

Number of Storeys	Maximum Floor Area per Storey
1	4800 m ²
2	2400 m ²
3	1600 m ²

2) A *farm building* or part of a *farm building* must be separated from an *occupancy* conforming to Part 3 or Part 9 - except for another *farm building* that is subject to Section 3.10. - by a *fire separation* having a *fire-resistance rating* of at least 1 h.

3) In the case of an office in a *farm building*, if the aggregate area of an office is not more than 10% of the *floor area* of the *storey* in which it is located, the office is not considered a *major occupancy*.

4) In a *farm building*, a *mezzanine* greater than 10% of the *floor area* in which it is located is considered a separate *storey*.

3.10.2. Spatial Separations

3.10.2.1. General

1) Except for greenhouses, where an *exposing building face* of a *farm building* is located less than 30 m from a property line, the centreline of a public thoroughfare, or a *building* other than a *farm building of low human occupancy*, the appropriate requirements of Subsection 9.10.14. for *medium hazard industrial occupancies* apply to the *exposing building face*.

3.10.3. Fire Blocks in Concealed Spaces

3.10.3.1. Location

1) *Fire stops* must be provided at floor, ceiling and roof levels to cut off all concealed draft openings occurring between *storeys* and between the top *storey* and roof space, including spaces filled with batt, loose fill or foamed plastic insulation.

3.10.3.2. Concealed Spaces in Walls or Partitions

1) The maximum dimension of any concealed space in a wall or *partition of combustible construction* must not exceed 3 m vertically and 6 m horizontally.

3.10.3.3. Fire Blocks in Horizontal Concealed Spaces

1) Horizontal concealed spaces within an attic or roof assembly in a *farm building* must be separated by construction conforming to Article 3.10.3.4. into compartments not more than

- a) 600 m² in area with no dimension more than 60 m, if the exposed construction materials within the space have a *flame-spread rating* not more than 25,
- b) 300 m² in area with no dimension more than 20 m, if the exposed construction materials within the space have a *flame-spread rating* more than 25 and the *building* is 20 m or less in width,
- c) 300 m² in area with the dimension of the compartment in the longitudinal direction no more than 15 m, if the exposed construction materials within the space have a *flame-spread rating* more than 25, and the *building* is 20 m or more, but less than 30 m in width, or
- d) 10 m in the longitudinal direction of any *building* greater than 30 m in width, if the exposed construction materials within the space have a *flame-spread rating* more than 25.

3.10.3.4. Fire Block Materials

1) Materials used to separate concealed spaces into compartments must not be less than

- a) solid lumber at least 38 mm thick,
- b) two layers of lumber, each at least 19 mm thick with joints staggered, where the width or height of the concealed space requires more than one piece of lumber to block off the space, or
- c) phenolic bonded plywood, waferboard or strandboard at least 11 mm thick with joints supported.

2) Openings through the *fire block* materials referred to in Sentence (1) must be protected to maintain the integrity of the construction.

3) Where the *fire block* materials referred to in Sentence (1) are penetrated by construction elements or by service equipment, a *fire stop* must be used to seal the penetration.

3.10.4. Fuel Storage Tanks

3.10.4.1. Fuel Storage

1) Fuels in a *farm building* must be stored in conformance with the *Manitoba Fire Code*, Manitoba Regulation 155/2011.

3.10.5. Fire Separations

3.10.5.1. Fire Resistance Ratings

1) Except as provided in Sentences (3) and (4), a fuel-fired *appliance* in a *farm building* must be
a) located in a *service room* or *service space* designed for that purpose, and
b) separated from the remainder of the *farm building* by a *fire separation* having a *fire-resistance rating* of not less than 1 h.

2) A room used in a *farm building* for crop drying or in which farm machinery is repaired must be separated from other *occupancies* by a *fire separation* having a *fire-resistance rating* of not less than 1 h.

3) Fuel-fired space heating *appliances*, space-cooling *appliances* and *service water heaters* in a *farm building* need not be separated from the remainder of the *building* as required in Clause (1)(b), if the equipment is designed for such use and serves no more than one room or *suite*.

4) A *service room* that contains an incinerator must be separated from the remainder of the *farm building* by a *fire separation* having a *fire-resistance rating* of not less than 1 h.

3.10.6. Exposed Foamed Plastic Insulation

3.10.6.1. Combustible Insulation and its Protection

1) Exposed foamed plastic material in *farm buildings* must be protected on the interior surfaces in conformance with Article 9.10.17.10.

2) This Article does not apply to unoccupied high humidity horticultural facilities where agricultural products are stored.

3.10.7 Egress and Exits

3.10.7.1. Number of Exits

1) Each *storey* of a *farm building* must be served by at least 2 *exits* consisting of exterior doorways and the *exits* must be spaced remotely from each other at opposite ends of the *building*.

3.10.7.2. Type of Exits

1) *Exits* in *farm buildings* must consist of
a) an exterior doorway,

- b) subject to Article 3.10.7.3, an exterior *exit* passageway,
- c) an exterior ramp,
- d) an exterior stairway,
- e) a fire escape conforming to Subsection 3.4.7.,
- f) subject to Article 3.10.7.4., a *horizontal exit*, or
- g) an openable window or panel providing an opening measuring not less than 900 mm by 900 mm, with the bottom of the opening no more than 1.5 m above the adjacent floor level.

3.10.7.3. Exterior Exit Passageways

- 1) Access to an exterior *exit* passageway from a *farm building* must be through *exit* doors at the floor level.

3.10.7.4. Restricted Use of Horizontal Exits

- 1) *Horizontal exits* must not comprise more than half the required number of *exits* from a *farm building*.

3.10.7.5. Location

- 1) *Exits* described in Article 3.10.7.2. must be located and arranged so that they are clearly visible or their locations must be clearly indicated.

- 2) *Exits* described in Article 3.10.7.2. must be accessible at all times.

3.10.7.6. Travel Distance to an Exit

- 1) The travel distance to an *exit* in a *farm building* must not exceed 45 m.

- 2) Sentence (1) does not apply if *exits* are placed along the perimeter which are not more than 60 m apart, measured along the perimeter.

3.10.7.7. Direction of Door Swing

- 1) An *exit* door in a *farm building* that swings inward on its axis must have a sign affixed to it that is no higher than 1.5 m from the floor level and that indicates the direction of door swing.

3.10.7.8. Stairs and Ladders for Exits above Ground Level or Floor Level

- 1) An exterior doorway that serves as an *exit* in a *farm building* must be served by

- a) an inside stair if the doorway is more than 600 mm above the adjacent floor level; and

- b) an outside stair if the doorway is more than 600 mm above the adjacent ground level.

- 2) Despite Sentence (1), an exterior doorway that serves as one of the *exits* required under Sentence 3.10.7.1.(1) must be served by

- a) an inside stair if the doorway is more than 300 mm above the adjacent floor level; and

- b) an outside stair if the doorway is more than 300 mm above the adjacent ground level.

3) An *exit* described in Clause 3.10.7.2.(1)(g) must be served by a stair if the bottom of the wall opening is more than 600 mm above the adjacent ground level.

4) Despite Sentence (3), an *exit* described in Clause 3.10.7.2.(1)(g) may be served by a permanently installed outside ladder conforming to Subsection 3.10.8. if the bottom of the wall opening is more than 2.5 m above ground level.

3.10.8. Ladders

3.10.8.1. Design Load

1) In a *farm building*, permanently installed ladders and their fastenings to the *building* must be designed for a concentrated load of 1.0 kN, applied so as to produce the most critical stress in the member concerned.

3.10.8.2. Termination above Ground Level

1) Permanently installed ladders serving as *exits* required in Sentence 3.10.7.2.(1) must terminate not more than 1.5 m and not less than 1.0 m above ground level.

3.10.8.3. Clear Space behind Rungs, Steps or Cleats

1) A clear space of not less than 175 mm must be provided behind the rungs, steps or cleats of any permanently installed ladder in a *farm building*.

3.10.8.4. Spacing of Rungs, Steps or Cleats

1) The spacing of rungs, steps or cleats of a ladder in a *farm building* must be uniform and must not exceed 300 mm.

3.10.8.5. Distance between Side Rails

1) The distance between the side rails of a ladder in a *farm building* must be not less than 250 mm.

3.10.8.6. Safety Cages

1) In a *farm building*, safety cages must be provided around permanently installed ladders of more than 6 m in height, starting not more than 3 m from the bottom of the ladder.

3.10.9 Building Fire Safety

3.10.9.1. Emergency Lighting

1) Except as provided in Sentence (3), emergency lighting must be provided in *farm buildings* to an average level of illumination of not less than 10 lx at floor or tread level in

- a) *exits*,
- b) principal routes providing access to *exit* in open floor areas, and
- c) *service rooms*.

2) The minimum value of the illumination required by Sentence (1) must be not less than 1 lx.

3) A *farm building* that is used for poultry or egg production does not require emergency lighting in areas intended for poultry or egg production.

3.10.9.2. Backup Power for Emergency Lighting

1) A *farm building* must have an independent power supply — such as batteries or a generator — which is

a) capable of maintaining the emergency lighting required by Article 3.10.9.1.

for a minimum period of 30 min if the regular power supply to the *farm building* is interrupted, and

b) designed and installed so that it will assume the electrical load for the emergency lighting automatically upon failure of the regular power.

2) If self-contained emergency lighting units are used, they must conform to CSA C22.2 No. 141, "Emergency Lighting Equipment."

3.10.10. Provisions for Firefighting

3.10.10.1. Access Route

1) A *farm building* must be provided with an all weather access road leading to the *building* to ensure access for firefighting.

3.10.10.2. Portable Fire Extinguishers

1) Portable fire extinguishers must be provided and installed in accordance with the *Manitoba Fire Code*, Manitoba Regulation 155/2011.