

Ontario Fire Code

SECTION 3.3 ***STORAGE***

Illustrated Commentary



***Office of the
Ontario
Fire Marshal***

3.3.1. Indoor Tire Storage

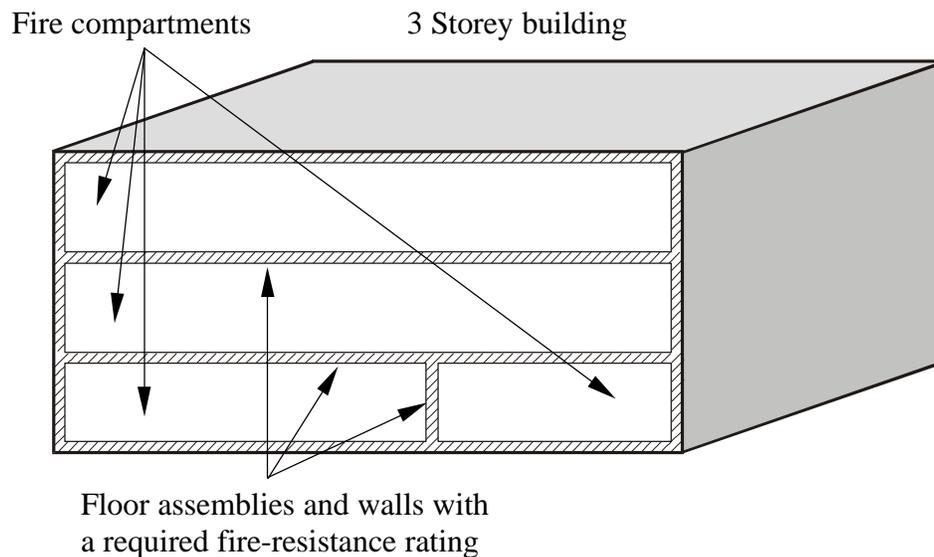
Application

3.3.1.1. This Subsection applies to **buildings** used for the storage of tires in which the bulk volume of tires stored in one **fire compartment** exceeds 425 m^3 .

Subsection 3.3.1. Indoor Tire Storage applies to buildings where storage of tires situated in one fire compartment exceeds the bulk volume of 425 m^3 .

For example, this subsection would not apply to a 3 storey building where each storey contains less than 425 m^3 of stored tires even though the total bulk volume of tires in the building exceeded 425 m^3 .

Rationale: Each storey in the building would be considered to be a separate fire compartment.



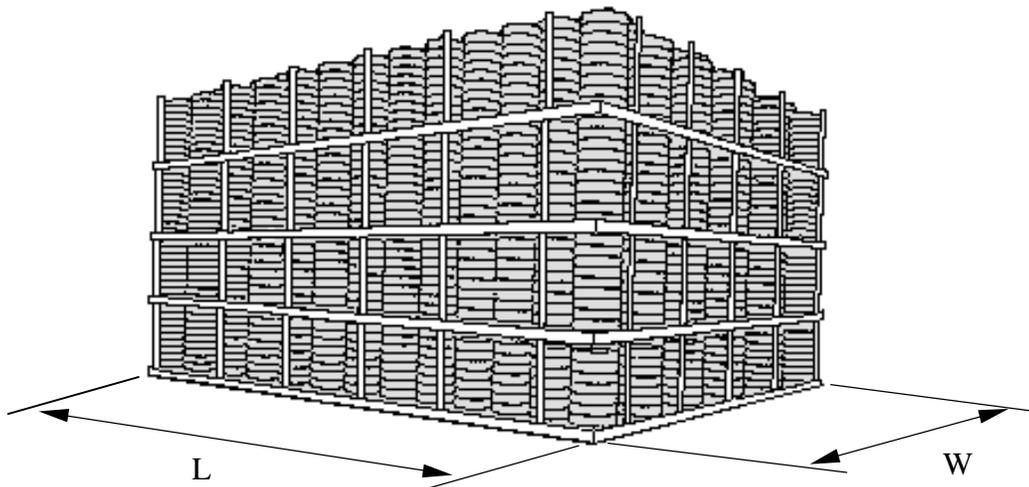
Building means any structure used or intended for supporting or sheltering any use or occupancy.
Fire compartment means an enclosed space in a building that is separated from all other parts of the building by enclosing construction that provides a fire separation having a required fire-resistance rating.

3.3.1. Indoor Tire Storage

Tire pile dimensions

3.3.1.2. A single pile of tires in a tire storage location shall occupy an area not greater than 500 m² with a maximum length of 30 m.

Placing a limit on the maximum area of a pile and limiting the piles maximum length and width can enhance fire-fighting activities.



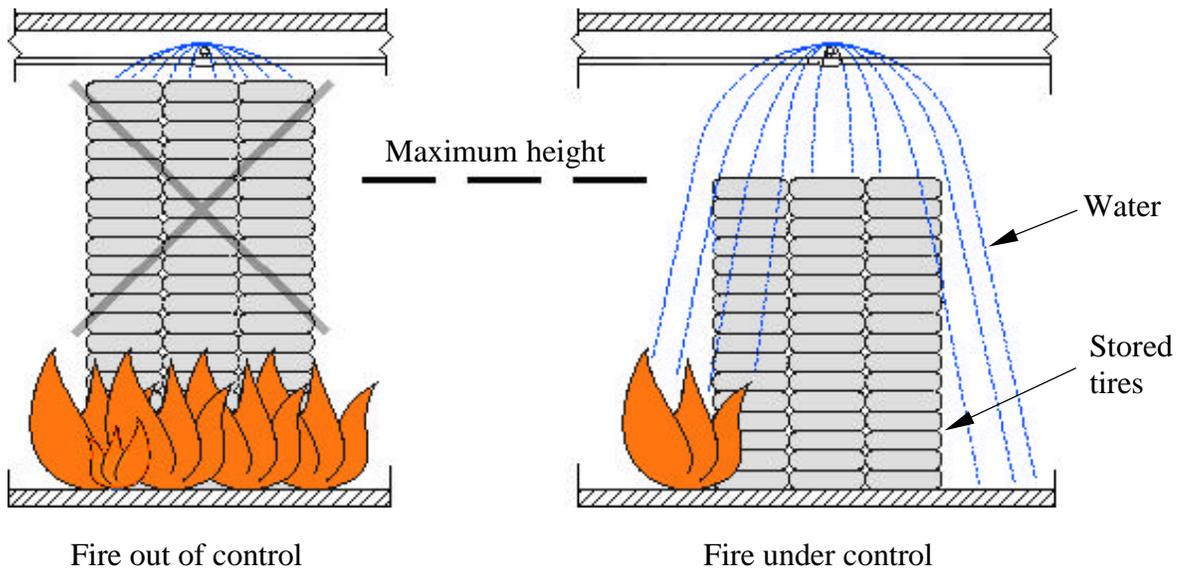
$$\text{Area} \leq 500 \text{ m}^2$$

$$L \leq 30 \text{ m}$$

3.3.1. Indoor Tire Storage
Tire pile dimensions

- 3.3.1.3.(1) The maximum piling height of tires shall not exceed the height used for the design of the fixed extinguishing system installed as required in Article 3.3.1.8.
- (2) The maximum piling height allowed in Sentence (1) shall be posted in conspicuous locations.

The objective of this requirement is to ensure that the sprinkler system has the capability to control or extinguish a fire.



3.3.1. Indoor Tire Storage

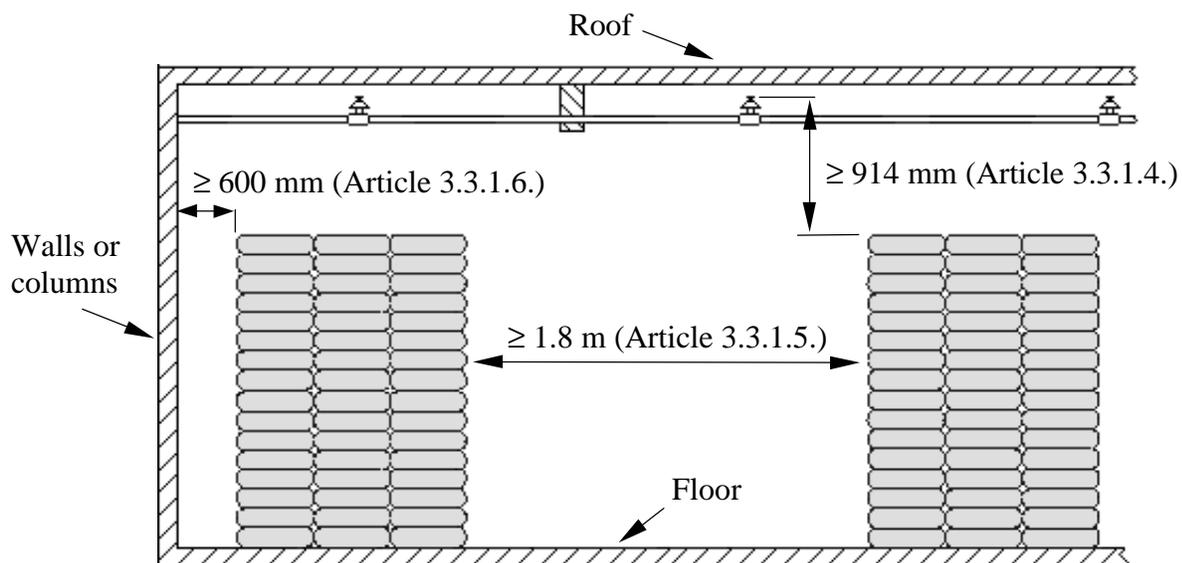
Pile clearance

- 3.3.1.4. A clearance of at least 914 mm shall be maintained between the tops of piles and sprinkler head deflectors.
- 3.3.1.5. Aisles between individual piles shall be at least 1.8 m wide.
- 3.3.1.6. A clearance of at least 600 mm shall be maintained between piles of tires and columns and enclosing walls.

The clearance required by Article 3.3.1.4. is intended to ensure that the water (extinguishing agent) discharging from the sprinkler head is not obstructed by the stored tires. An obstruction could prevent the extinguishing agent from discharging over the fire area, thus causing the automatic extinguishing system to be ineffective.

Article 3.3.1.5. provides aisles for fire department access to the piles.

Article 3.3.1.6. specifies the clearance required between storage piles and structural elements of the building that will reduce the possibility of structural damage resulting from a fire.



3.3.1. Indoor Tire Storage

Pile clearance

3.3.1.7. A tire storage location shall be classified as a Group 'F' Division 2 **occupancy.**

The Building Code classifies industrial occupancies into 3 divisions.

These include:

- High Hazard Group 'F' Division 1,
- Medium Hazard Group 'F' Division 2 and
- Low Hazard Group 'F' Division 3.

Similar to the Ontario Building Code, the Fire Code classifies a tire storage location as a Group 'F' Division 2.

Group 'F', Division 2

Aircraft Hangars
 Cold Storage Plants
 Dry Cleaning Establishments
 Electrical Substations
 Freight Depots
 Helicopter Landing Areas on Roofs
 Laboratories
 Laundries, except self-service
 Planing Mills
 Printing Plants
 Repair Garages
 Self-Service Storage Buildings
 Service Stations
 Storage Rooms
 Television Studios
Tire Storage
 Warehouses
 Woodworking Factories

Occupancy means the use or intended use of a building or part thereof for the shelter or support of person, animals or property.

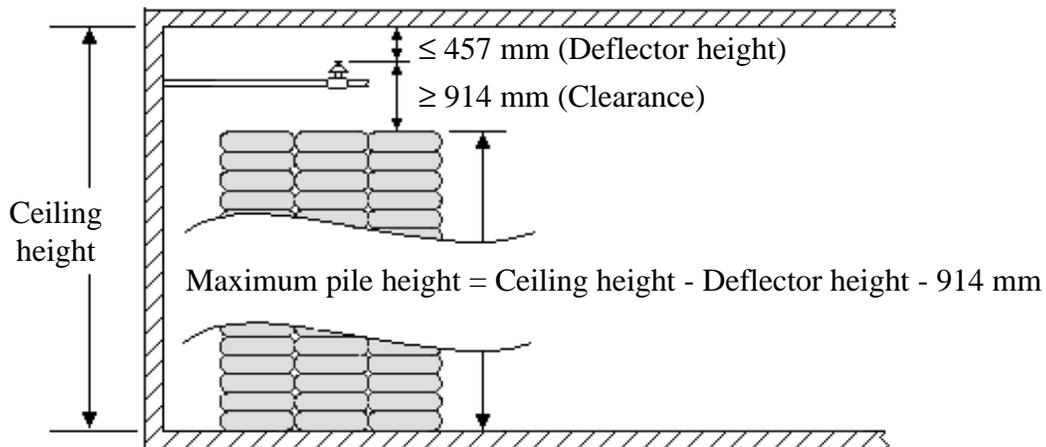
3.3.1. Indoor Tire Storage

Warehouse fire extinguishing systems

- 3.3.1.8.(1) Where the **floor area** of a tire storage location exceeds 250 m², the **floor area** shall be provided with an **approved** automatic fire extinguishing system installed in conformance with NFPA 231D, "Storage of Rubber Tires".
- (2) The design of the automatic fire extinguishing system required in Sentence (1) shall be based on the maximum piling height available.

A fire occurring in a pile of stored rubber tires would be extremely smoky, hot and difficult to control or extinguish. For these reasons, a specially designed and installed automatic fire extinguishing system shall be provided to protect each floor area containing stored tires where the floor area exceeds 250 m². An automatic fire extinguishing system is not required where the floor area does not exceed 250 m².

To determine the maximum pile height, you would have to consider the ceiling height of the space under consideration and height of the sprinkler head deflectors above the finished floor. For example, the NFPA standard requires the sprinkler head deflectors to be installed not more than 457 mm below the floor slab or roof deck. Further, article 3.3.1.8. requires that a clearance of not less than 914 mm be maintained between the top of the piles and the sprinkler head deflectors.



Approved means approved by the Chief Fire Official.

Floor area means the space on any storey of a building between exterior walls and required firewalls and includes the space occupied by interior walls and partitions, but does not include exits and vertical service spaces that pierce the storey.

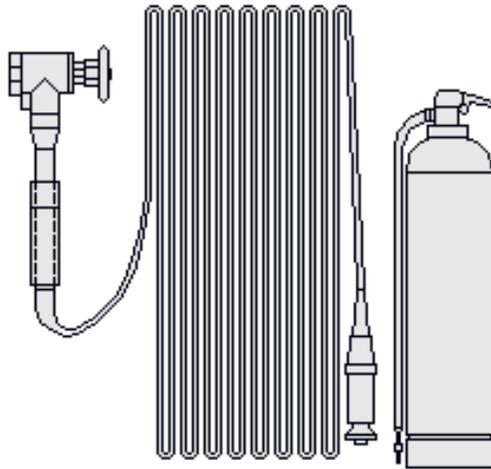
3.3.1. Indoor Tire Storage

Warehouse fire extinguishing systems

3.3.1.9. A standpipe and hose system shall be installed in conformance with NFPA 231D, "Storage of Rubber Tires".

When installing a standpipe and hose system in a sprinklered building, the installation must be compatible with the sprinkler system. The NFPA 231D "Storage of Rubber Tires" standard requires 38 mm fire hose to be provided to reach any portion of the storage area using one of the following methods of supplying water to the fire hoses:

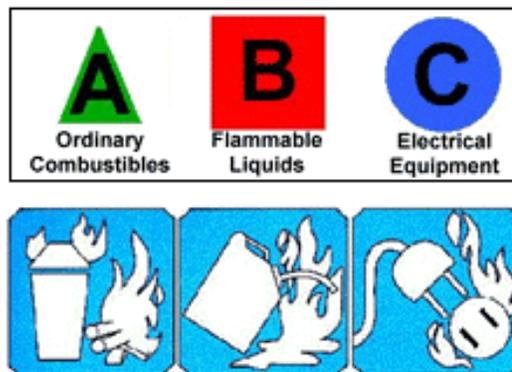
- a) hydrants
- b) a separate piping system for the fire hose stations
- c) valved hose connections on sprinkler risers where such connections are made upstream of sprinkler control valves, or
- d) an adjacent sprinkler system



3.3.1. Indoor Tire Storage
Portable extinguishers

- 3.3.1.10. Portable extinguishers conforming to Section 6.2 shall be provided in tire storage locations so that there is one extinguisher with a 2A:10BC or higher rating for every 250 m² of **floor area**.

This Article requires that portable fire extinguishers provided in the floor area be of a multi-purpose type and have a nominal rating of at least 2A:10BC. At least one fire extinguisher must be provided for every 250 m² of floor area.



Floor area means the space on any storey of a building between exterior walls and required firewalls and includes the space occupied by interior walls and partitions, but does not include exits and vertical service spaces that pierce the storey.

3.3.2. Indoor General Storage

Application

- 3.3.2.1. This Subsection applies to the indoor general storage of combustible or noncombustible solids with combustible packaging or storage aids to a height of 6.4 m, except that this Subsection does not apply to the bulk storage of unpackaged grain, coal or similar commodities, or special hazard commodities covered elsewhere in this Code.

This Subsection applies to general storage up to 6.4 m high, where the materials stored or the containers used are combustible and the material is stacked on the floor or stored using storage aids such as racks or bins.

3.3.2. Indoor General Storage

Storage pile dimensions

- 3.3.2.2.(1) The area of individual storage piles shall not exceed 500 m² in **buildings** that are not **sprinklered**.
- (2) The area of individual storage piles shall not exceed 1000 m² in **sprinklered buildings**.
- (3) Heights of storage piles in **buildings** that are not **sprinklered** shall not exceed 4.5 m.

Storage pile sizes are permitted to be larger in sprinklered buildings than in non-sprinklered buildings because sprinklers can effectively control or extinguish a fire.

Storage Pile Limitations	
Unsprinklered Buildings	Sprinklered Buildings
<ul style="list-style-type: none"> • The area of a pile shall not exceed 500 m² • The height of a pile shall not exceed 4.5 m 	<ul style="list-style-type: none"> • The area of a pile shall not exceed 1000 m² • The height of a pile is not restricted

Building means any structure used or intended for supporting or sheltering any use or occupancy.

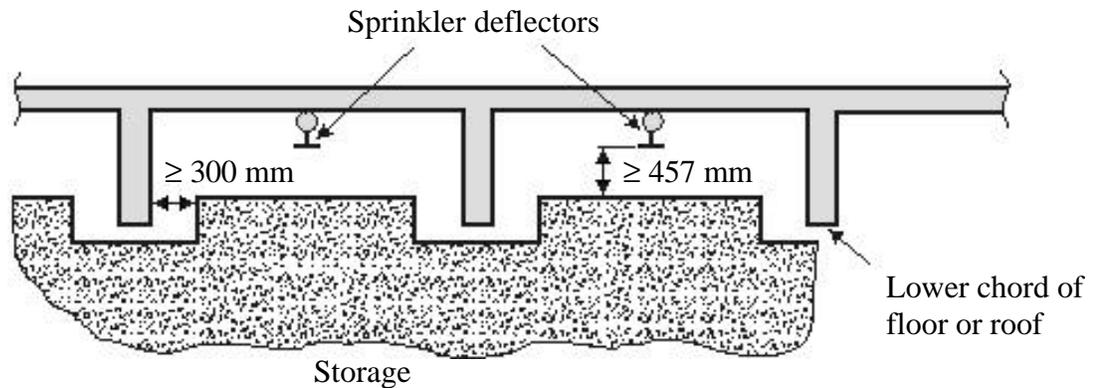
Sprinklered (as applied to a building or part thereof) means that the building or part thereof is equipped with a system of automatic sprinklers.

3.3.2. Indoor General Storage

Pile clearance

- 3.3.2.3.(1) The clearance between sprinkler head deflectors and the tops of piles shall not be less than 457 mm.
- (2) Where the storage piles are above the lower chords of floor or roof structural framing members, a horizontal clear space of at least 300 mm shall be maintained between the storage and the structural members.

Sentences (1) and (2) are intended to ensure that water discharging from automatic sprinklers or from a hand-held hose is not obstructed by the stored materials.

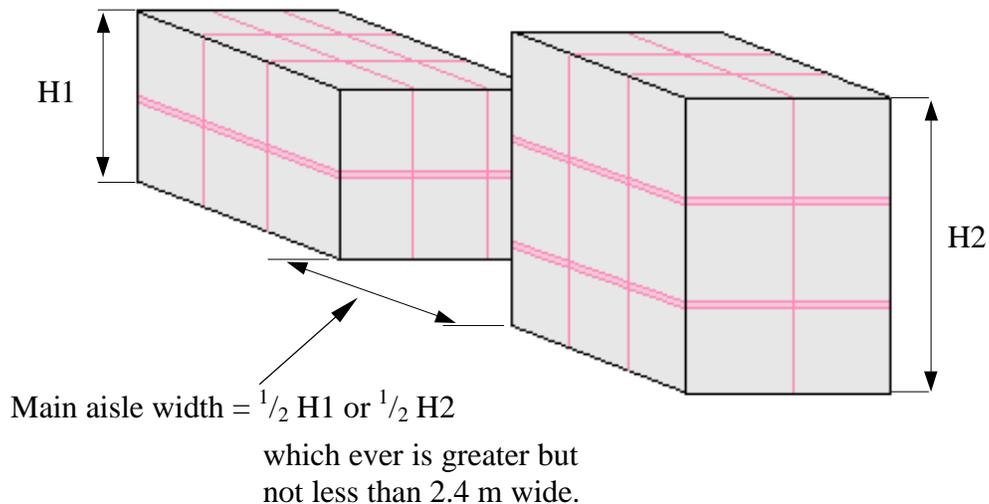


3.3.2. Indoor General Storage

Fire access aisles

- 3.3.2.4. At least one main aisle having a width equal to at least $1/2$ the height of the highest adjacent pile and extending the length of the structure shall be provided but in no case shall the width of the aisle be less than 2.4 m.
- 3.3.2.5. Aisles separating piles described in Article 3.3.2.2. shall be at least 2.4 m wide.

In order to facilitate access for fire fighting, there must be at least one main aisle not less than 2.4 m wide extending the length of the structure. Where the height of a pile exceeds 4.8 m, the width of the main aisle must be $1/2$ the height of the adjacent pile. In addition, aisles separating piles described in Article 3.3.2.2. must also be at least 2.4 m wide.



3.3.2. Indoor General Storage

Fire access aisles

- 3.3.2.6.(1) Adequate access for fire fighting purposes shall be provided and maintained to all portions of the premises, in conformance with Sentences (2) to (4).
- (2) Except as permitted by Sentence (3), at least one main aisle shall extend the length of the **building** with a minimum width of
- (a) 2.4 m for storage heights not more than 6 m, and
 - (b) 3.6 m for storage heights of more than 6 m.
- (3) Narrower aisles may be **approved** where the **building** is **sprinklered** and the sprinkler design is based on aisle widths less than required by Sentence (2) but in no case shall the aisle width be less than the aisle width on which the sprinkler design is based.
- (4) Access aisles not less than 1.0 m wide shall be provided to **exits**, to **fire department** access panels and to fire protection equipment.
- (5) Aisles shall be maintained free of obstruction.

This Article contains requirements to provide access and egress for the fire fighters with intent to avoid delays or ineffectiveness in conducting fire fighting operations that could result in the spread of fire and endanger the building occupants and emergency responders.

The width of aisles required in Sentence (2) varies depending upon storage pile heights for the purpose of avoiding total obstruction of aisles due to premature collapse of the piles during fire fighting operations.

Reduced aisle widths permitted in Sentence (3) recognizes that the size and intensity of a fire may be limited by the action of an automatic fire suppression system designed to protect the hazard.

Approved means approved by the Chief Fire Official.

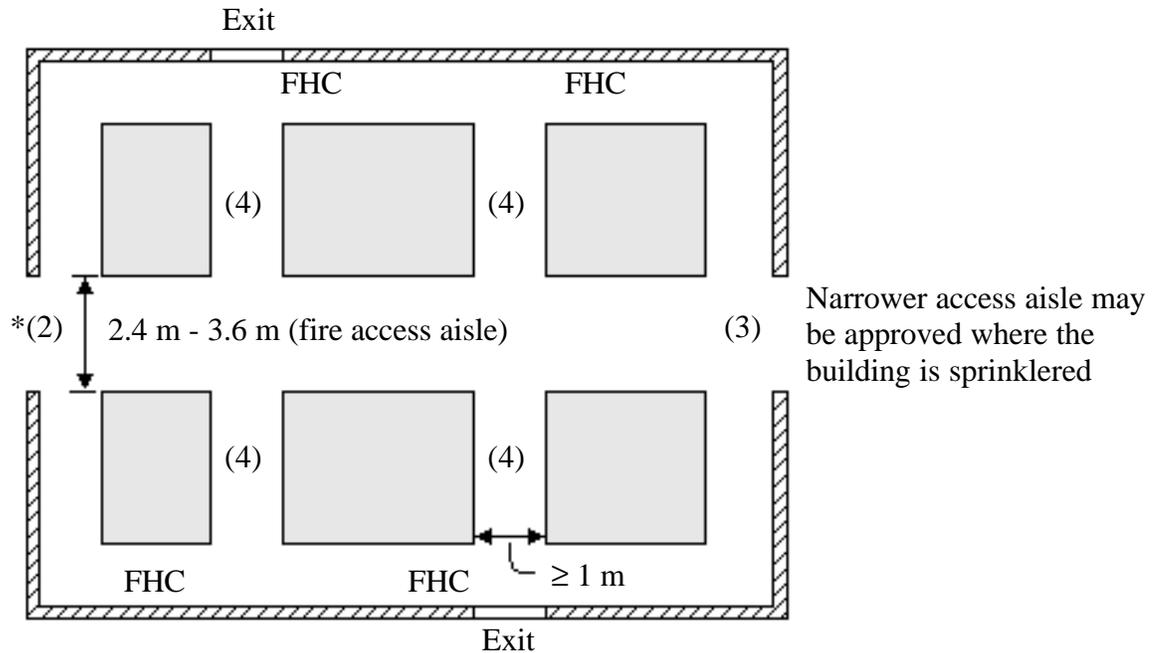
Building means any structure used or intended for supporting or sheltering any use or occupancy.

Exit means that part of a means of egress, including doorways, that leads from the floor area it serves to a separate building, an open public thoroughfare or an exterior open space protected from fire exposure from the building and having access to an open public thoroughfare

Fire department means a group of firefighters authorized to provide fire protection services by a municipality, group of municipalities or by an agreement made under section 3 of the Fire Protection and Prevention Act.

Sprinklered (as applying to a building or part thereof) means that the building or part thereof is equipped with a system of automatic sprinklers.

Sentences (4) and (5) require access aisles to be provided to fire equipment and exits. The access aisles must be maintained clear of obstructions to permit prompt access to the fire equipment and for the escape of occupants.



Note: FHC = Fire hose / Fire extinguisher

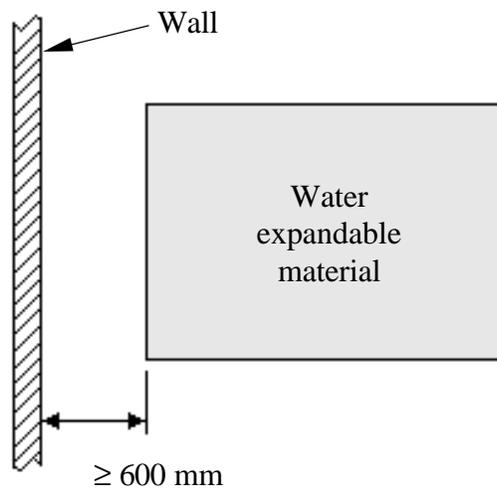
* The numbers in brackets () refer to the sentence number

3.3.2. Indoor General Storage

Fire access aisles

3.3.2.7. Wall clearances of at least 600 mm shall be maintained where stored commodities may swell or expand with the absorption of water.

The purpose of this article is to minimize the possibility of structural damage that may result from stored materials expanding when wet.

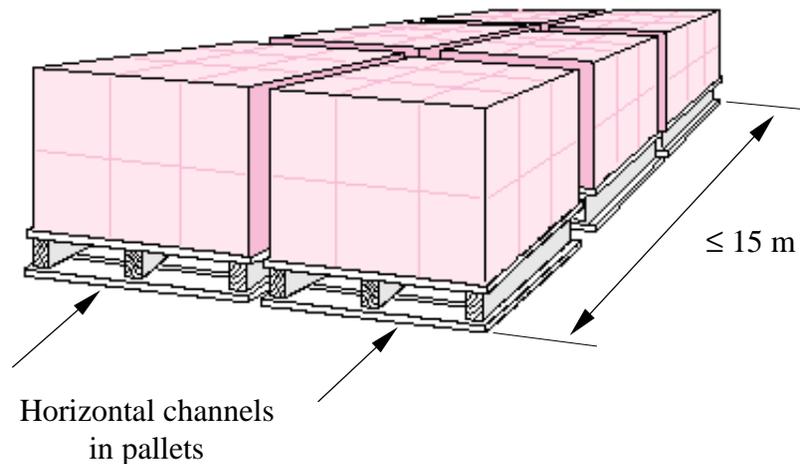


3.3.2. Indoor General Storage

Palletized storage arrangements

- 3.3.2.8. Palletized storage shall be arranged so that unobstructed horizontal channels formed by the top and bottom of pallets shall not exceed 15 m.

Article 3.3.2.8. is intended to reduce the horizontal spread of fire through pallet channels where palletized storage is placed in rows. The palletized storage must be arranged in a manner that would not permit the pallet channels to extend for more than 15 m.



3.3.2. Indoor General Storage

Palletized storage arrangements

3.3.2.9. Except as permitted in Article 3.3.2.10., pallets and dunnage not in use shall be stored outdoors and be located so as to avoid an exposure hazard.

Pallet storage

- 3.3.2.10.(1) Indoor storage of combustible pallets and dunnage may be permitted in **buildings** that are not **sprinklered** provided the area of storage does not exceed 100 m², the pile size does not exceed 1.2 m in height and 7.5 m in width, and the separating aisles are at least 2.4 m wide.
- (2) Combustible pallets shall not be stored indoors to a height greater than 1.2 m except in areas sprinklered in conformance with Sentence (3).
- (3) **Buildings** or compartments used for the storage of pallets shall be classified as Group 'F' Division 2 and shall be **sprinklered** in conformance with NFPA 231, "General Storage".

Due to the combustible nature of stored dunnage and combustible pallets, it is obvious that quantities of these materials when stored can create a serious fire hazard.

Article 3.3.2.9. states that the preferred location for storing pallets and dunnage (roughly-sawn individual pieces of wood used to separate vertically stored materials) is outdoors in a place that avoids an exposure hazard to other properties, buildings or other materials.

Article 3.3.2.10. permits combustible pallets and dunnage to be stored indoors provided certain conditions are met. The conditions vary depending upon whether the building is sprinklered or not.

Storage Pile Limitations	
<u>Unsprinklered Buildings</u>	<u>Sprinklered Buildings</u>
<ul style="list-style-type: none"> • The total area of stored combustible pallets and dunnage shall not exceed 100 m² • The pile sizes shall not exceed 1.2 m in height and 7.5 m in width and must be separated by aisles at least 2.4 m wide. 	<ul style="list-style-type: none"> • The pile sizes are not restricted provided the building is classified as a Group 'F' Division 2 and the sprinkler system conforms to NFPA 231 "General Storage"

Building means any structure used or intended for supporting or sheltering any use or occupancy.
Sprinklered (as applied to a building or part thereof) means that the building or part thereof is equipped with a system of automatic sprinklers.

Q1 What is meant by sprinklered?

A1 Sprinklered (as applied to a building or part thereof) means that the building or part thereof is equipped with a system of automatic sprinklers.

Q2 How can fire department access aisles be maintained at the proper minimum width?

A2 Refer to Ontario Fire Code 3.3.2.4. to 3.3.2.6.

Q3 What regulations apply to indoor tire pile clearance?

A3 Refer to Ontario Fire Code 3.3.1.4. to 3.3.1.7.

Q4 What requirements are given for safe pallet storage arrangements?

A4 Refer to Ontario Fire Code 3.3.2.8. to 3.3.2.10.
