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- 1. Introduction
- 2. Fire Protection
- 3. General Principles of Fire Safety Features
- 4. Types of Separations and Definitions
- 5. Separation of Residential Suites
- 6. Continuity of Fire Separations
- 7. Exemption from Fire Alarm System Requirements
- 8. Penetration of Fire Separations
- 9. Permitted Openings in Wall and Ceiling Membranes
- 10. Examples of Fire Separations
- 11. Alternative Solutions
- 12. On-Site Fire Separation Issues

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### Introduction

Interpretation of the building code is a forever changing and dynamic entity. The one constant that remains is the importance of fire safety. Fire separations is an important component of fire safety.

This presentation will cover the objectives, definitions, requirements, design considerations and other various issues surrounding Residential Fire separations. We will cover fire separations as they pertain to Part 9 of the 2010 National Building Code of Canada and the Manitoba Building Code Amendments. The parameters of Part 9 reviews include any building less than 600 m<sup>2</sup> and up to a maximum of 3 storeys.

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## Introduction

Disclaimer: Many of the examples given throughout the presentation are the interpretation of the employees of the City of Winnipeg only and should be viewed only as such.

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## Fire Protection

The object of fire safety measures is to provide for the safe egress of occupants, and to minimize the potential damage to the building where a fire originates, as well as to adjacent buildings. While compliance with code requirements can reduce the likelihood of fires, it cannot prevent them. Most fire safety requirements, therefore, have a component of both life safety and property protection, although these vary with each requirement.

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## General Principles of Fire Safety Features

For the purposes of this presentation, we will be mainly focusing on two of the six Principles of Fire Safety Features:

### Compartmentation

- Dividing the building into fire compartments (compartmentation), both to confine fires to their area of origin, and to keep other areas of the building tenable during fire emergencies. 9.10.8. & 9.10.9.

### Structural Fire Protection

- Protecting the structural members to prevent the premature collapse of a building, in order to give the occupants time to escape, and to allow firefighters a chance to extinguish the fire before the damage becomes too extensive.

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## Types of Separations and Definitions

### Types of Separations

- Smoke-tight barrier (secondary suites)
- Fire-resistance Rating – suite to suite
- Fire separation
- Party wall
- Fire wall

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## Types of Separations and Definitions

### Types of Separations

- Smoke-tight barrier (secondary suites)
- Fire-resistance Rating – suite to suite
- Fire separation
- Party wall
- Fire wall

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## Types of Separations and Definitions

### Definitions

- **Fire Resistance Rating** – means the time in minutes or hours that a material or assembly of materials will withstand the passage of flame and the transmission of heat when exposed
- **Fire Separation** – means a construction assembly that acts as a barrier against the spread of fire.
- **Fire Compartment** – means an enclosed space in a building that is separated from all other parts of the building by enclosing construction providing a fire separation having a required fire-resistance rating.
- **Party wall** - means a wall jointly owned and jointly used by 2 parties under easement agreement or by right in law, and erected at or upon a line separating 2 parcels of land each of which is, or capable of being, a separate real-estate entity.

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## Separation of Residential Suites

### 45 Minute Fire-Resistance Rating

Sentence 9.10.9.14.(1) of the 2010 MBC explains

Suites in residential occupancies shall be separated from adjacent rooms and suites by a fire separation having a fire resistance rating of not less than 45 min.

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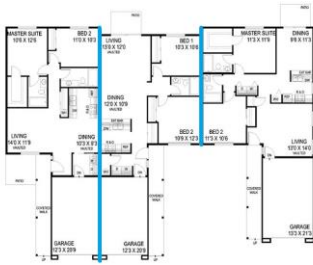
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## Separation of Residential Suites

### 45 Minute Fire-Resistance Rating



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## Separation of Residential Suites

### 1 Hour Fire-Resistance Rating

Sentence 9.10.9.14.(3) explains

Dwelling units that contain 2 or more storeys including basements shall be separated from the remainder of the building by a fire separation having a fire resistance rating not less than 1 Hr.

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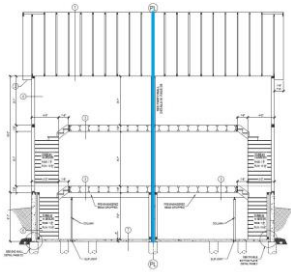
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### Separation of Residential Suites

1 Hour Fire-Resistance Rating



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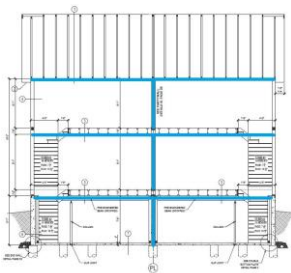
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### Separation of Residential Suites

1 Hour Fire-Resistance Rating



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### Separation of Residential Suites

1 Hour Fire-Resistance Rating



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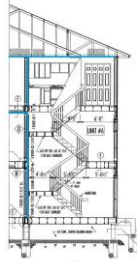
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## Separation of Residential Suites

1 Hour Fire-Resistance Rating



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## Separation of Residential Suites

### Party Wall

Sentence 9.10.11.2.(1) and (3) explains

- A party wall located on a property line of a building of residential occupancy containing two dwelling units (side by side) shall be constructed as a fire separation having not less than a 1 hr fire-resistance rating.
- The party wall shall provide continuous protection from the top of the footings to the underside of the roof deck.

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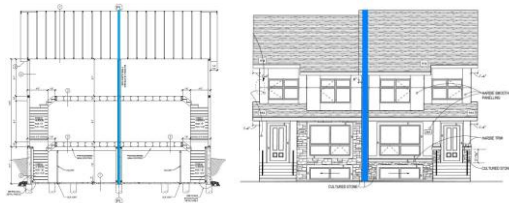
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## Separation of Residential Suites

### Party Wall



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## Separation of Residential Suites

### Fire-Resistance and Fire-Protection Ratings

#### Sentence 9.10.3.1.(1) states

Where a fire-resistance rating or a fire-protection rating is required in this Section for an element of a building, such rating shall be determined in conformance with the test methods described in Part 3, A-9.10.3.1. in Appendix A, or Appendix D.

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## Separation of Residential Suites

### Fire-Resistance and Fire-Protection Ratings

#### Sentence 9.10.3.1.(1) states

Where a fire-resistance rating or a fire-protection rating is required in this Section for an element of a building, such rating shall be determined in conformance with the test methods described in **Part 3, A-9.10.3.1. in Appendix A, or Appendix D.**

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## Continuity of Fire Separations

### Continuous Barrier

#### Sentences 9.10.9.2.(1) and (3) state

- Except as permitted in Article 9.10.9.3., a wall or floor assembly required to be a fire separation shall be constructed as a continuous barrier against the spread of fire and retard the passage of smoke.
- The continuity of a fire separation or smoke-tight barrier shall be maintained where it abuts another fire separation or smoke-tight barrier, a floor, a ceiling, a roof, or an exterior wall assembly.

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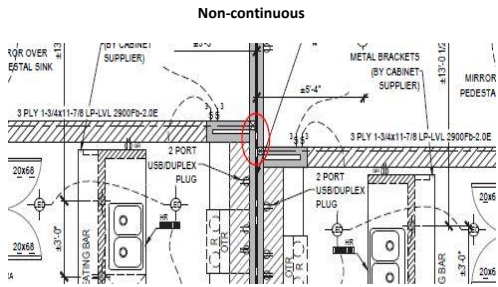
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### Continuity of Fire Separations



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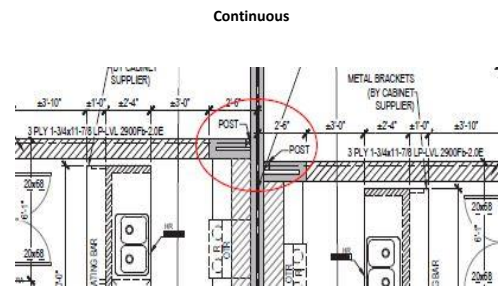
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### Continuity of Fire Separations



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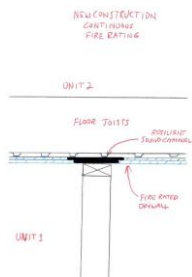
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### Continuity of Fire Separations



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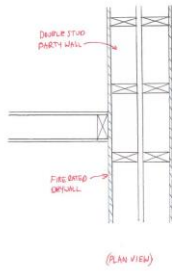
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### Continuity of Fire Separations



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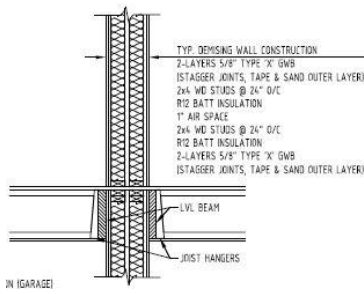
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### Continuity of Fire Separations



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### Continuity of Fire Separations



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## Continuity of Fire Separations




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## Continuity of Fire Separations

### Closures

- means a device or assembly for closing an opening through a fire separation or an exterior wall, such as a door, a shutter, wired glass or glass block, and includes all components such as hardware, closing devices, frames and anchors.

### Sentence 9.10.13.1.(1) explains

- openings in required fire separations shall be protected with a closure conforming to Table 9.10.13.1. and shall be installed in conformance with Chapters 2 to 14 of NFPA 80, "Fire Doors and Other Opening Protectives," unless otherwise specified herein.

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## Continuity of Fire Separations

### Closures

Table 9.10.13.1.  
Fire-Protection Ratings for Closures  
Forming Part of Sentence 9.10.13.1.(1)

Required Fire-Resistance Rating of Fire Separation	Minimum Fire-Protection Rating of Closure
30 or 45 min	20 min <sup>(1)</sup>
1 h	45 min <sup>(1)</sup>
1.5 h	1 h
2 h	1.5 h
3 h	2 h
4 h	3 h

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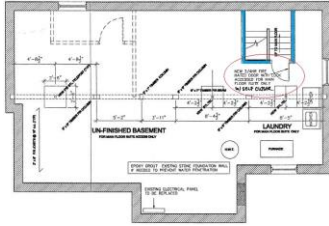
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### Continuity of Fire Separations

Closures



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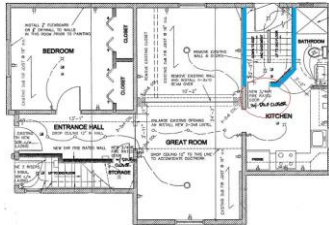
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### Continuity of Fire Separations

Closures



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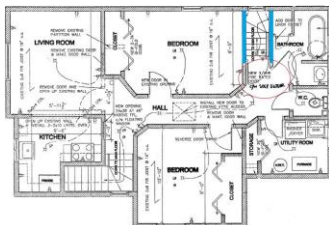
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### Continuity of Fire Separations

Closures



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## Exemption from Fire Alarm System Requirements

### Fire Alarm Exemption

Sentence 9.10.18.2.(1) of the 2010 MBC states

- A fire alarm is not required in a building containing not more than 4 dwelling units and no other occupancy.

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## Exemption from Fire Alarm System Requirements

### Portions of Buildings Considered as Separate Buildings

Sentence 9.10.18.6.(1) explains

- Where a vertical fire separation having a fire-resistance rating of not less than 1 Hr separates a portion of the building from the remainder of the building and there are no openings through the fire separation other than those for piping, tubing, wiring and conduit, the requirements for a fire alarm and detection systems may be applied to each portion so separated as if it were a separate building.

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## Exemption from Fire Alarm System Requirements



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## Penetration of Fire Separations

In Article 9.10.9.6., the following penetrations of Fire Separations shall be tightly fitted or fire stopped to maintain the integrity of the fire separation.

- Piping
- Tubing
- Ducts
- Chimneys
- Wiring
- Conduit
- Electrical outlet boxes
- Other similar service equipment

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## Penetration of Fire Separations

Each type of penetration requires specific measures to ensure the integrity of the fire separation is maintained such as:

- Noncombustible
- Fire stop
- Certain distance apart
- Combustible in some cases
- Not exceeding a certain diameter
- Fire dampers

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## Permitted Openings in Wall and Ceiling Membranes

Article 9.10.5.1. explains

A membrane forming part of an assembly required to have a fire-resistance rating shall not be pierced by openings into the assembly unless the assembly has been tested and rated for such openings. Permitted openings would include:

- Tightly fitted electrical boxes that are offset (staggered) within an assembly, and
- Openings leading to ducts within the ceiling space provided the ducts, the amount of openings and their protection conform to the requirements of Appendix D.

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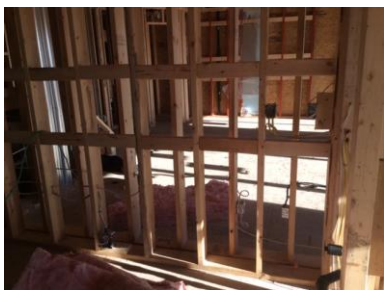
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## Permitted Openings in Wall and Ceiling Membranes



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## Examples of Fire Separations

### Determination of Ratings

Sentence 9.10.3.1.(1) states

- Where a fire-resistance rating or a fire-protection rating is required in this Section for an element of a building, such rating shall be determined in conformance with the test methods described in **Part 3, A-9.10.3.1. in Appendix A, or Appendix D.**

Sentence 3.1.7.1.(1) states

- The rating of a material, assembly of materials or a structural member that is required to have a fire-resistance rating, shall be determined on the basis of the results of tests conducted in conformance with CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials."

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## Examples of Fire Separations

### Determination of Ratings

Sentence 9.10.3.1.(1) states

- Where a fire-resistance rating or a fire-protection rating is required in this Section for an element of a building, such rating shall be determined in conformance with the test methods described in **Part 3, A-9.10.3.1. in Appendix A, or Appendix D.**

Sentence 3.1.7.1.(1) states

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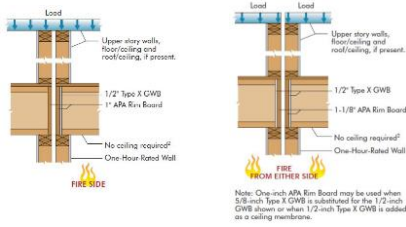
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### Examples of Fire Separations

#### CAN/ULC-S101 Compliant Assemblies




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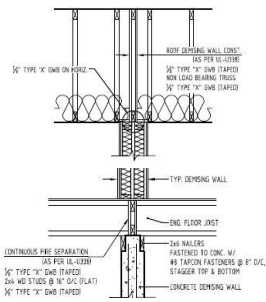
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### Examples of Fire Separations




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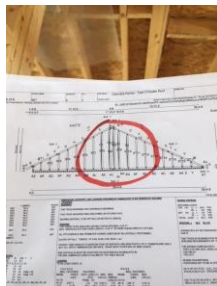
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### Examples of Fire Separations




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### Examples of Fire Separations




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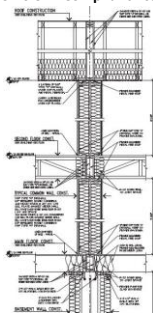
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### Examples of Fire Separations

A-9.10.3.1. Compliant Assembly




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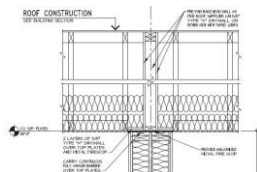
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### Examples of Fire Separations

Continuous Fire Separation

Wall Number	Description	Fire-Resistance Rating <sup>(1)</sup>		Typical Sound Transmission Class <sup>(2)</sup>
		Loadbearing	Non-Loadbearing	
W1	<ul style="list-style-type: none"> <li>• 38 mm x 89 mm studs spaced 400 mm or 600 mm o.c.</li> <li>• with or without absorptive material</li> <li>• 1 layer of gypsum board on each side</li> </ul>	1 h	1 h	36
W1A	<ul style="list-style-type: none"> <li>• 89 mm thick absorptive material<sup>(3)</sup></li> <li>• 15.9 mm Type X gypsum board<sup>(4)</sup></li> </ul>	1 h	1 h	36




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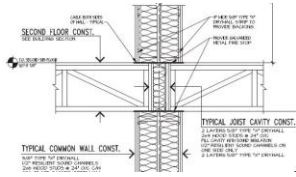
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## Examples of Fire Separations

W13	<ul style="list-style-type: none"> <li>two rows 38 mm x 89 mm studs, each spaced 402 mm or 600 mm o.c. on separate 38 mm x 89 mm plates set 25 mm apart</li> <li>with or without absorptive material</li> <li>1 layer of gypsum board on each side</li> </ul>				
W13a	<ul style="list-style-type: none"> <li>W13 with</li> <li>89 mm thick absorptive material on each side</li> <li>15.9 mm Type X gypsum board</li> </ul>		1 h	1 h	57




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## Examples of Fire Separations




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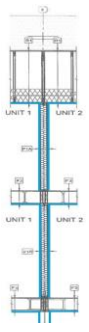
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## Examples of Fire Separations

Compartmentation




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### Examples of Fire Separations



- (M) VAULTED ROOF ASSEMBLY TO MEET AN EFFECTIVE R VALUE OF 48.3 M<sup>2</sup>/K CEILING MEMBRANE F R R = 60 MIN
- ASPHALT SHINGLES
- 1/2" ICE AND WATER SHIELD MEMBRANE
- 3/4" X 19" WOOD SHEATHING
- ENGINEERED APPROVED WOOD TRUSSES (REFER TO STRUCTURAL)
- FOAMGLASS FILL INSULATION - OWENINGS CORNING ECO TOUCH PINK FIBRE GLASS (THE UNRESTRICTED VENT AREA SHALL BE NOT LESS THAN 1 TO 300 OF THE INSULATED CEILING AREA)
- PROVIDE INSULATION STOPS AS REQUIRED
- 3 MIL POLY VAPOR BARRIER
- 2 LAYERS OF 5/8" TYPE X GYPSUM BOARD

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### Examples of Fire Separations



**Table D-3.3.1.C Time Assigned for Contribution of Steel or Light Steel Frame**

Description of Frame	Time Assigned to Frame, min
Wood studs 400 mm o.c. maximum	20
Wood studs 500 mm o.c. maximum	15
Steel studs 400 mm o.c. maximum	10
Wood top and/or floor joists 400 mm o.c. maximum	10
Open web steel joist floors and roofs with ceiling supports 400 mm o.c. maximum	10
Wood roof and wood floor truss assemblies 500 mm o.c. maximum	5

**Table D-3.3.1.B Fire-Resistance Rating for Ceiling Membranes**

Description of Membrane	Fire-Resistance Rating, min
15.8 mm Type X gypsum wallboard with 20 mm mineral wool batt insulation above wallboard	30
18 mm gypsum wallboard on metal lath	30
Double 14.8 mm Dimplex FR gypsum/plastic bonded	30
Double 12.7 mm Type X gypsum wallboard	45
25 mm gypsum wallboard on metal lath	60
32 mm gypsum wallboard on metal lath	90

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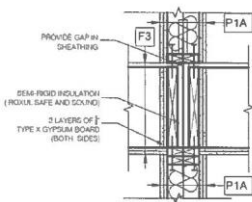
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### Examples of Fire Separations



- (M) 60 MIN. F R R FLOOR ASSEMBLY NBC-11112
- 3/4" X 19" WOOD SHEATHING
- ENGINEERED APPROVED JOIST @18" O/C
- M<sup>2</sup> OF ROCK WOOL SAFE AND SOUND INSULATION
- 2 LAYERS OF 5/8" TYPE X GYPSUM BOARD
- (M) 90 MIN. RATED DEMISING PARTITION (BETWEEN SUITES) NBC-11112
- TYPE X 5/8" GYPSUM BOARD
- RESILIENT METAL CHANNELS SPACED 16" O/C
- 2 X 6 WOOD STUDS
- 8 1/2" ROCK WOOL SAFE AND SOUND INSULATION
- 2 LAYERS OF TYPE X 5/8" GYPSUM BOARD

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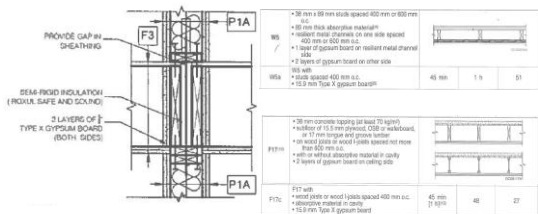
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### Examples of Fire Separations




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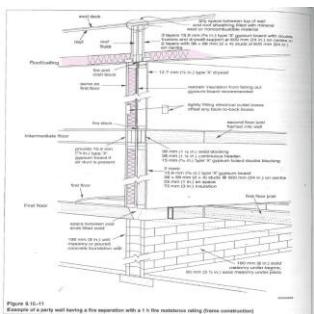
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### Examples of Fire Separations




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### Alternative Solutions

#### Alternative Solutions under Division C, Section 2.3

Documentation demonstrating the analytical methods and rationales to achieve at least the level of performance of prescriptive requirements of the Code. This documentation shall identify the following:

- Objective and functional statements (Division A, Part 2 & 3 respectively)
- Acceptable solutions (Part 3, Appendix A & D)
- Any assumptions, limiting or restricting factors
- Test procedures or engineering studies
- Building performance parameters that will support a Code compliance assessment

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## Alternative Solutions

### Alternative Solutions under Division C, Section 2.3

Documentation shall be in sufficient detail to convey the design intent and to support the validity, accuracy, relevance and precision of the Code analysis.

- Information about the qualifications, experience and background of the person(s) taking responsibility of the design.

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## On-Site Fire Separation Issues



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## On-Site Fire Separation Issues



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**On-Site Fire Separation Issues**



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**On-Site Fire Separation Issues**



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**On-Site Fire Separation Issues**



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### On-Site Fire Separation Issues



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### Questions?

Alan Mingaracal, C.E.T.  
(204) 986-6737  
[amingara@winnipeg.ca](mailto:amingara@winnipeg.ca)

Murray Rempel, C.E.T.  
(204) 986-3105  
[mrempel@winnipeg.ca](mailto:mrempel@winnipeg.ca)

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