Spatial Separations

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Agenda

Exposing Building Face
Limiting Distance
Unprotected Openings
Individual Opening Size & Spacing Limits
Navigating the Tables
Exterior Wall Construction
Exit Protection
Wall to Wall Exposure
Spatial Separations

*Exposing building face* means that part of the exterior wall of a *building* that faces one direction and is located between ground level and the ceiling of its top *storey* or, where the *building* is divided into *fire compartments*, the exterior wall of a *fire compartment* that faces one direction.

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*Fire compartment* means an enclosed space in a *building*,

(a) that is separated from all other parts of the building by enclosing construction that provides a *fire separation*, and

(b) that may be required to have a *fire-resistance rating*. 
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3.2.3.2. Area of Exposing Building Face

(1) Except as permitted by Sentences (2), and (3), the area of an *exposing building face* shall be calculated as the total area of exterior wall facing in one direction on any side of a *building* measured from the finished ground level to the uppermost ceiling.

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• This means that it doesn’t matter how many jogs there are in your wall, or how far back a portion is recessed, the exposing building face is calculated as though it were a continuous flat surface.
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(2) If a building is divided by fire separations into fire compartments, the area of exposing building face is permitted to be calculated for each fire compartment provided the fire separations have a fire-resistance rating not less than 45 min.
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• Generally, floor assemblies must be fire separations with at least a 45 minute fire resistance rating, so ....

• In most cases, the exposing building face can be calculated separately for each storey

• For apartment buildings, the exposing building face will be by apartment

• Exit enclosures will be fire compartments

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(3) In a building that contains an interconnected floor space, the area of the exposing building face for the interconnected floor space is permitted to be determined by considering each storey as a separate fire compartment notwithstanding openings through the floor assemblies.
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• Although the wordings are different, this holds true for Subsections 9.10.14. and 9.10.15. as well.

• So far we have talked about how you measure the exposing building face. Now we will talk about how you measure to it.

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*Limiting distance* means the distance from an *exposing building face* to a property line, to the centre line of a *street*, lane or public thoroughfare or to an imaginary line between two *buildings* or *fire compartments* on the same property, measured at right angles to the *exposing building face*. 
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• There can be more than one limiting distance for an exposing building face depending on what requirement you looking at, and what part of the Code you are using.

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3.2.3.1.(3) For the purpose of determining the type of construction and cladding and the fire-resistance rating of an exterior wall,

(a) the exposing building face shall be taken as the projection of the exterior wall onto a vertical plane located so that no portion of the exterior wall of the building or of a fire compartment, . . . is between the vertical plane and the line to which the limiting distance is measured,
3.2.3.1.(4) For the purpose of determining the actual percentage of unprotected openings permitted in an exterior wall, the location of the exposing building face is permitted to be taken at a vertical plane located so that there are no unprotected openings between the vertical plane and the line to which the limiting distance is measured.
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• In Article 9.10.14.2., you are permitted to determine the wall construction requirements for various sections of the wall based on their respective limiting distances

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(3) For the purpose of using Table 9.10.14.5. to determine the required type of construction, cladding and fire-resistance rating for an irregularly-shaped or skewed exterior wall,

(a) the exposing building face is permitted to be divided into any number of portions and the fire-resistance rating, type of cladding and percentage of unprotected openings limitations is permitted to be determined individually for each portion based on the limiting distance for each portion so divided,
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(b) the *exposing building face* shall be taken as the projection of the exterior wall onto a vertical plane located so that no portion of the exterior wall of the *building* is between the vertical plane and the line to which the *limiting distance* is established in Clause (a), and

(c) for the purpose of determining the actual area of *unprotected openings* permitted in an exterior wall, the *unprotected openings* shall be projected onto the vertical plane established in Clause (b).

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• Subsection 9.10.15. is an exception to Subsection 9.10.14., and only applies to residential building where there is no dwelling above another dwelling.

• It uses glazed area rather than unprotected openings, and has very few requirements for wall construction.

• In Article 9.10.15.2., you are permitted to determine the percentage of openings for various sections of the wall based on their respective limiting distances.
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9.10.15.2.(1) The area of an *exposing building face* shall be,

(a) taken as the exterior wall area facing in one direction on any side of a *building*, and

(b) calculated as, . . .

(iii) where Table 9.10.15.4. is used to determine maximum area of glazed openings, the area of any number of individual vertical portions of the wall measured from the finished ground level to the uppermost ceiling.

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9.10.15.4.(2) Where the limits on the area of glazed openings are determined for individual portions of the exterior wall, as described in Subclause 9.10.15.2.(1)(b)(iii) the maximum aggregate area of glazed openings for any portion shall not exceed the values in the row of Table 9.10.15.4. for the total area of the entire *exposing building face* based on the *limiting distance* of the individual portion.
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- Now that we know where the limiting distance is measured from on the building side, let’s look at the other end.
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Limiting distance means the distance from an exposing building face to a property line, to the centre line of a street, lane or public thoroughfare or to an imaginary line between two buildings or fire compartments on the same property, measured at right angles to the exposing building face.

3.2.3.1.(11) The required limiting distance for an exposing building face is permitted to be measured to a point beyond the property line that is not the centre line of a street, lane or public thoroughfare if,

(a) the owners of the properties on which the limiting distance is measured and the municipality enter into an agreement in which such owners agree that,

(i) each owner covenants that, for the benefit of land owned by the other covenantors, the owner will not construct a building on his or her property unless the limiting distance for exposing building faces in respect of the proposed construction is measured in accordance with the agreement,

(ii) the covenants contained in the agreement are intended to run with the lands, and the agreement shall be binding on the parties and their respective heirs, executors, administrators, successors and assigns,

(iii) the agreement shall not be amended or deleted from title without the consent of the municipality, and

(iv) they will comply with such other conditions as the municipality considers necessary, including indemnification of the municipality by the other parties, and

(b) the agreement referred to in Clause (a) is registered against the title of the properties to which it applies.

(12) Where an agreement referred to in Sentence (11) is registered against the title of a property, the limiting distance for exposing building faces shall be measured to the point referred to in the agreement.
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• There is an additional provision in Sentence 3.2.3.1.(8) requiring that the limiting distance be doubled for unsprinklered buildings where “. . . firefighting facilities cannot reach it within 10 minutes of the alarm being received . . .”

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• The equivalent provisions in Articles 9.10.14.3. and 9.10.15.3. start with “Where there is no fire department or where the fire department is not organized, trained and equipped to meet the needs of the community . . .”
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*Unprotected opening* means, when applied to an *exposing building face*,

(a) a doorway, window or opening, other than one equipped with a closure having the required *fire-protection rating*, or

(b) any part of a wall forming part of the *exposing building face* that has a *fire-resistance rating* less than required for the *exposing building face*.

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- The unprotected opening area of a window or door that does not have an appropriately rated closure is its rough opening area.

- Any portion of an exterior wall that doesn’t have the required fire resistance rating is an unprotected opening.
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• Sentence 3.2.3.1.(9) allows for assemblies that have been tested to the standard and meet everything but the temperature rise limits on the non-fire side.

• If you use such an assembly, you have to increase the area of unprotected openings to include a portion of that wall area based on the formula provided.

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• An opening can be protected by providing it with a closure having a fire protection rating appropriate for the fire resistance rating of the wall.

• A portion of a wall can be protected by constructing it with the required fire resistance rating.
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• In Subsection 9.10.15., “unprotected openings” is replaced by “glazed openings”, even if you choose to use 3.2.3. instead of 9.10.15.

• This means that you are measuring only the glass area of any window or door, not the rough opening.

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• Glass block and wired glass cannot be used as closures for limiting distances less than 1.2 m.

• For other walls in unsprinklered buildings, unprotected openings with glass block or wired glass can be included at half of their area.
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• There are additional restrictions on unprotected openings in unsprinklered buildings where the limiting distance is from 1.2 to 2 m.

• The maximum area of any individual opening is restricted to 0.35 to 1.88 $m^2$ depending on the limiting distance.

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• The minimum distance between the openings is:
  • 2 m horizontally for openings in the exposing building face
  • 2 m vertically for openings in the same room, space or storey
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• There are four spatial separation tables in 3.2.3. – two for unsprinklered buildings and two for sprinklered buildings. Within each of these, one table is for E, F1 and F2 occupancies and the other is for everything else.

• Since the unsprinklered building tables are more complex, we'll look at one of those.

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• For sprinklered building tables:
  • you don’t need the H/L ratio
  • there are fewer exposing building face rows
  • the maximum limiting distance needed for 100% permitted openings is 9 m or 15 m depending on the occupancy

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• Table 9.10.14.4. is a subset of Tables 3.2.3.1.B and 3.2.3.1.C

• Table 9.10.15.4. is the same as the top half of Table 9.10.14.4. except that it refers to gazed openings rather than unprotected openings
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Before we move on to the exposing building face construction requirements, remember that the permitted percentage of unprotected openings is the limit of the rough opening of all doors and windows without the appropriate fire protection rating, and the unrated portions of wall.
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- Article 3.2.3.7. lists several exceptions to the requirement for noncombustible cladding where greater than 10% opening are permitted, and where greater than 25% openings are permitted, as well as for mid-rise wood construction.

<table>
<thead>
<tr>
<th>Occupancy Classification of Buildings or Fire Compartments</th>
<th>Maximum Area of Unprotected Openings Permitted, % of Exposing Building Facade Area</th>
<th>Minimum Required Fire-Resistance Rating</th>
<th>Type of Construction Required</th>
<th>Type of Cladding Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A, B, C, D, or Group F, Division 3</td>
<td>0 to 10</td>
<td>1 h</td>
<td>Noncombustible</td>
<td>Noncombustible</td>
</tr>
<tr>
<td></td>
<td>&gt; 10 to 25</td>
<td>1 h</td>
<td>Combustible or Noncombustible</td>
<td>Noncombustible</td>
</tr>
<tr>
<td></td>
<td>&gt; 25 to 50</td>
<td>45 min</td>
<td>Combustible or Noncombustible</td>
<td>Noncombustible</td>
</tr>
<tr>
<td></td>
<td>&gt; 50 to &lt; 100</td>
<td>45 min</td>
<td>Combustible or Noncombustible</td>
<td>Combustible or Noncombustible</td>
</tr>
<tr>
<td>Group E, or Group F, Division 1 or 2</td>
<td>0 to 10</td>
<td>2 h</td>
<td>Noncombustible</td>
<td>Noncombustible</td>
</tr>
<tr>
<td></td>
<td>&gt; 10 to 25</td>
<td>2 h</td>
<td>Combustible or Noncombustible</td>
<td>Noncombustible</td>
</tr>
<tr>
<td></td>
<td>&gt; 25 to 50</td>
<td>1 h</td>
<td>Combustible or Noncombustible</td>
<td>Noncombustible</td>
</tr>
<tr>
<td></td>
<td>&gt; 50 to &lt; 100</td>
<td>1 h</td>
<td>Combustible or Noncombustible</td>
<td>Combustible or Noncombustible</td>
</tr>
</tbody>
</table>

Notes to Table 3.2.3.7:
(1) Cladding for buildings over 4 stories in building height within the scope of Article 32.2.4(A) or 32.2.5(A) or for life compartments in such buildings is required to be noncombustible.
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(3) Except as provided in Sentences (4) to (6), cladding for buildings or fire compartments where the maximum permitted area of unprotected openings is more than 10% of the exposing building face need not be noncombustible where the wall assembly complies with the requirements of Sentences 3.1.5.5.(1), (3) and (4) when tested in conformance with CAN/ULC-S134, “Fire Test of Exterior Wall Assemblies”.

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(4) Except as provided by Sentence (6), cladding for buildings or fire compartments where the maximum permitted area of unprotected openings is more than 10% but not more than 25% of the exposing building face need not be noncombustible where the wall assembly complies with Article 3.1.5.5.
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(5) Except as provided by Sentence (6), cladding for buildings or fire compartments where the maximum permitted area of unprotected openings is more than 25% but not more than 50% of the exposing building face need not be noncombustible where,

(a) the limiting distance is greater than 5 m,
(b) the building or fire compartment and all combustible attic or roof spaces are sprinklered,

(c) the cladding,

(i) conforms to Subsection 9.27.6., 9.27.7., 9.27.8., 9.27.9. or 9.27.10.,
(ii) is installed without furring members, or on furring not more than 25 mm thick, over gypsum sheathing at least 12.7 mm thick or over masonry, and
(iii) after conditioning in conformance with ASTM D2898, “Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing”, has a flame-spread rating not greater than 25 on the exterior face when tested in accordance with Sentence 3.1.12.1.(1),
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(d) the cladding,

(i) conforms to Subsection 9.27.12.,

(ii) is installed with or without furring members over gypsum sheathing at least 12.7 mm thick or over masonry,

(iii) has a flame-spread rating not greater than 25 when tested in accordance with Sentence 3.1.12.1.(2), and

(iv) does not exceed 2 mm in thickness exclusive of fasteners, joints and local reinforcements, or

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(e) the wall assembly complies with Article 3.1.5.5.
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(6) Subject to Sentence (7), cladding for buildings within the scope of Article 3.2.2.43A. or 3.2.2.50A. that exceed 4 storeys in building height or for fire compartments in such buildings where the maximum permitted area of unprotected openings is more than 10% of the exposing building face need not be noncombustible where the wall assembly complies with the requirements of Sentences 3.1.5.5.(3) and (4) when tested in accordance with CAN/ULC-S134, "Fire Test of Exterior Wall Assemblies".

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(7) A wall assembly described in Sentence (6) that includes combustible cladding of fire-retardant treated wood shall be tested for fire exposure after the cladding has been conditioned in conformance with ASTM D2898, "Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing".
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9.10.14.5.(2) Cladding on exposing building faces and exterior walls located above exposing building faces need not conform to the type of cladding required by Table 9.10.14.5. where,

(a) the exposing building face is constructed with no unprotected openings,

(b) the limiting distance is not less than 0.6 m, and
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(c) the cladding,

(i) conforms to Subsection 9.27.12.,
(ii) is installed without furring members over not less than 12.7 mm thick gypsum sheathing or over masonry,
(iii) has a flame-spread rating not more than 25 when tested in accordance with Sentence 3.1.12.1.(2), and
(iv) is not more than 2 mm in thickness exclusive of fasteners, joints and local reinforcements.

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(3) Except as provided in Sentence (4), where a garage or accessory building serves a single dwelling unit and is detached from any building, the exposing building face,

(a) need not conform to the minimum required fire-resistance rating in Table 9.10.14.5., where the limiting distance is 0.6 m or more,
(b) shall have a fire-resistance rating of not less than 45 min where the limiting distance is less than 0.6 m, and
(c) need not conform to the type of cladding required in Table 9.10.14.5. regardless of the limiting distance.
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(4) The requirements for fire-resistance rating, type of construction and type of cladding need not apply to the exposing building faces of a dwelling unit and a detached garage or accessory building that face each other, where,

(a) the detached garage or accessory building serves a single dwelling unit,
(b) the detached garage or accessory building is located on the same property as that dwelling unit, and
(c) the dwelling unit served by the detached garage or accessory building is the only major occupancy on the property.

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9.10.15.5.(2) Sentence (1) does not apply where,

(a) the limiting distance is not less than 1.2 m,
(b) the limiting distance is less than 1.2 m but not less than 0.6 m, provided that the exposing building face has a fire-resistance rating of not less than 45 min, or
(c) the limiting distance is less than 0.6 m, provided that the exposing building face has a fire-resistance rating of not less than 45 min and is clad with noncombustible material.
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(3) Where the limiting distance is less than 0.6 m, cladding on the exposing building face and on exterior walls located above the exposing building face that enclose an attic or roof spaces need not be noncombustible, provided the cladding,

(a) conforms to Subsection 9.27.12.,
(b) is installed without furring members over not less than 12.7 mm thick gypsum sheathing or over masonry,
(c) has a flame-spread rating not more than 25 when tested in accordance with Sentence 3.1.12.1.(2), and
(d) is not more than 2 mm in thickness exclusive of fasteners, joints and local reinforcements.

Spatial Separations

(4) The requirements for fire-resistance rating, type of construction and type of cladding need not apply to the exposing building faces of a dwelling unit and a detached garage or accessory building that face each other, where,

(a) the detached garage or accessory building serves a single dwelling unit,
(b) the detached garage or accessory building is located on the same property as that dwelling unit, and
(c) the dwelling unit served by the detached garage or accessory building is the only major occupancy on the property.
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• The OBC requires similar protection between fire compartments in a single building as it requires between buildings.

• It also has specific provisions relating to exposure risk for both enclosed and unenclosed exit facilities.

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• The requirements for the protection of exits is found in Articles 3.2.3.13., 9.9.4.4., 9.9.4.5. and 9.9.4.6.
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- Where the wall of an exit enclosure meets another wall at less than 135°, and there is an opening in the exit enclosure wall and an opening in the other wall within an area bounded by 3 m sideways, 10 m down and 2 m up from the exit enclosure opening, then the opening(s) in one of the walls needs to be protected.
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- Where the wall of an exit enclosure meets another wall at less than 135°, and there is a door in the exit enclosure wall and an opening in the other wall within 3 m sideways, of the exit door, then the opening in the wall needs to be protected.
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• For an unenclosed exit stair or ramp, the protected area extends 3 m sideways, 10 m below and 5 m above the stair or ramp.

• This includes stairs and ramps from porches.
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• The requirements for the protection of fire compartments is found in Articles 3.2.3.14. and 9.10.12.3.

• Similar to exit protection, the trigger is walls of different fire compartments which are parallel or meet at an angle of less than 135°.

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• Sentence 3.2.3.14.(1) provides a formula to specify the distance between unprotected openings:

\[ D_o = 2D - [(\theta/90) \times D], \text{ but not less than 1 m} \]
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• The exterior walls within $D_o$ of the opening need to have a fire resistance rating equal to that to the wall separating the compartments.
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- You can ignore all of this if both compartments are sprinklered and aren’t separated by a firewall
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- The provisions of Article 9.10.12.3 are simpler.

- Unprotected openings in different fire compartments need to be at least 1.2 m apart.

- The walls within 1.2 m of the internal fire separation need to have a fire resistance rating equal to that of the fire separation

Questions?