

## Exterior Walls Meeting at an Angle (NBC Articles 3.2.3.14 and 9.10.12.3)



### Purpose

This advisory will explain the City of Regina's interpretation regarding Articles 3.2.3.14 and 9.10.12.3 from Division B of the National Building Code (NBC). This interpretation was established based on the wording of the Code Articles, the accompanying NBC Intent Statements, as well as consultation with the Province of Saskatchewan's Building and Technical Standards Branch.

Specifically, this advisory will demonstrate that the City of Regina interprets that an exterior wall, as discussed in these Articles, shall be considered as an *unprotected opening* when it does not have a *fire-resistance rating* equivalent to the interior fire separation. Examples will be provided to show how this interpretation impacts the application of these Articles.

### Article 3.2.3.14 – Wall Exposed to Another Wall

This Article is concerned with fire spreading in a building from one *fire compartment* to another when the exterior walls of these *fire compartments* are parallel to each other or are at an angle of less than 135°. In these situations of concern, a calculation to determine  $D_o$  is required, and Sentence (2) requires that the exterior walls within the distance  $D_o$  shall have a *fire-resistance rating* equivalent to that of the internal *fire separation* between the *fire compartments*. *Unprotected openings* are not allowed to be exposed to each other within this distance,  $D_o$ . This requirement is provided to reduce the risk of fire bypassing the internal *fire separation* and spreading between *fire compartments* more quickly than Code finds acceptable.

The City of Regina has the following interpretations for Article 3.2.3.14:

- 1) This Article is concerned with *unprotected openings* of *fire compartments* being exposed to each other within areas of concern, as described above. The NBC defines *unprotected openings* to include "any part of a wall forming part of an *exposing building face* that has a *fire-resistance rating* less than that required for the *exposing building face*."
  - a. **Important:** The City of Regina finds that Sentence (2) of this Article dictates that the required *fire-resistance rating* for these portions of the *exposing building faces* of concern shall be equivalent to the *fire-resistance rating* of the internal *fire separation* between the fire compartments. **Any wall within the calculated distance  $D_o$  that has a *fire-resistance rating* less than internal *fire separation* is considered an *unprotected opening* and shall not be exposed to an *unprotected opening* in the other *fire compartment* within the distance  $D_o$ .**
- 2) Rated *closures* in these walls of concern are permitted to have a *fire-protection rating* based on Table 3.1.8.4
  - a. Note that Article 3.2.3.5 is not being applied to these walls meeting at an angle. Since the internal *fire separation* would be permitted to have *closures* with *fire-protection ratings* based on Table 3.1.8.4, this same approach is used for the exterior walls of these *fire compartments* that are meeting at an angle.

- 3) Calculating  $D_o$  requires a designer to perform spatial calculations for the exterior walls of concern in the reverse manner compared to how spatial calculations are normally calculated. The question to be satisfied is, “Based on the planned wall construction, what limiting distance would be required for the wall to comply with the applicable spatial table?”. This calculation must be done for each wall of concern, and the greater of the limiting distances shall be used in the  $D_o$  calculation. Note that  $D_o$  shall not be less than 1 m.
- a) Some exceptions and clarifications in the Code are provided:
- General exception:** where both *fire compartments* are sprinklered, these rules do not apply (except for *firewalls*, as described below).
  - Firewall clarification:** *unprotected openings* of *fire compartments* on opposite sides of a *firewall* shall be protected as described in this Article (even if both *fire compartments* are sprinklered).
  - Unsprinklered fire compartment clarification:** These requirements also apply if any of the *fire compartments* are not protected by sprinklers.
  - Exit fire compartment clarification:** where a *fire compartment* is an *exit* enclosure, designers shall refer to Sentence 3.2.3.13.(1) for design requirements.
  - Noncombustible walkway exemption:** these rules do not apply to *walkways* of *noncombustible* construction where Sentence 3.2.3.19.(5) is satisfied.
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### 3.2.3.14. Wall Exposed to Another Wall

**1)** Except as required by Sentences (3) and 3.2.3.13.(1) or as permitted by Sentence 3.2.3.19.(4), if an *unprotected opening* in an exterior wall of a *fire compartment* is exposed to an *unprotected opening* in the exterior wall of another *fire compartment*, and the planes of the 2 walls are parallel or at an angle less than  $135^\circ$ , measured from the exterior of the *building*, the *unprotected openings* in the 2 *fire compartments* shall be separated by a distance not less than  $D_o$  where

$$D_o = 2D - \left( \frac{\theta}{90} \times D \right)$$

but in no case less than 1 m, and

$D$  = the greater required *limiting distance* for the *exposing building faces* of the 2 *fire compartments*, and

$\theta$  = the angle made by the intersecting planes of the *exposing building faces* of the 2 *fire compartments* (in the case where the exterior walls are parallel and face each other,  $\theta = 0^\circ$ ).

(See Note A-3.2.3.14.(1).)

**2)** The exterior wall of each *fire compartment* referred to in Sentence (1) within the distance,  $D_o$ , shall have a *fire-resistance rating* not less than that required for the interior vertical *fire separation* between the *fire compartment* and the remainder of the *building*.

**3)** Sentence (1) does not apply to *unprotected openings* of *fire compartments* within a *building* that is *sprinklered* throughout, but shall apply to

- unprotected openings* of *fire compartments* on opposite sides of a *firewall*, and
- exposure from *unprotected openings* of a *fire compartment* that is not protected by an automatic sprinkler system.

Figure 1: NBC, Division B, Article 3.2.3.14

### Article 9.10.12.3 – Exterior Walls Meeting at an Angle

This Article is also concerned with fire spreading in a building from one *fire compartment* to another when the exterior walls of these *fire compartments* are at angle of less than 135°. This Article has been simplified compared to Article 3.2.3.14, as a calculation is not required for determining the spacing between *unprotected openings*. Rather, the distance required between *unprotected openings* in these exterior walls is simply given as 1.2m

The City of Regina has the following interpretations for Article 9.10.12.3:

- 1) This Article is concerned with *unprotected openings* of *fire compartments* being exposed to each other within areas of concern, as described above. The NBC defines *unprotected openings* to include “any part of a wall forming part of an *exposing building face* that has a *fire-resistance rating* less than that required for the *exposing building face*.”
  - a. **Important:** The City of Regina finds that Sentence (2) of this Article dictates that the required *fire-resistance rating* for these portions of the *exposing building faces* of concern shall be equivalent to the *fire-resistance rating* of the internal *fire separation* between the fire compartments. **Any wall within the 1.2 m distance that has a *fire-resistance rating* less than internal *fire separation* is considered an *unprotected opening* and shall not be exposed to an *unprotected opening* in the other *fire compartment* within the 1.2m distance.**
- 2) Rated *closures* in these walls of concern are permitted to have a *fire-protection rating* based on Table 9.10.13.1
  - a. Note that Sentences 9.10.14.4.(2) is not being applied to these walls meeting at an angle. Since the internal *fire separation* would be permitted to have *closures* with *fire-protection ratings* based on Table 9.10.13.1, this same approach is used for the exterior walls of these *fire compartments* that are meeting at an angle.
- 3) Some exceptions and clarifications in the Code are provided:
  - a. **Exit fire compartment clarification:** where a *fire compartment* is an *exit* enclosure, designers shall refer to Article 9.9.4.5 for design requirements.
  - b. **Secondary suite clarification:** a similar approach is used for walls meeting at an angle that separates compartments in houses that have secondary suites. However, where secondary suites only require a smoke-tight separation of 12.7 mm gypsum board, the exterior walls are only required to be finished on the interior with 12.7 mm gypsum board.
    - i. In these cases, the City of Regina interprets that openings such as operable doors or windows shall not be permitted within 1.2m of each other where the openings are in different compartments.

### 9.10.12.3. Exterior Walls Meeting at an Angle

**1)** Except as provided in Article 9.9.4.5., where exterior walls of a *building* meet at an external angle of 135° or less, the horizontal distance from an *unprotected opening* in one exterior wall to an *unprotected opening* in the other exterior wall shall be not less than 1.2 m, where these openings are

- a) in different *fire compartments*, or
- b) in different *dwelling units*, ancillary spaces or common spaces in a house with a *secondary suite*.


**2)** Except as provided in Sentence (3), the exterior wall of each *fire compartment* referred to in Sentence (1) within the 1.2 m distance shall have a *fire-resistance rating* not less than that required for the interior vertical *fire separation* between the compartment and the remainder of the *building*.

**3)** Where interior walls between *dwelling units*, ancillary spaces or common spaces in a house with a *secondary suite* are not constructed as *fire separations*, the exterior wall of each *dwelling unit*, ancillary space or common space referred to in Sentence (1) within the 1.2 m distance shall be finished on the interior with not less than 12.7 mm thick gypsum board.

Figure 2: NBC, Division B, Article 9.10.12.3

### Examples

Below are some examples of how the requirements from Articles 3.2.3.14 and Article 9.10.12.3 can be satisfied. *Unprotected openings* that are beyond the extents of the rated exterior wall assemblies are not a concern, as they will be spaced further than required by these Articles. (Also note that for examples (b) and (c), if the wall being rated was less than 1.2 m long, then the rating would only need to extend for the length of the wall being rated).

 Rated Assembly

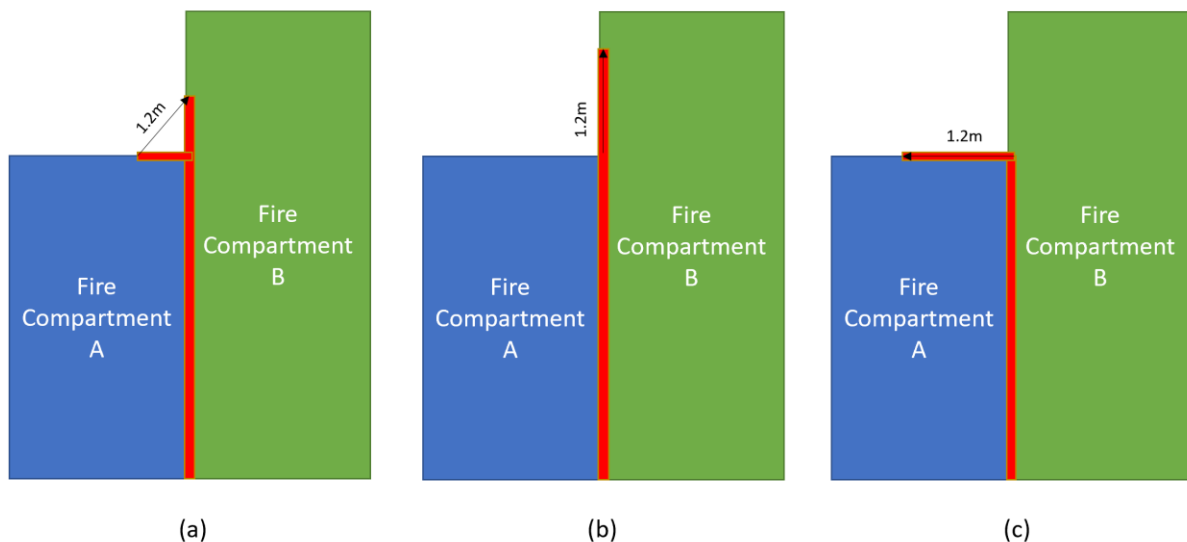
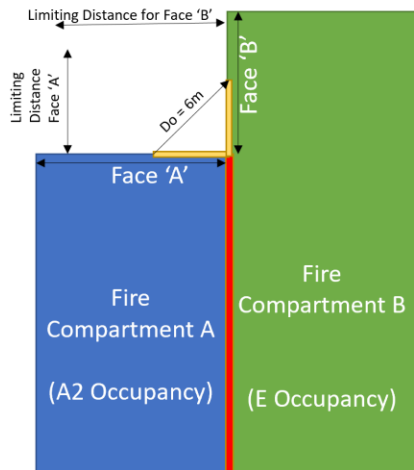


Figure 3: Article 9.10.12.3 - Any arrangement that ensures no unprotected openings are exposed to each other within 1.2m

For designs required to comply with Article 3.2.3.14, a similar set of compliance options are possible. However, rather than simply using 1.2m, the distance  $D_o$  must be calculated and used. An example is shown below.

- 2 Hour Interior Fire Separation
- Potential location of 2 hour rated exterior walls to meet  $D_o$



| Given Information             |  |
|-------------------------------|--|
| Building Sprinklered?         | No   |
| Face 'A' Area                 | 10m <sup>2</sup> (ratio <3:1)              |
| Face 'A' Planned Construction | No FRR<br>C or NC Wall<br>C or NC Cladding |
| Face 'B' Area                 | 10m <sup>2</sup> (ratio <3:1)              |
| Face 'B' Planned Construction | No FRR<br>C or NC Wall<br>C or NC Cladding |
| Angle of Ext. Walls           | 90 degrees                                 |

| Calculated Information   |     |
|--|-----|
| Limiting Distance Required for Face 'A' for Planned Construction (Requires 100% UPO from Table 3.2.3.1.-B) | 5 m |
| Limiting Distance Required for Face 'B' for Planned Construction (Requires 100% UPO from Table 3.2.3.1.-C) | 6 m |
| $D_o$ (calculated using largest limiting distance from above, and 90 degrees for angle)                    | 6 m |

Figure 4: Article 3.2.3.14 -  $D_o$  calculation and rating exterior walls to meet the  $D_o$  minimum distance

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