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## Proposed Change 1831

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<b>Code Reference(s):</b>	<b>NBC20 Div.B 9.36.2.5. (first printing)</b>
Subject:	Building Envelope - General
Title:	Insulation of Masonry Fireplaces
Description:	This proposed change clarifies the requirements for insulation of masonry fireplaces.

This change could potentially affect the following topic areas:

- |  |   |
|--|---|
| <input type="checkbox"/> Division A                                | <input checked="" type="checkbox"/> Division B              |
| <input type="checkbox"/> Division C                                | <input checked="" type="checkbox"/> Design and Construction |
| <input type="checkbox"/> Building operations                       | <input checked="" type="checkbox"/> Housing                 |
| <input checked="" type="checkbox"/> Small Buildings                | <input type="checkbox"/> Large Buildings                    |
| <input type="checkbox"/> Fire Protection                           | <input type="checkbox"/> Occupant safety in use             |
| <input type="checkbox"/> Accessibility                             | <input type="checkbox"/> Structural Requirements            |
| <input checked="" type="checkbox"/> Building Envelope              | <input checked="" type="checkbox"/> Energy Efficiency       |
| <input type="checkbox"/> Heating, Ventilating and Air Conditioning | <input type="checkbox"/> Plumbing                           |
|  | <input type="checkbox"/> Construction and Demolition Sites  |

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### Problem

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Sentence 9.36.2.5.(3) of Division B of the National Building Code of Canada requires a conventional masonry fireplace to be insulated; however, the requirements are onerous, impractical to apply, and conflict with other applicable requirements for conventional masonry fireplaces.

There exists no authoritative literature (e.g., technical papers, guides or consensus-based standards) that details the design and construction of an insulated conventional masonry fireplace or that offers deemed compliance.

This situation results in difficulties for Code users when demonstrating and enforcement officials when determining compliance.

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### Justification

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The challenges associated with insulating a masonry fireplace include

- the inability to insulate conventional masonry fireplaces to Code without encountering conflicting requirements while still complying with other

- construction requirements related to fire safety,
- difficulties for authorities having jurisdiction when verifying the compliance of a prescribed design or construction,
- the absence of a prescriptive consensus standard to reference and the absence of comprehensive prescriptive details and descriptions within authoritative literature pertaining to insulating conventional masonry fireplaces, and
- the objective of Section 9.36. requirements to minimize heat loss through the building envelope.

Given these challenges, it is proposed that:

- masonry fireplaces be uninsulated (as they were in the past and currently are in practice), which would eliminate conflicts between Code requirements, facilitate compliance, and retain a demonstrated history of known performance,
- the current requirements for the minimum RSI value of a masonry fireplace remain unchanged, i.e., not less than 55% of that required by Tables 9.36.2.6.-A and -B except where trade-off options are used,
- the trade-off options be used
  - to reduce the prescribed minimum RSI value of a conventional masonry fireplace to a lower value that is representative of the RSI value of an uninsulated fireplace, and
  - to correspondingly increase the R-value of an adjacent element in the building envelope, thereby ensuring that heat loss through the building envelope remains unchanged from the current (insulated) requirements, and
- a minimum RSI value for a conventional masonry fireplace be introduced, facilitating trade-off options, equivalent to that offered by a triple-wythe clay brick masonry wall (290 mm). By using thermal resistance values from Table A-9.36.2.4.(1)-D, this minimum RSI value would be calculated to be  $290 \times 0.0007 = 0.203$  RSI (R-1.2).

Requiring that masonry fireplaces be uninsulated would avoid conflicts between Code requirements and would ensure that the requirements can be applied in practice without fire hazards. Keeping the current minimum RSI requirements would ensure there is no additional heat loss from the building envelope that would be caused by this proposed change.

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## PROPOSED CHANGE

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### NBC20 Div.B 9.36.2.5. (first printing)

#### [9.36.2.5.] 9.36.2.5. Continuity of Insulation

- [1] 1)** Except as provided in Sentences (2) to (10) and in Sentence 9.36.2.4.(3) regarding balcony and canopy slabs, and except for clearances around components required for fire safety reasons, interior *building* components that meet *building* envelope components and major structural members that partly penetrate the *building* envelope shall not break the continuity

of the insulation and shall not decrease the effective thermal resistance at their projected area to less than that required in Articles 9.36.2.6. and 9.36.2.8. (See Note A-9.36.2.5.(1).)

**[2] 2)** Where an interior wall, *foundation* wall, *firewall*, *party wall* or structural element penetrates an exterior wall or insulated roof or ceiling and breaks the continuity of the plane of insulation, the penetrating element shall be insulated

[a] a) on both of its sides, inward or outward from the *building* envelope, for a distance equal to 4 times its uninsulated thickness to an effective thermal resistance not less than that required for exterior walls as stated in Table 9.36.2.6.-A or 9.36.2.6.-B,

[b] b) within the plane of insulation of the penetrated element to an effective thermal resistance not less than 60% of that required for the penetrated element, or

[c] c) within itself to an effective thermal resistance not less than that required for the penetrated element.

(See Note A-9.36.2.5.(2).)

**[3] 3)** Where a masonry fireplace or flue penetrates an exterior wall and breaks the continuity of the plane of insulation, ~~the fireplace or flue shall be insulated within the plane of insulation of the wall or within itself to an effective thermal resistance not less than 55% of that required for the exterior wall as stated in Table 9.36.2.6.-A or 9.36.2.6.-B (See Note A-9.36.2.5.(3).)~~

[a] --) be uninsulated.

[b] --) be considered as an opaque *building* assembly, and

[c] --) except as provided in Sentence (4), have an effective thermal resistance not less than 55% of that required for the exterior wall as stated in Table 9.36.2.6.-A or 9.36.2.6.-B.

**[4] --)** For the purpose of demonstrating compliance using the trade-off options described in Article 9.36.2.11.,

[a] --) the effective thermal resistance required by Clause (3)(c) is permitted to be reduced in accordance with Sentence 9.36.2.11.(2), but need not comply with Sentence 9.36.2.11.(6), and

[b] --) the fireplace or flue shall be assigned an RSI value of 0.203 unless a higher effective thermal resistance is determined in accordance with Article 9.36.2.2.

**[5] 4)** Where an ornamentation or appendage penetrates an exterior wall and breaks the continuity of the plane of insulation, the penetrating element shall be insulated

[a] a) on both of its sides, inward or outward from the *building* envelope, for a distance equal to 4 times the insulated thickness of the exterior wall to an effective thermal resistance not less than that required for the wall as stated in Table 9.36.2.6.-A or 9.36.2.6.-B,

[b] b) within the plane of insulation of the wall to an effective thermal resistance not less than 55% of that required for the exterior wall,

or

[c] c) within the penetrating element to an effective thermal resistance not less than that required for the exterior wall.

**[6] 5)** Except as provided in Sentences (9) and (10), where two planes of insulation are separated by a *building* envelope assembly and cannot be physically joined, one of the planes of insulation shall be extended for a distance equal to at least 4 times the thickness of the assembly separating the two planes. (See Note A-9.36.2.5.(5).)

**[7] 6)** Except as provided in Sentence (7) and Article 9.36.2.11., where mechanical, plumbing or electrical system components, such as pipes, ducts, conduits, cabinets, chases, panels or recessed heaters, are placed within and parallel to a wall assembly required to be insulated, the effective thermal resistance of that wall at the projected area of the system component shall be not less than that required by Tables 9.36.2.6.-A, 9.36.2.6.-B, 9.36.2.8.-A and 9.36.2.8.-B (See Note A-9.36.2.5.(6).)

**[8] 7)** The effective thermal resistance of a wall at the projected areas of plumbing and electrical system components, such as plumbing vent pipes, conduits, and electrical outlet and switch boxes, need not comply with Sentence (6), provided

[a] a) the effective thermal resistance at the projected area of the system component is not less than 60% of that required in Articles 9.36.2.6. and 9.36.2.8., and

[b] b) the insulation is continuous on the cold side behind the system component.

**[9] 8)** Except as permitted by Article 9.36.2.11., where mechanical ducts, plumbing pipes, conduits for electrical services or communication cables are placed within the insulated portion of a floor or ceiling assembly, the effective thermal resistance of the assembly at the projected area of the ducts, pipes, conduits or cables shall be not less than  $2.78 (m^2 \times K)/W$ .

**[10] 9)** Joints and junctions between walls and other *building* envelope components shall be insulated in a manner that provides an effective thermal resistance that is no less than the lower of the minimum values required for the respective adjoining components. (See Note A-9.36.2.5.(9).)

**[11] 10)** Sentence (1) does not apply where the continuity of the insulation is interrupted

[a] a) between the insulation in the *foundation* wall and that of the floor slab,

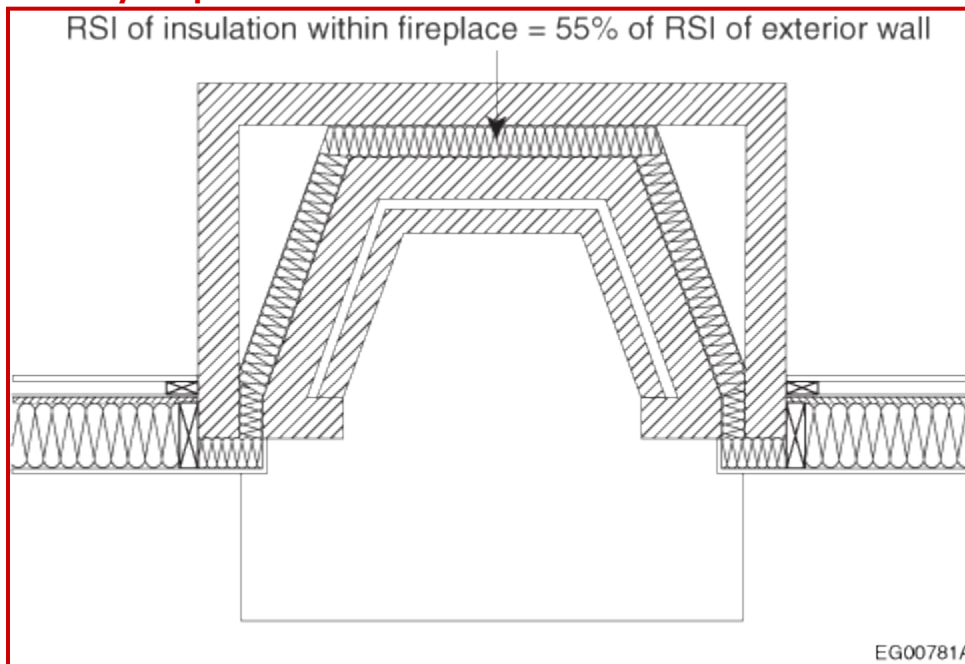
[b] b) by an integral perimeter footing of a slab-on-grade (see Sentences 9.25.2.3.(5) and 9.36.2.8.(8)), or

[c] c) at the horizontal portion of a *foundation* wall that supports masonry veneer and is insulated on the exterior.

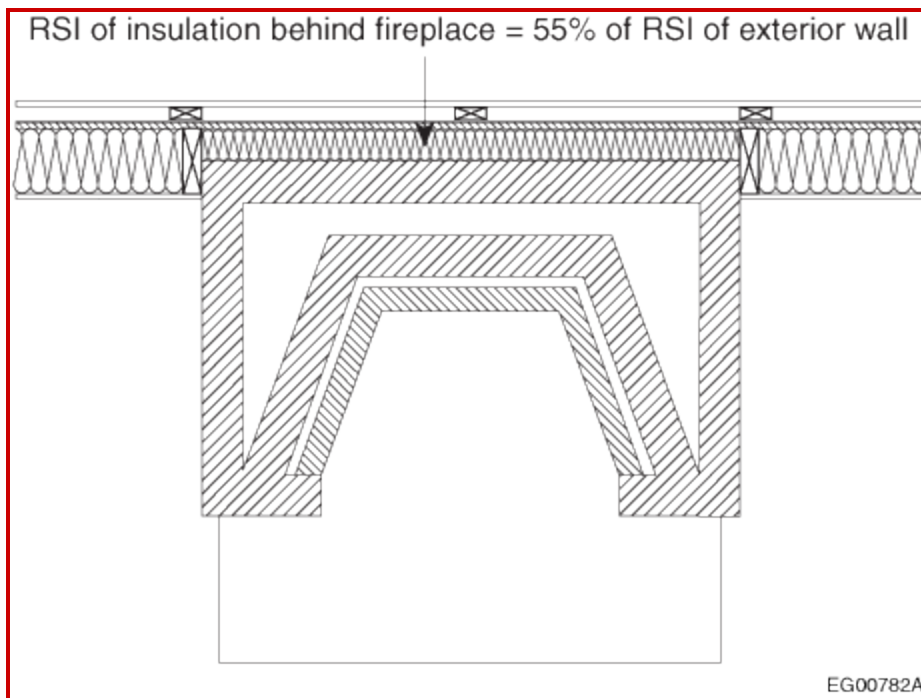
**Note A-9.36.2.5.(3) - Insulation of Masonry Fireplaces.**

The two insulation options for masonry fireplaces and flues presented in Sentence 9.36.2.5.(3) are consistent with those presented in Sentences 9.36.2.5.(2) and (4) with the exception of the option to insulate the sides of the penetrating element to 4 times the thickness of the penetrated wall, which would not be an energy-efficient option in cases where the penetration by the fireplace or flue is several feet wide. Figures A-9.36.2.5.(3)-A and A-9.36.2.5.(3)-B illustrate the options for achieving a continuously insulated exterior wall where it is penetrated by a masonry fireplace or flue.

**Figure [A-9.36.2.5.(3)-A] A-9.36.2.5.(3)-A  
Masonry fireplace insulated within itself**



**Figure [A-9.36.2.5.(3)-B] A-9.36.2.5.(3)-B  
Masonry fireplace insulated within plane of insulation of exterior wall**



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## Impact analysis

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This proposed change is not expected to result in any additional costs to Code users. Also, it is not expected to result in increased energy consumption. It addresses potential fire hazards by permitting the construction of a masonry fireplace prescriptively, which is otherwise prohibited.

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## Enforcement implications

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This proposed change could be enforced by the existing Code enforcement infrastructure without requiring additional resources. The current provisions, however, are without authoritative prescribed solutions and means to deem compliance. This proposed change does not have enforcement implications beyond the practices required to enforce the existing Code provisions.

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## Who is affected

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Designers, engineers, architects, manufacturers, builders, specification writers and building officials.

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## OBJECTIVE-BASED ANALYSIS OF NEW OR CHANGED PROVISIONS

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### NBC20 Div.B 9.36.2.5. (first printing)

[\[9.36.2.5.\]](#) 9.36.2.5. ([\[1\]](#) 1) [F92-OE1.1]

[\[9.36.2.5.\]](#) 9.36.2.5. ([\[2\]](#) 2) [F92-OE1.1]

[\[9.36.2.5.\]](#) 9.36.2.5. ([\[3\]](#) 3) [F92,[F93](#)-OE1.1]

[\[9.36.2.5.\]](#) 9.36.2.5. ([\[5\]](#) 4) [F92-OE1.1]

[\[9.36.2.5.\]](#) 9.36.2.5. ([\[6\]](#) 5) [F92-OE1.1]

[\[9.36.2.5.\]](#) 9.36.2.5. ([\[7\]](#) 6) [F92-OE1.1]

[\[9.36.2.5.\]](#) 9.36.2.5. ([\[8\]](#) 7) [F92-OE1.1]

[\[9.36.2.5.\]](#) 9.36.2.5. ([\[9\]](#) 8) [F92-OE1.1]

[\[9.36.2.5.\]](#) 9.36.2.5. ([\[10\]](#) 9) [F92-OE1.1]

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