Proposed Change 1951

Code Reference(s):	**NBC20 Div.B 9.36.2.5. (first printing)**
Subject:	Building Envelope - General
Title:	Continuity of Insulation
Description:	This proposed change lowers the insulation requirements for the rough opening gap around windows and doors, excluding the sill.

This change could potentially affect the following topic areas:

- [ ] Division A
- [ ] Division C
- [ ] Building operations
- [x] Small Buildings
- [ ] Fire Protection
- [ ] Accessibility
- [x] Building Envelope
- [ ] Heating, Ventilating and Air Conditioning
- [x] Division B
- [x] Design and Construction
- [x] Housing
- [ ] Large Buildings
- [ ] Occupant safety in use
- [ ] Structural Requirements
- [x] Energy Efficiency
- [ ] Plumbing
- [ ] Construction and Demolition Sites

Problem

The energy efficiency requirements in Sentence 9.36.2.5.(9) of Division B of the National Building Code of Canada regarding the insulation in rough opening gaps of windows and doors, particularly the sills of windows and doors, may create water-drainage issues in the gap between the window or door unit and the framing.

Failure to maintain a dry and airtight environment will negatively impact the effectiveness of the insulation as well as the long-term performance of the building envelope. This may result in costly retrofits and discomfort to occupants.

Justification

The continuity of the air barrier and the provision of adequate drainage provides a greater impact on energy performance than does the amount of insulation or the effective thermal resistance (RSI) value of the assembly. Therefore, the gap between the window or door and the supporting structure should be drainable and the rough opening should have a sloped sill or back dam to facilitate water drainage to the exterior of the building envelope.

To facilitate positive drainage at the sill, this proposed change would permit a relaxation to the requirements regarding continuity of insulation and minimum effective thermal resistance for the rough opening gap around windows and doors.

PROPOSED CHANGE

[9.36.2.5.] 9.36.2.5. Continuity of Insulation

[1] 1) Except as provided in Sentences (2) to (11) ~~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, it 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).)

[4] 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.

[5] 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).)

[6] 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).)

[7] 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.

[8] 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 ($m^2 \times K)/W$.

[9] 9) Except as provided in Sentence (11), ~~J~~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).)

[10] 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.

[11] --) The rough opening gap around windows and doors, excluding the sill,

shall have an effective thermal resistance (RSI value) not less than 0.56 (m^2×K)/W. (See Note A-9.36.2.5.(11).)

Note A-9.36.2.5.(11) Proper Drainage of the Rough Opening Gap Around Windows, Doors and Sills.

Any solution employed to meet the effective thermal resistance and air barrier requirements for the rough opening gap around windows, doors and sills should ensure that proper drainage to the exterior is not compromised. Installing the insulation (where required) and the air barrier at the interior perimeter of the window or door will facilitate positive drainage at the sill. Any exterior sealing at the header and jambs should be considered part of the second plane of protection.

REVISED PROPOSED CHANGE FOLLOWING PUBLIC REVIEW

[9.36.2.5.] 9.36.2.5. Continuity of Insulation

Note A-9.36.2.5.(11) Proper Drainage of the Rough Opening Gap Around Windows, Doors and Sills.

Any solution employed to meet the effective thermal resistance and air barrier requirements for the rough opening gap around windows, doors and sills should ensure that proper drainage to the exterior is not compromised. Installing the insulation (where required) and the air barrier at the interior perimeter of the window or door will facilitate positive drainage back to the exterior at the sill. Requirements for the installation of windows, doors and skylights can be found in Article 9.7.6.1.~~Any exterior sealing at the header and jambs should be considered part of the second plane of protection.~~

Impact analysis

This proposed change is not expected to result in any additional costs or changes to current installation practices. Eliminating insulation at the sill does not have a significant or easily quantifiable impact on the overall energy performance of the building as a whole. A study done by the National Research Council Canada showed that the insulation of the rough opening gap around windows has a limited effect on the temperature differential as compared to the airtightness of the assembly.

For more information, see the following publication: "Window-wall interface details to evaluate the risk of condensation on box windows" by Maref, W.; Van Den Bossche, N.; Armstrong, M. M.; Lacasse, M. A.; Elmahdy, A. H.; Glazer, R. in 1st Central European Symposium on Building Physics (Cracow, Poland; September 13-15, 2010).

The proposed change to facilitate positive drainage at the sill will prevent the deterioration of the building envelope and facilitate the avoidance of costly retrofits.

Enforcement implications

This proposed change can be enforced by the existing infrastructure without additional resources.

Who is affected

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

OBJECTIVE-BASED ANALYSIS OF NEW OR CHANGED PROVISIONS

[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-OE1.1]

[9.36.2.5.] 9.36.2.5. ([4] 4) [F92-OE1.1]

[9.36.2.5.] 9.36.2.5. ([5] 5) [F92-OE1.1]

[9.36.2.5.] 9.36.2.5. ([6] 6) [F92-OE1.1]

[9.36.2.5.] 9.36.2.5. ([7] 7) [F92-OE1.1]

[9.36.2.5.] 9.36.2.5. ([8] 8) [F92-OE1.1]

[9.36.2.5.] 9.36.2.5. ([9] 9) [F92-OE1.1]

[9.36.2.5.] 9.36.2.5. ([10] 10) no attributions

[9.36.2.5.] -- ([11] --) [F92-OE1.1]

[9.36.2.5.] -- ([11] --) no attributions