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Proposed Change 1943

Code Reference(s):	**NECB25 Div.B 8.4.2.9.(2) (first printing)**
Subject:	Airtightness
Title:	Harmonizing the Standard for Whole Building Air Leakage Testing
Description:	This proposed change harmonizes the standard for whole building air leakage testing referenced in the prescriptive and modeling requirements in the NECB by only referring to ASTM E3158, the newer, more accurate and more reproducible testing procedure.
Related Code Change Request(s):	CCR 1989

This change could potentially affect the following topic areas:

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

Problem

Article 3.2.4.2. and Sentence 8.4.2.9.(2) of Division B of the National Energy Code of Canada for Buildings (NECB) were introduced in the 2020 edition to provide guidance on testing procedures and to specify the target performance value for whole building airtightness (i.e., the leakage rate of the air barrier system of the building).

Sentence 3.2.4.2.(1) references ASTM E3158, “Standard Test Method for Measuring the Air Leakage Rate of a Large or Multizone Building,” as the test standard to determine the normalized air leakage rate for whole building air leakage.

Sentence 8.4.2.9.(2) references ASTM E779, "Standard Test Method for Determining Air Leakage Rate by Fan Pressurization," as the test standard to determine the flow rate when it is used in the calculation of the normalized air leakage rate in the whole building energy model, as well as ASTM E3158 by referring to Article 3.2.4.2. and Sentence 3.2.4.2.(1).

Both ASTM E779 and ASTM E3158 are standards for whole building air leakage testing, but ASTM E779 is much older and is considered less accurate and reproducible than ASTM E3158.

Referencing two standards for the same purpose in the same Article may cause confusion for Code users and enforcement difficulties for authorities having jurisdiction (AHJs). It is important to ensure that the Code requirements are harmonized and reference the appropriate standard.

Justification

This proposed change would update the standard referenced in Article 8.4.2.9. from ASTM E779 to ASTM E3158. Referencing one sole standard for whole building air leakage testing would

a. provide the most current, accurate and industry-accepted test standard in Article 8.4.2.9., and
b. harmonize the Code requirements on air leakage testing for whole buildings.

PROPOSED CHANGE

[8.4.2.9.] 8.4.2.9. Air Leakage

[1] 2) The air leakage rate of the *building envelope* shall be adjusted using the following equation:

$$I_{AGW} = C \times I_{75Pa} \times \frac{S}{A_{AGW}}$$

where

I_{AGW} = adjusted air leakage rate of the *building envelope* at a typical operating pressure differential of 5 Pa and relative to the area of the above-ground walls, in $L/(s \times m^2)$,

C = $(5 \text{ Pa} / 75 \text{ Pa})^n$, where n = flow exponent, which shall be 0.60, if no whole *building* test result is available, or the calculated value, if whole *building* testing is carried out in accordance with Article 3.2.4.2. and a series of tests are conducted at different differential pressures,

I_{75Pa} = assumed or measured normalized air leakage rate of the *building envelope* at a pressure differential of 75 Pa, in $L/(s \times m^2)$, where the measured air leakage rate at a pressure differential of 75 Pa is calculated as $I_{75Pa} = Q/S$, where Q = volume of air flowing through the *building envelope* when subjected to a pressure differential of 75 Pa, in L/s, determined in accordance with ~~ASTM E779, "Standard Test Method for Determining Air Leakage Rate by Fan Pressurization",~~ASTM E3158, "Standard Test Method for Measuring the Air Leakage Rate of a Large or Multizone Building", following the criteria ~~as per~~stated in Sentence 3.2.4.2.(1), ~~in L/s,~~ and S = total area of the *building envelope*, ~~as per~~determined in accordance with Clause 3.2.4.2.(1)(c), in m^2, and

A_{AGW} = total area of above-ground walls, in m^2.

(See Note A-8.4.2.9.(2).)

Impact analysis

This proposed change would have no cost implications, as conducting a field test in accordance with either standard has the same overall cost. In fact, this proposed change might reduce the cost, as only one field test would need to be completed to meet the requirements of both Articles 3.2.4.2. and 8.4.2.9., rather than two different tests (ASTM E3158 and E779), one for each Article.

This proposed change would also reduce the potential for confusion in the industry resulting from the reference to two different standards in the NECB.

Enforcement implications

This proposed change could be enforced using existing infrastructure.

This proposed change would also simplify the demonstration of compliance with the NECB, since the results of one field test could be used to comply with both Articles 3.2.4.2. and 8.4.2.9.

Who is affected

Designers, engineers, architects, building officials, manufacturers and suppliers.

OBJECTIVE-BASED ANALYSIS OF NEW OR CHANGED PROVISIONS

[8.4.2.9.] 8.4.2.9. ([1] 2) [F99-OE1.1]