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## Proposed Change 1814

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<b>Code Reference(s):</b>	<b>NBC20 Div.B 9.36.6.2. (first printing)</b> <b>NBC20 Div.B 9.36.6.3. (first printing)</b> <b>NBC20 Div.B 9.36.6.4. (first printing)</b>
Subject:	Airtightness
Title:	Removing the NLA Airtightness Metric
Description:	This proposed change removes the normalized leakage area (NLA) metric for airtightness level determination.

This change could potentially affect the following topic areas:

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| <input type="checkbox"/> Division A                                | <input checked="" type="checkbox"/> Division B             |
| <input type="checkbox"/> Division C                                | <input type="checkbox"/> Design and Construction           |
| <input type="checkbox"/> Building operations                       | <input 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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The National Building Code of Canada (NBC) provides both the normalized leakage area at a reference pressure of 10 Pa ( $NLA_{10}$ ) and the normalized leakage rate at a reference pressure of 50 Pa ( $NLR_{50}$ ) as airtightness metrics. These metrics are provided with the intent to be used as a size-neutral option for small attached dwelling units.

Differing calculation methodologies for these two metrics have effectively limited the usefulness of  $NLA_{10}$ ; Code users are finding  $NLR_{50}$  more useful and more applicable for compliance and comparison. Because there is no true equivalency between the values provided for the three air leakage metrics (i.e., air changes per hour at a reference pressure of 50 Pa ( $ACH_{50}$ ),  $NLR_{50}$  and  $NLA_{10}$ ) in the requirements of the National Model Codes or other codes (e.g., NBC, Ontario Building Code) or various energy efficiency programs (e.g., ENERGY STAR for new homes), this difference in calculation methods has caused confusion for Code users in the application of calculated data. Effectively, this situation has resulted in the use of the  $NLA_{10}$  in the NBC being redundant.

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## Justification

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NLA<sub>10</sub> was introduced in the National Model Codes as one of the airtightness metrics to determine the airtightness level of building envelopes, because it visualizes the leakage area, which could be helpful from a communication perspective for an energy-efficiency requirement.

However, the NLA<sub>10</sub> metric does not differentiate the hole's size or shape and is not frequently used as it is not helpful to demonstrate compliance.

NLA<sub>10</sub> may be considered redundant when the other two airtightness metrics (i.e., ACH<sub>50</sub> and NLR<sub>50</sub>) are available. Therefore, this proposed change would remove the technically redundant NLA<sub>10</sub> metric from the NBC to avoid confusion about the interpretation of calculated data and to avoid unnecessary calculations for Code users.

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## PROPOSED CHANGE

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### NBC20 Div.B 9.36.6.2. (first printing)

#### **[9.36.6.2.] 9.36.6.2. Definitions**

- [1] 1)** For the purposes of this Subsection, the following terms shall have the meanings stated herein:
- [a] a) "zone" means a *conditioned space* or part thereof having a sufficiently large opening onto the location where the airtightness testing equipment is installed to provide enough airflow such that the entire zone is at the same pressure (see Note A-9.36.6.2.(1)(a)),
  - [b] b) "attached zone" means a zone whose boundary area is fully or partially in contact with an adjacent zone or zones (see Note A-9.36.6.2.(1)(b)),
  - [c] c) "ACH<sub>50</sub>" refers to the air changes per hour at a reference pressure of 50 Pa, **and**
  - ~~[d] d) "NLA<sub>10</sub>" refers to the normalized leakage area at a reference pressure of 10 Pa, and~~
  - [e] e) "NLR<sub>50</sub>" refers to the normalized leakage rate at a reference pressure of 50 Pa.

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### NBC20 Div.B 9.36.6.3. (first printing)

#### **[9.36.6.3.] 9.36.6.3. Determination of Airtightness**

- [1] 1)** Where airtightness is to be used as input to the energy model calculations, it shall be determined through a multi-point depressurization test carried out in accordance with CAN/CGSB-149.10, "Determination of the airtightness of building envelopes by the fan depressurization method", using the following parameters described therein:
- [a] a) as-operated, and

[b] b) guarded or unguarded.

**[2] 2)** ~~Except as provided in Sentence (3), w~~Where airtightness is to be used to demonstrate compliance with an Airtightness Level listed in Table 9.36.6.4.-A or 9.36.6.4.-B, it shall be determined through a single-point, two-point or multi-point depressurization test carried out in accordance with CAN/CGSB-149.10, "Determination of the airtightness of building envelopes by the fan depressurization method", using the following parameters described therein:

[a] a) as-operated, and

[b] b) guarded or unguarded, as applicable.

~~**[3] 3)** Determining  $NLA_{10}$  using a single-point test is not permitted.~~

### NBC20 Div.B 9.36.6.4. (first printing)

#### **[9.36.6.4.] 9.36.6.4. Determination of Airtightness Level**

- [1] 1)** Compliance with an Airtightness Level listed in Table 9.36.6.4.-A or 9.36.6.4.-B shall be determined in accordance with this Article using the value of  $ACH_{50}$ ,  ~~$NLA_{10}$~~  or  $NLR_{50}$  determined in accordance with Sentence 9.36.6.3.(2).
- [2] 2)** For the purposes of Sentences (3) and (4), the Airtightness Level for *buildings* or *dwelling units* containing more than one zone shall be the lowest Airtightness Level achieved for the zones therein. (See Note A-9.36.6.4.(2).)
- [3] 3)** Except as provided in Sentence (4), the Airtightness Level for single zones and attached zones shall be determined by complying with one of the corresponding airtightness values stipulated in Table 9.36.6.4.-A.

**Table ~~[9.36.6.4.-A]~~ 9.36.6.4.-A**

#### **Airtightness Levels for Single Zones and Attached Zones Determined Using the Guarded Method**

**Forming Part of Sentences 9.36.6.3.(2), [9.36.6.4.] 9.36.6.4.([1] 1) and ([3] 3), and 9.36.8.8.(1)**

Airtightness Levels	Airtightness Metrics		
	$ACH_{50}$	<del><math>NLA_{10}</math></del> $cm^2/m^2$	$NLR_{50}$ , L/s×m <sup>2</sup>
	Maximum Airtightness Values		
AL-1A	2.5	<del>1.20</del>	0.89
AL-2A	2.0	<del>0.96</del>	0.71
AL-3A	1.5	<del>0.72</del>	0.53
AL-4A	1.0	<del>0.48</del>	0.35
AL-5A	0.6	<del>0.29</del>	0.21

- [4] 4)** Where the unguarded method is used to determine the airtightness of an attached zone, the Airtightness Level shall be determined by complying with one of the corresponding airtightness values stipulated in Table 9.36.6.4.-B, provided the zone is tested independently.

**Table [9.36.6.4.-B] 9.36.6.4.-B**  
**Airtightness Levels for Attached Zones Determined Using the Unguarded Method**  
**Forming Part of Sentences 9.36.6.3.(2), [9.36.6.4.] 9.36.6.4.([1] 1) and ([4] 4), and 9.36.8.8.(1)**

Airtightness Levels	Airtightness Metrics		
	ACH <sub>50</sub>	<del>NLA<sub>10</sub>, cm<sup>3</sup>/m<sup>2</sup></del>	NLR <sub>50</sub> , L/s×m <sup>2</sup>
	Maximum Airtightness Values		
AL-1B	3.0	<del>1.92</del>	1.17
AL-2B	2.5	<del>1.6</del>	0.98
AL-3B	2.0	<del>1.28</del>	0.78
AL-4B	1.5	<del>0.96</del>	0.59
AL-5B	1.0	<del>0.64</del>	0.39
AL-6B	0.6	<del>0.38</del>	0.23

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## Impact analysis

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As the NLA<sub>10</sub> metric is not frequently used, this proposed change that removes it from the NBC would resolve the confusion caused by inconsistent calculations between differing airtightness metrics, as well as save the time and effort of calculating the NLA<sub>10</sub> value based on airtightness testing results.

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## Enforcement implications

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This proposed change could be enforced using existing Code enforcement infrastructure.

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## Who is affected

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Contractors, building owners, building officials and fire officials.

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## OBJECTIVE-BASED ANALYSIS OF NEW OR CHANGED PROVISIONS

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### NBC20 Div.B 9.36.6.2. (first printing)

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### NBC20 Div.B 9.36.6.3. (first printing)

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[\[9.36.6.3.\]](#) 9.36.6.3. ([\[1\]](#) 1) [F90-OE1.1]

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### NBC20 Div.B 9.36.6.4. (first printing)

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[\[9.36.6.4.\]](#) 9.36.6.4. ([\[2\]](#) 2) [F90,F91,F92,F93,F95,F100-OE1.1]

[\[9.36.6.4.\]](#) 9.36.6.4. ([\[3\]](#) 3) [F90,F91,F92,F93,F95,F100-OE1.1]

[\[9.36.6.4.\]](#) 9.36.6.4. ([\[4\]](#) 4) [F90,F91,F92,F93,F95,F100-OE1.1]