

APPENDIX A | BUILDING AIRTIGHTNESS TARGETS IN CODES AND STANDARDS ACROSS B.C.

This appendix outlines the current whole-building airtightness performance targets that may be applicable across British Columbia. **Refer to the *Illustrated Guide – Achieving Airtight Buildings*, published by BC Housing, for information and guidance on designing, constructing, and testing airtight buildings.**

An airtight building enclosure is an important part of a modern building. It can increase energy efficiency, improve durability, and allow greater control over occupant comfort and indoor air quality. Airtightness requirements in building codes and energy performance standards are becoming increasingly stringent across North America. Historically, many codes and standards have included only requirements for the air permeance of materials and components in building enclosure assemblies, but experience has shown that this approach is often insufficient to achieve higher levels of airtightness. More recent codes and standards have now begun to also include targets for whole-building airtightness as a way of achieving consistently higher levels of performance.

To achieve these targets, airtightness must be considered through all phases of a building project, from design through construction to completion. To confirm these targets have been met, whole-building airtightness testing is performed.

Codes and standards typically specify airtightness performance targets using either of two metrics: Air Changes per Hour (ACH) or Normalized Air Leakage Rate (in L/s per m² of building enclosure area). Both metrics are reported at a specific pressure difference, usually 50 or 75 Pascals (Pa). The following table summarizes the mandatory and non-mandatory target maximum air leakage rates found in the various codes and standards that may be applicable across British Columbia. It is important to note that the table does not represent all available codes and standards in North America and is not able to capture specific intricacies which may be relevant to a given project. For more information on specific testing requirements and performance targets, always refer directly to the referenced code or standard.

The following building code and energy performance standards are not listed in the following table and do not currently include whole building airtightness requirements or targets.

- BC Building Code Part 9.36 current base prescriptive air barrier requirements
- ASHRAE 90.1-2010 Energy Standard for Buildings Except Low-Rise Residential Buildings
- ASHRAE 189.1-2014 Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings

[Air Changes per Hour versus Air Leakage Rate](#) | Codes and standards may specify airtightness targets using an air change rate or an air leakage rate. While it is possible to convert from one airtightness metric to the other for a specific building, it is not possible to provide a single conversion factor that applies to all buildings. This is because the conversion is a function of the volume to enclosure area ratio which varies with building height, shape, etc.

Standard	Buildings Where Testing is Required	Mandatory Target?	Airtightness Performance Target	Referenced Test Standard
ASHRAE 90.1-2016	All (except low-rise residential) for possible compliance path	Yes ¹	2.0 L/s·m ² @ 75 Pa	ASTM E779, ASTM E1827
BC Building Code Energy Step Code (2017)	Part 9 Residential	Yes (except Step 1)	Varies ²	CAN/CGSB 149.10, ASTM E779, USACE
	Part 3 buildings	No ³	Max TEDI/EUI ⁴	ASTM E779, USACE
Vancouver Building By-Law (2014)	Part 9 Residential (1- & 2-family dwellings)	Yes ⁵	3.5 ACH ₅₀	None
Vancouver Green Building Policy for Rezonings (2017)	Near Zero Emission Buildings (Passive House)	No	0.6 ACH ₅₀ (if Passive House)	EN 13829 / ISO 9972
	Low Emission Green Buildings	No	2.0 L/s·m ² @ 75 Pa	ASTM E779 or equivalent
EnerGuide 15.1 (2015)	Part 9 Residential	No	None	CAN/CGSB 149.10-M86
Energy Star® Homes 12.6 (2015)	Part 9 Residential Attached	Yes	3.0 ACH ₅₀ or 1.32 L/s·m ² @ 50 Pa	CAN/CGSB 149.10-M86
	Part 9 Residential Detached	Yes	2.5 ACH ₅₀ or 0.93 L/s·m ² @ 50 Pa	CAN/CGSB 149.10-M86
Energy Star® MFHR 1.0 (2015)	Part 3 Residential (Suite)	Yes	1.5 L/s·m ² @ 50 Pa ⁶	ASTM E779 2010, ASTM E1827
IECC (2012)	Part 3 Commercial ^{7,8} for possible compliance path	Yes ¹	2.0 L/s·m ² @ 75 Pa	ASTM E779 or equivalent
	Part 9 Residential ⁹	Yes	3.0 ACH ₅₀	None
IGCC (2012)	All buildings	Yes	1.25 L/s·m ² at 75 Pa	None
LEED BD+C	Seeking Residential Air Infiltration Credit	Yes	Varies ¹⁰	None
	Seeking Environmental Tobacco Smoke Control Credit	Yes	1.17 L/s·m ² @ 50 Pa ⁶	None
Net Zero Energy	All (testing recommended)	No ¹¹	1.0 ACH ₅₀	None
Passive House	All	Yes	0.6 ACH ₅₀	EN 13829 / ISO 9972
R-2000 Standard (2012)	Part 9 Residential	Yes	1.5 ACH ₅₀ or 0.7 cm ² /m ² @ 10 Pa	CAN/CGSB 149.10-M86
PHIUS+ 2015	Non-combustible 5+ Storeys	Yes	0.4 L/s·m ² @ 50 Pa or 0.5 L/s·m ² @ 75 Pa	None
	All other buildings	Yes	0.25 L/s·m ² @ 50 Pa or 0.4 L/s·m ² @ 75 Pa	None

1. Further testing and remedial measures required to reduce air leakage when target is exceeded.
2. Targets based on the performance level (Step) and Climate Zone.
3. Measured airtightness to be reflected in energy model.
4. TEDI, Thermal Energy Demand Intensity; EUI, Energy Use Intensity (kWh/m² per year).
5. Training required when target is exceeded, remedial measures required to reduce air leakage if greater than 5.5 ACH₅₀.
6. Air leakage testing only required for a specific subset of individual units, not the entire building.
7. Commercial buildings under the IECC includes nearly all large buildings, including multi-unit residential buildings over 3 stories
8. Target applies only to ASHRAE/IECC Zones 4-8.
9. Target applies only to ASHRAE/IECC Zones 3-8.
10. Target varies based on Climate Zone and desired LEED points.
11. Voluntary target set on a case-by-case basis to meet net zero energy use.