LEED v4 BD+C: Homes and Multifamily

Canadian Alternative Compliance Paths (ACPs), Interpretations, and Tips

Updated: Feb 16, 2021

This document was prepared by CaGBC to assist in identifying Alternative Compliance Paths (ACPs), Interpretations, and tips that will assist Canadian projects pursuing LEED for Homes v4 certification. Except where noted, the credit language below matches guidance that has been formally published by USGBC for the following rating systems:

- **LEED v4 BD+C: Homes and Multifamily Lowrise:** Single-family homes and multi-family residential buildings of 1 to 3 stories. Projects 3 to 5 stories may choose the Homes rating system that corresponds to the ENERGY STAR program in which they are participating.
- **LEED v4 BD+C: Multifamily Midrise:** Multi-family residential buildings of 4 or more occupiable stories above grade. The building must have 50% or more residential space. These buildings may also use LEED BD+C: New Construction.

The ACPs and Interpretations outlined below replace the provisional ACPs and Interpretations that were previously made available to Canadian projects through CaGBC. All projects registered **after November 1st, 2019** must use the ACPs and Interpretations below and may not use the provisional rulings.

Certification Submittal

When submitting for certification, project teams should reference all ACPs and Interpretations (by name and addenda number) in the LEED for Homes workbook and Submittal Template, so certification reviewers are aware that these rulings have been applied. Project teams are strongly encouraged to use the LEED for Homes v4/v4.1 Canadian ACP Submittal Tool and include it with the certification submittal.

LEED v4.1 Projects

Unless or until further direction is provided by CaGBC or USGBC, all of the ACPs and Interpretations below can be applied as-is to projects using the LEED v4.1 Residential Single Family Homes Rating System, with the following exceptions:

- EA credit Annual Energy Use – the LEED points available in this credit have changed in LEED v4.1 Single Family, so the table in the ACP below is not accurate. LEED for Homes Provider QADs can use the LEED for Homes v4 / v4.1 Canadian ACP Submittal Tool (under EA tab) to convert EnerGuide performance to LEED v4.1 points.
- EA credit Active Solar-Ready Design – this credit is no longer available in the LEED v4.1 Residential Single Family Rating System.

Table of Credits

The following table outlines prerequisites and credits where alternative direction for Canadian projects is provided. Three types of direction are provided:

1) Alternative Compliance Paths (ACPs): These are approved pathways for compliance with credit or prerequisite requirements.
2) LEED Interpretations: These are official answers to formal technical inquiries about implementing LEED on a project.
3) Canadian Tips: Additional guidance for Canadian project teams, offered by the CaGBC.

Prerequisite or Credit	Type of Direction	Release Date
LTp: Floodplain Avoidance	ACP	October 14, 2019
SSc: Heat Island Reduction	Canadian Tip	February 2021
WEp: Water Metering	LEED Interpretation	October 5, 2018
EAp: Minimum Energy Performance / EAc: Annual Energy Use [Low-rise & single-family only]	ACP	October 14, 2019
EAp: Minimum Energy Performance / EAc: Annual Energy Use [Multifamily Midrise]	ACP	April 20, 2017
EAp: Minimum Energy Performance, Commissioning [Multifamily Midrise]	ACP	October 14, 2019
EAc: Annual Energy Use [Low-rise & single-family only]	ACP	October 14, 2019
EAc: Active Solar-Ready Design [Low-rise & single-family only]	ACP	October 14, 2019
EAc: HVAC Start Up Credentialing [Low-rise & single-family only]	ACP	October 14, 2019
EQp: Ventilation	ACP	October 14, 2019
EQp: Radon-resistant construction	LEED Interpretation	October 14, 2019
EQp: Compartmentalization	ACP	October 14, 2019
EQc: Balancing of Heating and Cooling System	Canadian Tip	February 2021

LT PREREQUISITE: Floodplain Avoidance

Alternative Compliance Path (100002324) **Publish Date: October 14, 2019**

Applies to:
LEED BD+C: Homes, Multifamily Midrise

The following language is added to the International Tips section:

For projects developed on land that lies within a flood hazard area, meet the requirements of ASCE 24-2014[1] and all the following:

1. Heating, cooling, and hot water equipment must be located above the 100-year flood plain height, in a serviceable location that meets the requirements of the manufacturer's installation instructions and any relevant building codes.
2. Ductwork – including ventilation supply, exhaust, outside air intakes, dryer vents, combustion venting, etc. – must be located above the 100-year flood plain height. If ductwork is needed below the 100-year flood plain height to satisfy code or other LEED requirements, ductwork length should be minimized as much as possible.
3. Electrical service box must be located above the 100-year flood plain height.
4. Any basement circuits must be limited to the basement only, to allow for power to be restored to the remainder of the building if the basement has been flooded.
5. Any electric service disconnect must be located above grade, to allow for easy disconnect of power in an emergency.
6. Any propane tanks in the home must be located above the 100-year flood plain height, or must be secured.
7. No carpet may be installed in levels of the home / building below the 100-year flood plain height.
8. Install backflow protection for any drainage piping below the level of the adjoining street. Drainage systems shall be designed such that backflow prevention devices are sufficient for expected surge of a 100-year storm.
9. All buildings and accessory structures (e.g. parking garages, storage sheds) must be anchored to resist flotation, collapse, and lateral movement.

Supporting resources

- National Flood Insurance Program
- Measures included in the list above were taken from a few sources, including the NFIP and the Alberta Building Code Bulletin "Disaster Recovery Program Flood Mitigation Measures for Homes Being Rebuilt".

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[1] The approved ACP was not meant to include this reference to ASCE 24-2014. CaGBC is working with USGBC to have this corrected.

SS CREDIT: Heat island reduction

Canadian Tip! **Publish Date: February 2021**

Applies to:
LEED BD+C: Homes, Multifamily Midrise

Tip for Canadian projects:

The credit language in the Rating System states "ENERGY STAR qualified roof products… or performance equivalent for projects outside the US."

Clarification: A product is deemed equivalent to an ENERGY STAR qualified roof if it meets the following performance requirements:

- Low Slope roofs must have an initial solar reflectance of ≥ 0.65
- Steep Slope roofs must have an initial solar reflectance of ≥ 0.25

Where "solar reflectance" is defined as the fraction of solar flux reflected by a surface expressed as a percent or within the range of 0.00 and 1.00.

Where "low slope roofs" are defined as surfaces with a slope of 2:12 inches or less, and "steep slope roofs" are defined as surfaces with a slope greater than 2:12 inches.

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WE PREREQUISITE: Water Metering

LEED Interpretation ID# 10482 **Publish Date: October 5, 2018**

Applies to:
LEED BD+C: Homes, Multifamily Midrise

Inquiry

Our LEED v4 Homes project is located in Canada. Our local water authority currently uses flat rate water billing, so billing is not based on water consumption. A whole-house water meter does not help meet the intent of Water Efficiency (WE) prerequisite Water Metering unless the homeowner is made aware of consumption habits and charged money for consumption. Installing a meter for compliance with the prerequisite would be a wasted cost; if our authority later changes policy and bills based on usage, the meter installed for our LEED certification will be replaced by a meter approved by the authority. To encourage market transformation without wasted costs, we propose meeting the prerequisite in the following way: contact the local water authority in writing to formally request an approved water meter, and request billing based on water consumption.

Ruling

The project is proposing an alternate approach to meet the intent of LEED v4 Homes Water Efficiency prerequisite Water Metering.

LEED v4 single-family homes projects located in regions with only flat rate billing may comply with this prerequisite in the following way: Contact the local water authority (or comparable utility / agency) in writing to formally request an approved water meter, and request billing based on water consumption instead of flat rate billing. The project team should use the letter template provided by USGBC/GBCI-Canada (below) to develop the written communication to the local water authority; the team may make minor adjustments to the template to better reflect local market conditions and environmental priorities.

If the agency is unwilling to provide an approved water meter, this LEED prerequisite is considered satisfied through the delivery of the notice. Project teams must confirm the response received from the local water authority in their LEED submission.

Project teams may consider installing automatic water shut off valves and leak detection systems to support effective water management and reduce consumption waste.

CaGBC's adaptation of the Letter template:

To [Local Water Authority, Utility or Agency]:

I am writing in regards to the billing structure for water services at [project name], which is pursuing green building certification under the LEED rating system developed by the U.S. Green Building

Council, and delivered in Canada by Green Business Certification Institute (GBCI)-Canada. LEED stands for Leadership in Energy and Environmental Design, and the rating system provides a framework to create healthy, efficient and cost-saving green buildings.

To support effective water management and ongoing efficiency efforts, I am writing to formally request that the utility provide and install a permanent, whole-house water meter and establish billing for the project based on water consumption instead of flat rate billing.

Water is among the world's most precious resources, and effective water management and monitoring of consumption is an essential strategy for meeting the United Nations Sustainable Development Goal #6, Ensure availability and sustainable management of water and sanitation for all. Accurate water consumption data provides residents served by your utility with the critical measured usage information we need to understand water consumption habits and minimize waste.

For these reasons, I request that [Local Utility Provider] install a water meter at [project name] that will be used to track water usage and establish consumption-based billing.

I look forward to hearing back from you.

Sincerely,
[Home owner or developer name]

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EA PREREQUISITE: Minimum Energy Performance

Alternative Compliance Path (100002326) Publish Date: October 14, 2019

Applies to:
LEED BD+C: Homes

Low-rise and single-family projects in Canada must meet all the following requirements:

1. Achieve an EnerGuide Rating of 80 or greater, a HERS Rating of 70 or lower, or at least 10% savings compared to the EnerGuide Version 15 Reference Home. Single-family homes with less than 800 ft^2 of conditioned floor area and multifamily buildings with an average dwelling unit size less than 1,200 ft^2 of conditioned floor area must demonstrate at least 5% savings compared to the EnerGuide Version 15 Reference Home.
2. At least one of the following appliances must be ENERGY STAR labeled and installed in each home / dwelling unit:
    a. Refrigerator
    b. Dishwasher
    c. Clothes washer

    Projects are exempt if none of these appliance types are installed.
3. Provide written confirmation that the EPA ENERGY STAR Certified Homes Version 3 Water Management System Builder Requirements were satisfied. Any elements that contradict local or provincial code are exempt.
4. Install insulation and fenestration that meets or exceeds the levels outlined in National Building Code 9.36, the ENERGY STAR for New Homes Canada 2012 Standard, the Novoclimat 2.0 program, or 2009 IECC. Installation must be verified by an energy rater using the ENERGY STAR Rater Field Checklist, Thermal Enclosure System section or an approved alternative thermal bypass inspection checklist. Insulation must be installed to meet the RESNET Grade I standard (or have continuous exterior foam). The following is a summary of Grade 1 installation requirements (please refer to the RESNET Standards or the Building America Solution Center for more information):

    Insulation must be installed according to manufacturer instructions. Insulation material uniformly fills each cavity side-to-side and top-to-bottom, without substantial gaps or voids around obstructions (such as blocking or bridging), and is installed and/or fitted tightly around wiring and other services in the cavity. Compression or incomplete fill amounts to 2% or less. Wall insulation shall be enclosed on all six sides and shall be in substantial contact with the sheathing material on at least one side (interior or exterior) of the cavity.
5. Perform heating and cooling system design calculations and install the system accordingly, including:
    a. Perform room-by-room design calculations using CSA F280, HRAI Digest / Manuals, ASHRAE Fundamentals, ACCA Manual J, or an equivalent.
    b. Select equipment properly sized to meet the loads using CSA F280, HRAI Digest / Manuals, ACCA Manual S, or an equivalent. Equipment shall not be oversized by more than 30% (cooling) or 40% (heating); see the EPA ENERGY STAR for Homes Version 3 HVAC Design Report for additional allowances.

c. Design ductwork (if applicable) to meet the loads using the HRAI Digest / Manuals, ACCA Manual D, or an equivalent.

6. Provide proof of proper refrigerant charge (if applicable). If a refrigerant charge test is not possible due to low outdoor ambient temperatures at the condenser (i.e. < 55°F, <12.8°C), the system must include a thermal expansion valve.
7. Forced air systems with at least 10 feet of ductwork: all duct runs must be fully ducted or fully enclosed with sheet metal (i.e. building cavities may not be used as ducts).
8. Forced air systems with at least 10 feet of ductwork: meet one of the following:
    a. Test at rough-in: total duct leakage must be ≤ 6 CFM25 per 100 ft^2 of conditioned floor area OR ≤ 60 CFM (or ≤ 4 CFM25 per 100 ft^2 of conditioned floor area OR ≤ 40 CFM if the system has fewer than 3 returns).
    b. Test at final: total duct leakage rate must be ≤ 12 CFM25 per 100 ft^2 of conditioned floor area OR ≤ 120 CFM (or ≤ 8 CFM25 per 100 ft^2 of conditioned floor area OR ≤ 80 CFM if the system has fewer than 3 returns).
    c. Meet the duct sealing requirements (Section 4.7.2.3) of the 2012 ENERGY STAR for New Homes Canada Standard, and have visual verification of duct sealing by a third-party rater. Heating and cooling system ducts shall be sealed as follows:
        i. seal all supply transverse joints, branch take-offs, branch supply joints and manufactured beaded joints on round perimeter pipes located on all floors.
        ii. for common return ducts, the more stringent of (1) or (2) shall apply: (1) the drop to the furnace and at least one horizontal metre of return duct(s) measured from the furnace/air handler connection must be sealed with tape or mastic approved for the application; or (2) within a framed or closed mechanical room, all the return ducts, including joist returns, must be sealed with tape or mastic approved for the application.
9. Forced air systems with at least 10 feet of ductwork: Have the Rater measure the external static pressure (IWC) at both the return side and supply side (see Section 5.2 of the ENERGY STAR for Homes version 3 Rater Field Checklist). *Note: this is only required to be done by Raters in cases where the contractor has already drilled the holes to test. Raters should not drill the holes.*
10. Bathroom and kitchen exhaust rates must be tested by a third-party (e.g. Green Rater, energy rater), and tested rate must meet or exceed the designed rates.
11. Whole-house ventilation rate must be tested by a third-party (e.g. Green Rater, energy rater), and the tested whole-house ventilation rate must be within +/- 15 CFM or +/-15% of designed rates. For ERV/HRV systems, this allowance is +/- 15 CFM or +/- 25% of designed rates.

Supporting resources:

- Basic information about Natural Resources Canada
- An overview of the software suite used to produce the EnerGuide score (known as Hot2000) is also available from NRCan.
- Information about the R-2000 program is available.

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EA PREREQUISITE: Minimum Energy Performance
EA CREDIT: Annual Energy Use

Alternative Compliance Path

Publish Date: June 24, 2014
Last updated: April 20, 2017

Applies to:
LEED BD+C: Multifamily Midrise

Relevant Requirement Language:

Option 1. Whole-building energy simulation

Demonstrate an improvement of 5% for new construction, 3% for major renovations, or 2% for core and shell projects in the proposed building performance rating compared with the baseline building performance rating. Calculate the baseline building performance according to ANSI/ASHRAE/IESNA Standard 90.1–2010, Appendix G, with errata (or a USGBC-approved equivalent standard for projects outside the U.S.), using a simulation model.

ACP:

Projects in Canada may instead demonstrate a percentage improvement in the proposed building performance rating compared with the baseline according to the National Energy Code for Buildings (NECB) 2011. The same percentage cost improvement in energy performance is required to meet the Prerequisite, and the same points for percentage cost improvement in energy performance are applicable for the Credit.

The following conditions (where applicable) must be met. Note that unless otherwise noted, CanQUEST (the Canadian energy modelling software based on eQUEST that performs NECB 2011 compliance runs) does not implement many of these conditions correctly and would require corresponding modifications to the Reference case.

1. **Comply with mandatory requirements of ASHRAE 90.1-2010**

   ASHRAE 90.1-2010 mandatory requirements must be met, in addition to the performance path limitations referenced in the NECB 2011 Sections 3.4.1.2, 5.4.1.2 and 6.4.1.2. In cases where ASHRAE and the NECBC reference requirements concerning the same item, the more stringent requirement shall be adhere to.

   The following exceptions apply:

   - ASHRAE 90.1-2010 mandatory items 6.4.3.9, 9.4.1.2b, 9.4.1.4, 9.4.1.5, 9.4.3

2. **Apply fenestration area convention similar to ASHRAE 90.1-2010**

   Maintain the same FWR (as defined by NECB, including doors) for the Reference as exists in the Proposed Design, up to the prescribed maximum. If the Proposed Design's FWR exceeds the prescribed FWR, scale down the fenestrations in the Reference case accordingly.

3. **Apply skylight area convention similar to ASHRAE 90.1-2010**

   Maintain the same SRR for the Reference as exists in the Proposed Design, up to the prescribed 5% maximum. If the Proposed Design's SRR exceeds 5%, scale down the skylights in the Reference case accordingly.

4. **Model proposed and reference outside air similar to ASHRAE 90.1-2010**
   Proposed and reference (baseline) outside air rates shall be modelled as per ASHRAE 90.1 – 2010 (G3.1.2.6).
5. **Apply ASHRAE kitchen exhaust demand ventilation requirements**
   Provide for the same demand ventilation requirements as described in ASHRAE Appendix G3.1.1.d.
6. **Apply ASHRAE's chiller heat recovery requirements**
   Provide for the same chiller heat recovery requirements as applies to ASHRAE.
7. **Apply supply air temperature reset controlled based on warmest zone**
   Reset the minimum supply air temperature to satisfy the cooling requirements of the warmest zone, as stipulated in NECB Section 5.2.8.8. Note that this control setting is already corrected in CanQUEST for the Reference case.
8. **Account for uninsulated structural penetrations if they exceed 2% of net wall area**
   The 2% allowance may be applied, but based on the net opaque wall area, not the entire building envelope area.
9. **Follow ASHRAE/LEED rules for renovations to existing buildings**
   Model existing components consistent with ASHRAE and LEED provisions.
10. **Account for all anticipated energy use in building**
    Fully account for all energy end-uses in the energy performance modelling.
11. **DES Systems are to be modeled according to Option 1, Path 1 or Option 1, Path 2 as indicated in the LEED v4 Reference Guide**
    The following exceptions apply:
    - Option 1, Path 1 - Do not apply ASHRAE 90.1-2010 requirements for purchased heating and cooling. Under this ACP, purchased heating and cooling (as applicable) are modeled as cost-neutral in the baseline and proposed case. Local rates for purchased heating (fossil fuel based) and cooling are used to establish the purchased heating and cooling costs. The energy model's scope accounts for only downstream equipment, plus purchased heating and cooling. NECB clause 8.4.3.6 does not apply for LEED projects.
    - Model baseline systems in accordance with NECB requirements, with DX coils replaced with chilled water coils if purchased cooling is present and fossil-fired furnaces replaced with hot water coils if purchased heating is present.
    - Option 1, Path 2: Do not apply ASHRAE 90.1-2010 requirements for baseline systems. Model baseline systems in accordance with NECB requirements for onsite generated equipment (i.e. assume building is not connected to a DES and the proposed building is modeled with a virtual plant according to LEED v4 Reference Guide requirements).

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EA PREREQUISITE: Minimum Energy Performance

Alternative Compliance Path (100002326) **Publish Date: October 14, 2019**

Applies to:
LEED BD+C: Multifamily Midrise

Relevant Requirement Language:

OPTION 2. Commissioning using Prescriptive Path

1. Reduced Heating and Cooling Distribution System Losses for In-unit HVAC

ACP:

Multifamily midrise projects in Canada with forced-air systems and at least 10 feet of ductwork may satisfy Option 2, Part 1. Reduce Heating and Cooling Distribution System Losses for In-unit HVAC by meeting one of the following:

1. Test at rough-in: total duct leakage must be ≤ 6 CFM25 per 100 ft2 of conditioned floor area OR ≤ 60 CFM (or ≤ 4 CFM25 per 100 ft2 of conditioned floor area OR ≤ 40 CFM if the system has fewer than 3 returns).
2. Test at final: total duct leakage rate must be ≤ 12 CFM25 per 100 ft2 of conditioned floor area OR ≤ 120 CFM (or ≤ 8 CFM25 per 100 ft2 of conditioned floor area OR ≤ 80 CFM if the system has fewer than 3 returns).
3. Meet the duct sealing requirements (Section 4.7.2.3) of the 2012 ENERGY STAR for New Homes Canada Standard, and have visual verification of duct sealing by a third-party rater. Heating and cooling system ducts shall be sealed as follows:
    a. seal all supply transverse joints, branch take-offs, branch supply joints and manufactured beaded joints on round perimeter pipes located on all floors.
    b. for common return ducts, the more stringent of (1) or (2) shall apply: (1) the drop to the furnace and at least one horizontal metre of return duct(s) measured from the furnace/air handler connection must be sealed with tape or mastic approved for the application; or (2) within a framed or closed mechanical room, all the return ducts, including joist returns, must be sealed with tape or mastic approved for the application.

The requirement in Option 2, Part 1 is automatically satisfied by installing only non-ducted systems, or forced-air systems with less than 10 feet of ductwork per dwelling unit. All the other requirements in Option 2 Commissioning Using Prescriptive Path, including Fundamental Commissioning of Central HVAC Systems, Construction Document Specifications, and Multifamily Midrise Thermal Enclosure Inspection Checklist, must be met as written in the published v4 credit language.

Supporting resources (include links to new standards or requirements referenced):

- The 2012 ENERGY STAR for New Homes Canada Standard

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EA CREDIT: Annual Energy Use

Alternative Compliance Path (100002326) Publish Date: October 14, 2019

Applies to:
LEED BD+C: Homes

For low-rise and single-family projects in Canada, achieve an EnerGuide rating of 80 or greater or demonstrate savings compared to the EnerGuide Version 15 Reference Home energy consumption (in gigajoules). LEED points are awarded according to tables EA-3 and EA-4 below.

AND

Earn 1 point for every 4% decrease in conditioned floor area compared to the reference home, as shown in Table EA-2 below. Buildings that are larger than the reference home lose 1 point for every 4% increase in conditioned floor area. For multi-family buildings, home size includes only in-unit space.

AND

Earn up to 1 point for lighting, according to Table EA-1 below.

AND

Earn up to 2 points for appliances. To receive credit for one type (e.g. refrigerator), every appliance of that type must meet the requirements.

- ENERGY STAR qualified refrigerator (1 point)
- ENERGY STAR qualified dishwasher (0.5 point)
- ENERGY STAR qualified clothes washer (0.5 point)

Projects cannot exceed the maximum number of points in the EA section.

Table EA-1: LEED points for reducing lighting power density

Watt / sq feet	Watts / sq meter	LEED pts
0.72	7.7	0.5
0.60	6.5	1

Table EA-2: Conditioned floor area of reference home

Bedrooms	1	2	3	4	5	Add'l
Floor area (sq feet)	1,000	1,600	2,200	2,800	3,400	+600 ft^2 per add'l bedroom
Floor area (sq meters)	93	148	204	260	315	+55.6 m^2 per add'l bedroom

Table EA-3: LEED points based on EnerGuide Rating performance

EnerGuide Rating	LEED points
80	5
80.5	6
81	7
81.5	8
82	9
82.5	10
83	11
83.5	12
84	13
84.5	14
85	15
85.5	16
86	17
86.5	18
87	19
88	20
89	21
90	22
91	23
93	24
97	25
100	26

Table EA-4: LEED points based on energy performance compared to the EnerGuide Version 15 Reference Home. A "small home" is defined as a single-family home with less than 800 ft^2 (74 m^2) of conditioned floor area or multifamily buildings with an average dwelling unit size of less than 1,200 ft^2 (110 m^2).

% savings over EnerGuide Reference Home	% savings over EnerGuide Reference Home (small homes)	LEED points
10%	5%	4
12%	6%	5
14%	7%	6
16%	8%	7
18%	9%	8
20%	10%	9
24%	13%	10
28%	16%	11
32%	19%	12
36%	22%	13
40%	25%	14
45%	29%	15
50%	33%	16
55%	37%	17
60%	41%	18
65%	45%	19
70%	50%	20
75%	55%	21
80%	60%	22
85%	70%	23
90%	80%	24
95%	90%	25
100%	100%	26

Supporting resources:

- Basic information about Natural Resources Canada
- A brief description of the EnerGuide label is available from the NRCan website.
- An overview of the software suite used to produce the EnerGuide score (known as Hot2000) is also available from NRCan.

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EA CREDIT: Active solar-ready design

Alternative Compliance Path (100002326) **Publish Date: October 14, 2019**

Applies to:
LEED BD+C: Homes

Projects in Canada may be awarded 1 point for meeting all requirements in the Natural Resources Canada (NRCan) Solar Ready Guidelines, Sections 1.1 through 6.1.

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EA CREDIT: HVAC Start-Up Credentialing

Alternative Compliance Path (100002326) Publish Date: October 14, 2019

Applies to:
LEED BD+C: Homes

Have all heating, cooling, and ventilation systems are installed or commissioned by an individual that holds either of the following designations from the Heating, Refrigeration, and Air Conditioning Institute of Canada (HRAI):

- HRAI Residential Air System Design Technician (RASDT) Designation
- HRAI Residential Hydronics Design Technician (RHDT) Designation

Supporting resources:

- A brief description of the HRAI designations is available and a description of the courses taught for these certifications is also online. The Designation is verifiable using the HRAI database of professionals.

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IEQ PREREQUISITE: Ventilation

Alternative Compliance Path (100002328) **Publish Date: October 14, 2019**

Applies to:
LEED BD+C: Homes, Multifamily Midrise

Projects in Canada may instead meet the following:

CASE 1. SINGLE FAMILY

Meet all the following requirements for local exhaust and outdoor air ventilation:

1. Local Exhaust
   - Design and install local exhaust systems in all bathrooms (including half-baths / powder rooms) and the kitchen to meet the requirements of National Building Code of Canada 2015 Section 9.32 or the local equivalent, whichever is more stringent. Sample requirements that relate to minimum intermittent local exhaust flow rates are shown in Table EQ-1 below.
   - Exhaust air to the outdoors. Do not route exhaust ducts to terminate in attics or interstitial spaces. Recirculating range hoods or recirculating over-the-range microwaves do not satisfy the kitchen exhaust requirements.
   - Use ENERGY STAR–labeled (or equivalent) bathroom exhaust fans in all bathrooms (including half-baths / powder rooms). Continuously operating bath fans must have a sound level that does not exceed one sone. An HRV or ERV can be used to exhaust single or multiple bathrooms if it has a fan efficiency and sensible heat-recovery efficiency (SRE) that meets the ENERGY STAR Technical Specifications for Residential Heat Recovery Ventilators and Energy-Recovery Ventilators (H/ERVs) Version 2.0.

ENERGY STAR Technical Specifications for H/ERVs, Version 2

SRE and Fan Efficacy Minimum Requirements

Minimum SRE at 32° F (0° C)	Minimum SRE at -13° F (-25° C)	Minimum Fan Efficacy with 32° F (0° C) supply temperature	
65%	60%	SRE < 75%	1.2 CFM/W (0.57 L/s/W)
		SRE ≥ 75%	0.8 CFM/W (0.38 L/s/W)

   - For exhaust hood systems capable of exhausting more than 400 cubic feet per minute (188 liters per second), provide makeup air at a rate approximately equal to the exhaust air rate. Makeup air systems must have a means of closure and be automatically controlled to start and operate simultaneously with the exhaust system.
   - Bathroom and kitchen exhaust rates must be tested by a third party (e.g. Green Rater, energy rater), and tested rate must meet or exceed the designed rates.

2. Whole House Mechanical Ventilation
   - Design and install a whole-house mechanical ventilation (e.g. principal ventilation) system in accordance with National Building Code Canada 2015 Section 9.32[2] or CAN/CSA F326 (R2014) *Residential Mechanical Ventilation Systems*, or a local equivalent, whichever is more stringent. Continuous whole house ventilation fans must be rated for sound at a maximum of one sone. Remote-mounted fans (including, for example, ERVs & HRVs) are exempt from the sound requirement. ~~Simplified minimum air-flow requirements are shown in Table EQ-2.~~[3]
   - Exhaust fans that serve as the principal ventilation system must be designed to run continuously, and the dedicated control switch for the exhaust fan must (a) have 2 settings (on and off), (b) be located where it will be accessible for the purposes of servicing the exhaust fan but not likely to be turned off inadvertently, and (c) be clearly marked "principal ventilation exhaust fan".
   - Whole-house ventilation rate must be tested by a third party (e.g. Green Rater, energy rater), and tested whole-house ventilation rate must be within +/- 15 CFM or +/- 15% of designed rates. For ERV/HRV systems, this allowance is +/- 15 CFM or +/- 25% of designed rates.

CASE 2. MULTIFAMILY

Meet all of the following requirements for local exhaust and outdoor air ventilation:

1. Local Exhaust
   - Meet all of the local exhaust requirements for the single-family section (CASE 1), above.

2. Whole House Mechanical Ventilation
   - Design and install a whole-unit mechanical ventilation (e.g. principal ventilation) system in accordance with National Building Code Canada 2015 Section 9.32[2] or CAN/CSA F326 (R2014) *Residential Mechanical Ventilation Systems,* or a local equivalent, whichever is more stringent. Continuous whole-unit ventilation fans must be rated for sound at a maximum of one sone. Remote-mounted fans (including, for example, ERVs & HRVs) are exempt from the sound requirement. ~~Simplified minimum air-flow requirements are shown in Table EQ-2.~~[3]
   - Provide outdoor air to each unit directly from the outdoors. Do not design systems that rely on transfer air from pressurized hallways or corridors, adjacent dwelling units, attics, etc.
   - Locate air inlets that are part of the ventilation design at least 10 feet (3 meters) from known sources of contamination, such as a stack, vent, exhaust hood, or vehicle exhaust. Place the intake such that entering air is not obstructed by snow, plantings, or other material. Air inlets must be covered by screens to exclude rodents and insects (mesh not larger than 1/2 inch or 13 millimeters). Note: Concentric or immediately adjacent air intake and exhaust openings are allowed for HRVs, but shall be constructed and installed so as to prevent cross-contamination.

[2] The reference to National Building Code Canada 2015 was not included in the published ACP, but the omission is a mistake. The CaGBC is working with USGBC to get this corrected.
[3] Table EQ-2 and reference to it was included in error. The CaGBC is working with the USGBC to get this corrected.

- Non-unit spaces must meet the minimum requirements of ASHRAE Standard 62.1–2010, Sections 4–7, Ventilation for Acceptable Indoor Air Quality (with errata), or local equivalent, whichever is more stringent.
- Exhaust fans that serve as the principal ventilation system must be designed to run continuously, and the dedicated control switch for the exhaust fan must (a) have 2 settings (on and off), (b) be located where it will be accessible for the purposes of servicing the exhaust fan but not likely to be turned off inadvertently, and (c) be clearly marked "principal ventilation exhaust fan".
- Whole-house ventilation rate must be tested by a third party (e.g. Green Rater, energy rater), and tested whole-house ventilation rate must be within +/- 15CFM or +/- 15% of designed rates. For ERV/HRV systems, this allowance is +/- 15 CFM or +/- 25% of designed rates.

Table EQ-1. Minimum air-flow requirements for local exhaust

Location	Minimum Air Flow
Kitchen flow hood	50 L/s (100 CFM) intermittent
Bathroom, half-bath / powder room	25 L/s (50 CFM) intermittent ***or*** 20 CFM (9 L/s) continuous

~~Table EQ-2. Minimum air-flow requirements for continuous ventilation systems~~[3]

~~Floor Area~~	~~Minimum Air-flow Rate~~				
	~~Number of Bedrooms~~				
	~~0-1~~	~~2-3~~	~~4-5~~	~~6-7~~	~~>7~~
~~≤ 1,500 ft^2 (≤ 140 m^2)~~	~~30 CFM (14 L/s)~~	~~45 CFM (21 L/s)~~	~~60 CFM (28 L/s)~~	~~75 CFM (35 L/s)~~	~~90 CFM (42 L/s)~~
~~1,501 – 3,000 ft^2 (140 – 280 m^2)~~	~~45 CFM (21 L/s)~~	~~60 CFM (28 L/s)~~	~~75 CFM (35 L/s)~~	~~90 CFM (42 L/s)~~	~~105 CFM (49 L/s)~~
~~3,001 – 4,500 ft^2 (140 – 420 m^2)~~	~~60 CFM (28 L/s)~~	~~75 CFM (35 L/s)~~	~~90 CFM (42 L/s)~~	~~105 CFM (49 L/s)~~	~~120 CFM (56 L/s)~~
~~4,501 – 6,000 ft^2 (421 – 560 m^2)~~	~~75 CFM (35 L/s)~~	~~90 CFM (42 L/s)~~	~~105 CFM (49 L/s)~~	~~120 CFM (56 L/s)~~	~~135 CFM (64 L/s)~~
~~6,001 – 7,500 ft^2 (561 – 700 m^2)~~	~~90 CFM (42 L/s)~~	~~105 CFM (49 L/s)~~	~~120 CFM (56 L/s)~~	~~135 CFM (64 L/s)~~	~~150 CFM (71 L/s)~~
~~> 7,500 ft^2 (> 700 m^2)~~	~~105 CFM (49 L/s)~~	~~120 CFM (56 L/s)~~	~~135 CFM (64 L/s)~~	~~150 CFM (71 L/s)~~	~~165 CFM (78 L/s)~~

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IEQ PREREQUISITE: Radon-resistant construction

LEED Interpretation ID# 10496 **Publish Date: October 14, 2019**

Applies to:
LEED BD+C: Homes, Multifamily Midrise

Inquiry

How does an international project meet the requirements of this prerequisite?

Ruling

Choose one of the following options:

1. Assume the project is in a high-risk radon area and install a passive ventilation system as outlined in the prerequisite. This option is highly encouraged because installing a radon system after construction completion can be difficult.

2. Do not install a passive ventilation system and complete the following steps: Test for radon at the completion of the project using either a long-term or short-term test. For multiple residential buildings on a site, contact GBCI for sampling options.
   - Long-term test (30+ day test): Conduct a single long-term test. If the result is less than 4 pCi/L (150 Bq/m^3), no remediation is needed and the prerequisite is satisfied. If the result is 4 pCi/L (150 Bq/m^3) or greater, install an active radon mitigation system. Once the active mitigation system is installed, undergo another test (short-term or long-term) to confirm that the mitigation system is operating as needed.

   OR;
   - Short-term test (<30 day test): Conduct a short-term test. If the result is 4 pCi/L (150 Bq/m^3) or less, no re-test or remediation is needed and the prerequisite is satisfied. If the result exceeds 4 pCi/L (150 Bq/m^3), conduct remediation OR conduct a second short-term test. If the average of the two tests is 4 pCi/L (150 Bq/m^3) or less, no re-test or remediation is needed and the prerequisite is satisfied. If the average of the two tests exceeds 4 pCi/L (150 Bq/m^3), install an active radon mitigation system. Once the active mitigation system is installed, undergo another test (short-term or long-term) to confirm that the mitigation system is operating as needed.

3. Demonstrate project is in low-risk radon area via city test data. Cities that have been proven to have an average radon concentration of 4 pCi/L (150 Bq/m^3) or less through testing (with a minimum of 50 tests) are considered equivalent to EPA radon zone 2. Projects located in these cities are therefore are exempted from the radon requirements of this prerequisite.[4]

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[4] This third option was originally released as an ACP for Canadian projects.

IEQ PREREQUISITE: Compartmentalization

Alternative Compliance Path (100002327) **Publish Date: October 14, 2019**

Applies to:
LEED BD+C: Homes, Multifamily Midrise

The following language is added to the International Tips section:

Projects in Canada may instead meet the following:

Compartmentalize each residential unit to minimize leakage between units. Minimize uncontrolled pathways for environmental tobacco smoke and other indoor air pollutants between units by sealing penetrations in walls, ceilings, and floors and by sealing vertical chases (including utility chases, garbage chutes, mail drops, and elevator shafts) adjacent to the units.

Weather-strip all doors in the residential units leading to common hallways to minimize air leakage into the hallway. Weather-strip all exterior doors and operable windows to minimize leakage from outdoors.

Demonstrate acceptable sealing of residential units by a blower door test. Follow the procedure described by RESNET, CAN/CGSB 149.10-M86, or the ENERGY STAR Multifamily High Rise Program Testing and Verification Protocols, Version 1.0, with an allowable maximum leakage corresponding to Table EQ-3 below. Testing must include leakage through all surfaces, including exterior and party walls, floors, and ceiling. Note: This test is intended to capture all leakage from the unit, not just leakage to the outdoors; as such, neighboring units must not be pressurized.

AND

Install a balanced whole-house ventilation system (not just exhaust only or supply only) that meets the requirements of the Ventilation prerequisite.

AND

Design the heating and cooling system with returns in every enclosed room OR install no forced-air heating and cooling.

Table EQ-3. Maximum air leakage requirements (per m^2 or ft^2 of enclosure)

ACH @50Pa	NLR @50 PA	
	$L/s/m^2$	$Cfm50/ft^2$
7.0	1.52	0.30

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IEQ CREDIT: Balancing of Heating and Cooling Distribution Systems

Canadian Tip! **Publish Date: February 2021**

Applies to:
LEED BD+C: Homes, Multifamily Midrise

Option 2. Supply Air-Flow Testing

Tip for Canadian projects:

The credit language in the Rating System states “Have the total supply air-flow rates in each room tested by a qualified energy rater using a flow hood with doors closed, or another acceptable method, per RESNET or ACCA Quality Installation Specifications”. The Reference Guide also states “measure the airflow at each register to very system performance. The final airflow must be within +/- 20% of the total flow (or +/- 25 CFM) of design, per ACCA Manual D.”

As an alternative to the ACCA protocols, Canadian projects may follow the supply air-flow testing protocols outlined in the HRAI Manuals as long as the supply air-flow rates are tested in every room and the tested rates are within +/- 20% (or +/- 25 CFM) of the designed, calculated air-flow rates. Per the Alternative Compliance Path # 100002326, the designed air-flow rates may be calculated using CSA F280 or the HRAI Digest / Manuals.

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