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2012 ENERGY STAR® for New Homes Standard



Canada

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PREFACE

The 2012 ENERGY STAR for New Homes®¹ (ESNH) Standard is the first comprehensive national ESNH Standard to be published. Prior to this standard, technical requirements for ESNH have included three revisions of Natural Resources Canada's (NRCan's) "Minimum Requirements for ENERGY STAR® Qualified New Homes" and several revisions of technical specifications for Ontario and Saskatchewan.

This edition was developed using an open and transparent process which included the formation of a Committee with a balanced representation of expertise and interest groups, a decision-making process based on the principles of consensus, and public review of the final draft "ENERGY STAR® for New Homes Standard."

Key changes in the "2012 ENERGY STAR for New Homes Standard" include:

- **Using a building code reference house as the baseline.** A reference house is based on minimum requirements under the applicable building code. It forms the baseline for determination of the energy target. This ensures that ESNH is complementary to building codes that include energy requirements.
- **Making the energy target more stringent.** An ENERGY STAR qualified home is approximately 20 percent more efficient than a reference house. This level strikes a balance between the premium level of energy efficiency associated with the ENERGY STAR label and an acceptable incremental cost (relative to a house built to minimum building code requirements).
- **Mandating minimum insulation requirements.** All ENERGY STAR qualified homes, regardless of compliance approach, have minimum prescribed levels of insulation. This ensures a certain level of emphasis is placed on the envelope which reinforces good building science principles as well as provides consistent messaging for all ENERGY STAR qualified homes.
- **Mandating a minimum amount of electrical savings.** All ENERGY STAR qualified homes, regardless of compliance approach, have a minimum of 400 kilowatt-hours (kWh) of electrical savings relative to houses with non-ENERGY STAR qualified products. This ensures a certain level of electrical savings in all ESNH qualified homes and provides consistent messaging. Offering a variety of choices provides flexibility to builders.
- **Changes to the prescriptive and performance methodologies.** For the prescriptive approach, ESNH uses a 'core Builder Option Package (BOP) plus options approach'. To meet compliance, a builder must implement all aspects of the core BOP and then choose a minimum number of items from an options list specified for each BOP. For the performance approach, the builder must meet a prescribed energy target in addition to the minimum requirements.
- **Flexible integration of ENERGY STAR qualified products.** With the exception for fenestration, there is no longer a blanket requirement for ENERGY STAR qualified products. Instead, ENERGY STAR qualified products, such as appliances and lighting, are included on the eligible electrical savings list. The requirement for a certain minimum

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2012 ENERGY STAR® for New Homes Standard

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amount of electrical savings encourages installation of these products yet provides flexibility for builders.

Major changes have also been made to the format of documentation for the program. Previously, there were "Minimum Requirements" (with NRCan approved exemptions), "Compliance Options", an NRCan-approved Builder Option Package (BOP) for Saskatchewan, and a Technical Specification for Ontario. Moving forward, the minimum requirements and compliance options will all be developed and owned by NRCan and combined into this one document in a format closely following that of official standards. Separate ESNH Administrative Procedures will accompany this Standard.

All comments and inquiries regarding this standard, including requests for interpretation, should be addressed to New Housing, Housing Division, Office of Energy Efficiency, Natural Resources Canada, 930 Carling Ave., Building #1, Ottawa, ON, K1Y 4X2 or e-mail: NewHousingInquiries_nh@NRCan.gc.ca.

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INTRODUCTION

The international ENERGY STAR program was developed by the U.S. Environmental Protection Agency (EPA) in 1992. The program was designed to encourage energy-efficient practices that help to reduce greenhouse gas emissions. By identifying and promoting energy-saving products, the initiative helps protect the environment and lowers energy bills at the same time. The Office of Energy Efficiency (OEE) of NRCan has promoted the international ENERGY STAR symbol in Canada and monitored its use since 2001.

The ENERGY STAR[®] for New Homes (ESNH) initiative promotes energy efficiency guidelines that enable new homes to be approximately 20 percent more energy efficient than those built to the provincial or national building code.² The increased efficiency of these homes translates into reduced energy costs for homeowners.

Overview

An ENERGY STAR qualified home is a home that has been built by a licensed ENERGY STAR for New Homes builder who incorporates energy-efficient features into the home so that it can meet the specifications in the ESNH Standard. A sampling of ENERGY STAR qualified new homes are evaluated on-site by an independent energy advisor (i.e., one not employed by the builder). ESNH energy advisors are recruited, trained and certified by an ESNH service organization that is licensed by NRCan.

Features

Some of the features that builders typically incorporate into ENERGY STAR qualified new homes include:

- Heating and cooling systems: More energy efficient space conditioning systems, such as furnaces, air conditioners, and water heaters.
- Windows, patio doors and skylights: Fenestration products, such as windows, glass doors and skylights, that are ENERGY STAR qualified. This feature alone may reduce energy costs by more than 10 percent.
- Walls and ceilings: There is often more insulation in the ceilings and walls of an ENERGY STAR qualified home than required by the building code.
- Airtightness: ENERGY STAR qualified houses must meet specified maximum air leakage limits, which helps save energy for heating and cooling as well as increases comfort.
- Electrical savings: Each ENERGY STAR qualified house has a minimum of 400 kilowatt-hours (kWh) of electrical savings measures, such as ENERGY STAR qualified lighting or appliances, which help reduce electrical loads.

² The National Building Code will be applied in regions where energy provisions are not included in the provincial building code. The final energy target will not be less than a rating of 80 on the version of the EnerGuide Rating System's approved compliance software in force for the region.

1 SCOPE AND APPLICATION

1.1 Scope

The “ENERGY STAR[®] for New Homes Standard” specifies the technical requirements for a house to be an *ENERGY STAR* qualified home. It covers topics such as eligibility requirements, pertinent references, and terms and definitions used in the program. It also specifies the minimum requirements common to all ENERGY STAR qualified new homes, outlines the compliance options, and details the prescriptive packages, also known as the Builder Option Packages (BOPs).

1.2 Application

1.2.1 Eligible Housing Types

ENERGY STAR for New Homes (ESNH) applies to new residential buildings that:

- (a) are within the scope of Part 9 of the National Building Code of Canada (NBC),
- (b) are *on permanent foundations*, and
- (c) are one of the following types:
 - (i) *detached houses*, including houses with *secondary suites*,
 - (ii) *attached houses*, which include semi-detached houses, row houses, and attached houses with *secondary suites*, and,
 - (iii) *multi-unit residential buildings* (MURBs), which include stacked townhouses, *duplexes*, *triplexes* and *apartment buildings*.

NOTES:

- 1) Part 9 of the NBC applies to residential buildings that are not more than three (3) storeys in building height and not more than 600 m² in building area. Refer to the NBC for additional details on the scope and application of Part 9.
- 2) Under ESNH, new residential buildings are considered those that are no more than six (6) months old following the date of first occupancy.
- 3) ESNH does not apply to buildings that contain non-residential units.

1.2.2 Determination of number of *heating degree days*

Where required in this Standard, the number of *heating degree days* shall be defined based on applicable building code requirements. Where the applicable building code does not define the number of *heating degree days*, or where no applicable provincial building code exists, NBC 2010 Appendix C shall be used.

1.3 Compliance

1.3.1 Minimum Requirements

All ENERGY STAR qualified homes shall comply with the minimum requirements specified in Section 4.

1.3.2 Compliance Options

All ENERGY STAR qualified homes shall follow one of the compliance options specified in Section 5.

1.3.3 Build-Out Date

This Standard comes into effect on December 1, 2012. Houses enrolled prior to this date must be labelled prior to November 30, 2014.

2 REFERENCES

The following referenced documents are required for the application of this Standard.

2.1 Documents Produced by Natural Resources Canada

| Title | ESNH Reference |
|---|----------------|
| 2012 ENERGY STAR® for New Homes Administrative Procedures | Preface |
| EnerGuide Rating System: Energy Advisor Procedures (New Homes) | 4.2.1 |
| Evaluation Procedures for Low-Rise Multi-Unit Residential and Mixed-Used Buildings | 4.2.1 |
| Climate Zones – ENERGY STAR (Fenestration) | 4.2.3 |
| New Housing Programs' 2012 Energy Credits | 5.1.4 |
| ENERGY STAR for New Homes® Tables for Calculating Effective Thermal Resistance of Opaque Assemblies | 5.2.3 |

These documents may be obtained from:
Office of Energy Efficiency
Natural Resources Canada
580 Booth St., 18th Floor
Ottawa ON K1A 0E4
NewHousingInquiries_nh@NRCan.gc.ca

2.2 Documents Published by Other Organizations

| Issuing Agency | Document Number | Title of Document | ESNH Reference |
|----------------|---------------------|--|---------------------------|
| ANSI/ASHRAE | 62.1-2010 | Ventilation for Acceptable Indoor Air Quality | 4.7.1.5 |
| CCBFC | NRCC 53301 | National Building Code of Canada 2010 | 1.2.1 1.2.2 Table 3 |
| CGSB | 51-GP-27M-1979 | Thermal Insulation, Polystyrene, Loose Fill | 4.2.2.2 |
| CGSB | CAN/CGSB-51.25-M87 | Thermal Insulation, Phenolic, Faced | 4.2.2.2 |
| CGSB | CAN/CGSB-149.10-M86 | Determination of the Airtightness of Building Envelopes by the Fan Depressurization Method | 4.2.1 |
| CSA | F378.1-11 | Glazed and unglazed liquid heating solar collectors - Test methods | 4.5 |
| CSA | F378-87 (R2004) | Solar Collectors | 4.5 |
| CSA | P.7-10 | Test method for Measuring Energy Loss of Gas-Fired Instantaneous Water Heaters | 3.1 |
| CSA | P.9-11 | Test method for determining the performance of combined space and water heating systems (combos) | 4.3.2 |
| CSA | P.10-07 | Performance of Integrated Mechanical Systems for Residential Heating and Ventilation | 4.3.1 |

| Issuing Agency | Document Number | Title of Document | ESNH Reference |
|----------------|--|--|---------------------------|
| CSA | CAN/CSA-B415.1-10 | Performance Testing of Solid-Fuel-Burning Heating Appliances | 3.1 4.3.5.2 4.3.5.3 |
| CSA | CAN/CSA-C656-05 (R2010) | Performance Standard for Split-System and Single-Package Central Air Conditioners and Heat Pumps | 4.3.3 |
| CSA | CAN/CSA F379 Series-09 | Packaged Solar Domestic Hot Water Systems (liquid to liquid heat transfer) | 4.5 |
| EPA | 40 Code of Federal Regulations (CFR) Part 60 Subpart AAA | Standards of Performance for New Residential Wood Heaters | 4.3.5.2 4.3.5.3 |
| ULC | CAN/ULC-S701-05 | Thermal Insulation, Polystyrene, Boards and Pipe Covering | 4.2.2.2 |
| ULC | CAN/ULC-S702-97 | Mineral Fibre Thermal Insulation for Buildings | 4.2.2.2 |
| ULC | CAN/ULC-S703-01 | Cellulose Fibre Insulation (CFI) for Buildings | 4.2.2.2 |
| ULC | CAN/ULC-S704-03 | Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced | 4.2.2.2 |
| ULC | CAN/ULC-S705.1-01 | Thermal Insulation – Spray Applied Rigid Polyurethane Foam, Medium Density – Material - Specification | 4.2.2.2 |
| ULC | CAN/ULC-S706-02 | Wood Fibre Thermal Insulation for Buildings | 4.2.2.2 |
| ULC | CAN/ULC-S712.1-10 | Standard for Thermal Insulation – Light Density, Open Cell Spray Applied Semi-Rigid Polyurethane Foam – Material Specification | 4.2.2.2 |
| ULC | CAN/ULC-S716.1-11 | Standard for Exterior Insulation and Finish Systems (EIFS) – Materials and Systems | 4.2.2.2 |

3 DEFINITIONS AND ABBREVIATED TERMS

3.1 Definitions

The following terms and definitions, which are italicized throughout, apply for the purposes of this document.

above grade wall area

The above grade wall area is measured on the basis of interior wall dimensions and includes all perimeter boundary walls that are exposed to the exterior or common to another heated unit and perimeter floor framing (i.e., rim joists) extending from the line of *finished ground* to the ceiling of the uppermost floor.

air changes per hour @50 Pa

The number of times per hour the entire heated volume of air in a house is replaced when the building envelope is subjected to a differential pressure of 50 Pascals with the exterior.

air-source heat pumps

Air-source heat pumps come in two configurations: split system and single package. Split system air-source heat pumps are comprised of a matched condenser coil (outdoor unit comprising a condenser coil, compressor and cooling fan) and indoor coil (typically located with the furnace or air handler). A single package system has all components in one cabinet and is located on the roof or through the wall.

NOTES:

- 1) The inclusion of an energy-efficient DC blower motor in the furnace or air handler may be used to determine the energy efficiency rating of the matched split system to qualify as an ENERGY STAR product.
- 2) For modelling purposes, energy efficiency ratings for air source heat pumps are listed at: a) Single package: http://oee.nrcan.gc.ca/pml-lmp/index.cfm?action=app.search-recherche&appliance=HP_SP and b) split-system http://oee.nrcan.gc.ca/pml-lmp/index.cfm?action=app.search-recherche&appliance=HP_SS.

apartment building

A *multi-unit residential building* that has four or more *residential units*.

approved compliance software

Residential building energy simulation modelling software approved by NRCan, e.g., HOT2000™.

attached house

One *residential unit* that shares a wall with one or more adjacent dwellings, each with a separate entrance. Alternate names are row house, townhouse, and semi-detached.

NOTE: Attached houses do not include stacked units – stacked units fall under *multi-unit residential buildings*.

builder option package (BOP)

A set of pre-determined building envelope, mechanical and electrical specifications which have been validated against a representative standard set of house archetypes developed by NRCan to ensure, on average, a specified performance level.

combined space and water heating system

A system that provides both space heating and domestic hot water using a *fuel-fired boiler* or a storage-type or tankless *water heater*. The system may or may not include a secondary storage tank.

detached house

A *residential unit* with walls, floors, ceilings and roof independent of any other building, as opposed to semi-detached or row house sharing common walls.

direct-vent

A venting system in which all the combustion air is supplied directly from the outdoors and the products of combustion are vented directly to the outdoors via independent, totally enclosed passageways connected directly to the appliance.

duplex

A *multi-unit residential building* that has 2 stacked units.

effective thermal resistance

Represents the combined resistance to the flow of heat of all the elements of a given assembly, taking into account the various thermal properties of these elements; measured in *R-value*.

EnerGuide Rating

A standard measure of a home's energy performance using standard operation assumptions; the energy efficiency level is rated on a scale of 0 to 100, with 100 being the most efficient.

energy efficiency ratio (EER)

A measure of energy performance for cooling equipment and heat pump systems. The steady-state rate of heat energy removal (i.e. cooling capacity) by the equipment measured in Btu/h divided by the steady-state rate of energy input to the equipment measured in watts at specified temperatures.

ENERGY STAR[®]

A registered trademark identifying an international energy efficiency program developed by the U.S. Environmental Protection Agency (EPA) in 1992; the Office of Energy Efficiency (OEE) of NRCAN has promoted the international *ENERGY STAR* symbol in Canada and monitored its use since 2001.

ENERGY STAR qualified

ENERGY STAR qualified products have been tested according to prescribed procedures and been found to meet or exceed higher energy efficiency levels without compromising performance. For *ENERGY STAR* qualified categories and products in Canada, see <http://oee.nrcan.gc.ca/residential/10759>.

equivalent leakage area

The size of the hole through which would pass the same amount of air that passes through all of the air leakage holes in the building envelope when the pressure across all holes is equal. It is the area of a sharp edged orifice (a sharp round hole cut in a thin plate) that would leak the same amount of air as the building does at a pressure difference of 10 Pascals; expressed in cm² or in².

exterior door system

An exterior door system is a door that is exposed to the outdoors, and includes the door slab, frame, and all packaged integrated glazing, transoms and sidelights.

finished grade

The average elevation of *finished ground* as determined between two points extending from one corner to the next corner along a wall of the building.

finished ground

The elevation of the built and natural environment adjoining the exterior of the building, as determined at any single point.

fixture

A complete lighting unit consisting of a lamp or lamps, housing, and a connection to a source of electrical power. Floor and desk lamps, chandeliers, vanity light bars, pendulum lights and wall sconces are all considered "fixtures". Also known as a luminaire or lamp.

fuel-fired boiler

A self-contained fuel burning appliance with an energy input of less than 300,000 Btu/h, for supplying low-pressure steam or hot water for space heating. The energy efficiency performance over a heating season for a boiler is measured by the annual fuel utilization efficiency (AFUE). Eligible units fall under Canada's Energy Efficiency Regulations and are listed on NRCan's equipment database.

NOTE: NRCan's database for residential equipment is found at:
http://oee.nrcan.gc.ca/pml-lmp/index.cfm?action=app_welcome-bienvenue

heating degree days

The summation of the number of Celsius degrees for which the mean daily temperature is below 18 °C for a calendar year.

instantaneous (water heater)

Also referred to as a tankless water heater or an on-demand water heater. See *water heater* for more information.

integrated HRV air handler

A product that provides air circulation and distribution of fresh air as well as ventilation with heat recovery.

integrated mechanical system

A product or set of products that provides all of the following functions: space heating; potable water heating; ventilation with heat recovery; and air circulation and distribution of fresh air.

mechanically-vented

An appliance or piece of equipment and its combustion venting system in which the products of combustion are entirely exhausted to the outdoors by a mechanical device, such as a fan, blower or aspirator, upstream or downstream from the combustion zone of the appliance or equipment, and the portion of the combustion venting system that is downstream of the fan, blower or aspirator is sealed and does not include draft hoods or draft control devices.

multi-unit residential building (MURB)

A MURB is a low-rise building of purely residential occupancy that:

- consists of a set of separate stacked *residential units*, with each *residential unit* having a private entrance either outside the building or from a common hall, lobby, vestibule or stairway inside the building,
- incorporates a minimum of two vertically stacked *residential units* and is a minimum of two storeys above *finished grade*, and
- contains no more than 32 *residential units*, including common areas.

Row houses not meeting these requirements are not considered to be MURBs. Houses and houses with *secondary suites* do not qualify as MURBs.

nominal thermal resistance

Represents the resistance to the flow of heat of the installed insulation of a given assembly; measured in *R-value*.

normalized leakage area

The ratio of the *equivalent leakage area* to the area of the building envelope, where the area of the building envelope is defined as all floors, walls (including doors and windows) and ceilings (flat or sloping) that are correspondingly below, above and adjacent to unheated spaces and spaces heated to less than 10 °C; expressed in cm²/m² or in²/ft².

normalized leakage rate

The quantity of air that leaks into or out of the building per hour, divided by the total envelope surface area (in m² or ft²) at a differential pressure of 50 Pa, where total envelope surface area is defined as all floors, walls (including doors and windows) and ceilings (flat or sloping); expressed in L/s • m² @50Pa or CFM/ft² @50 Pa.

NOTE: Walls which are common with another heated unit are included in the total envelope surface area.

opaque assembly

A building assembly that does not let any light pass through, excluding opaque components of door and window units.

permanent foundation

An assembly that transfers loads from the building to the supporting soil or rock, and renders the building immovable.

principal ventilation capacity

The airflow rate of the ventilation system which is 40% to 60% of the *total ventilation capacity*.

R-value

The measure of thermal resistance. The higher the R-value, the greater the resistance to heat. When used in this Standard, the metric R-value, denoted as 'RSI', will be followed by the imperial R-value in parenthesis, denoted by 'R', e.g., RSI 1.76 (R10). The conversion rate is: 1 RSI (m² °C/W) = 5.678 R (ft²°F/W).

residential unit

A building or part of a building operated as a housekeeping unit, used or intended to be used by one or more persons and usually containing cooking, eating, living, sleeping and sanitary facilities.

secondary suite

A self-contained *residential unit* with a prescribed floor area located in a building or portion of a building of only residential occupancy that contains only one other residential unit and common spaces, and where both residential units constitute a single real estate entity.

seasonal energy efficiency ratio (SEER)

A measure of seasonal energy performance for cooling equipment. The cooling output energy in Btu during a typical cooling season divided by the total electric energy input in watt-hours during the same period.

slab on grade foundation

A foundation where the distance between the slab and ceiling is greater than 1.2 m (4 ft.) with the slab at or within 0.6 m (2 ft.) of *finished grade*.

solid fuel

A biomass fuel (in the context of ESNH).

NOTE: Consistent with definition in CSA B415.1-10 "Performance Testing of Solid-Fuel-Burning Heating Appliances", this includes cordwood, wood chips, sawdust, fire logs, wood, paper, other biomass pellets and briquettes, and kernel corn and other grains.

total ventilation capacity

The minimum rate required, averaged over a 24 hour period, at which the ventilation system shall be capable of supplying outdoor air.

triplex

A multi-unit residential building that has 3 stacked residential units.

water heater

Equipment used to produce potable domestic hot water. Its energy efficiency performance is called the energy factor (EF), thermal efficiency (TE) or standby loss (measured in watts). ESNH eligible units are listed on NRCan's equipment database and either fall under Canada's Energy Efficiency Regulations, or, in the case of gas-fired instantaneous units, meet CSA-P.7-10 "Test Method for Measuring Energy Loss of Gas-Fired Instantaneous Water Heaters".

NOTE: NRCan's database for residential equipment is found at:

<http://oee.nrcan.gc.ca/pml-lmp/index.cfm?action=app.welcome-bienvenue>

3.2 Abbreviated Terms

| | |
|-------|--|
| ACH | air changes per hour |
| AFUE | annual fuel utilization efficiency |
| BOP | Builder Option Package |
| BTU | British thermal unit |
| CCBFC | Canadian Commission on Building and Fire Codes |
| CFL | compact fluorescent light bulb |
| CFM | cubic feet per minute |
| CSA | Canadian Standards Association |
| DWHR | drain water heat recovery |
| EER | energy efficiency ratio |
| EF | energy factor |
| ELA | equivalent leakage area |
| EPA | Environmental Protection Agency (U.S.) |
| ERV | energy (or enthalpy) recovery ventilator |
| ESNH | ENERGY STAR for New Homes |
| GJ | gigajoule |
| HRV | heat recovery ventilator |
| HVI | Home Ventilating Institute |
| ICF | insulated concrete form |
| IMS | integrated mechanical system |
| kWh | kilowatt hour |
| LPM | litres per minute |
| MURB | multi-unit residential building |
| NBC | National Building Code of Canada |
| NLA | normalized leakage area |
| NLR | normalized leakage rate |
| NRCan | Natural Resources Canada |
| OBC | Ontario Building Code |
| OSB | oriented strand board |
| Pa | pascal |
| SDHW | solar domestic hot water |
| SEER | seasonal energy efficiency ratio |
| SIP | structural insulated panel |
| SRE | sensible heat recovery efficiency |
| ULC | Underwriters Laboratories of Canada |
| W | watts |

4 MINIMUM REQUIREMENTS

4.1 Applicable Regulations

4.1.1 Building Codes and Regulations

The “ENERGY STAR for New Homes Standard” is not a substitute for local building codes or regulations. It is an additional set of requirements that may be more stringent in the area of energy efficiency. Where a conflict may be present, all local building codes and regulations take precedence over the measures outlined in this Standard. Where building code requirements or regulations exceed those of ESNH, or vice versa, the more stringent requirement shall apply.

4.1.2 Energy Efficiency Regulations

Equipment and products that are regulated in Canada under Canada’s “Energy Efficiency Act” and installed in ESNH housing shall comply with Canada’s “Energy Efficiency Regulations.”

NOTES:

- 1) The intent of this requirement is to ensure that all equipment and products installed in ESNH housing meet the CSA standards specified in Canada’s “Energy Efficiency Regulations.”
- 2) For more information on Canada’s “Energy Efficiency Regulations”, refer to:
<http://oee.nrcan.gc.ca/regulations/17311>

4.2 Building Envelope

4.2.1 Airtightness

The house shall be constructed sufficiently airtight such that the whole house air leakage is less than or equal to one of the airtightness targets specified in Table 1, when measured in accordance with the as-operated method based on CAN/CGSB 149.10-M86 “Determination of the Airtightness of Building Envelopes by the Fan Depressurization Method.”

Table 1
Maximum Whole House Air Leakage Targets
Forming Part of 4.2.1

| Building Type | ACH @50Pa | NLA @10 Pa | | NLR @50 Pa | |
|---------------|-----------|---------------------------------|--------------------------------------|--------------------|-----------------------|
| | | cm ² /m ² | in ² /100 ft ² | L/s/m ² | cfm50/ft ² |
| Attached | 3.0 | 2.12 | 3.06 | 1.32 | 0.26 |
| Detached | 2.5 | 1.26 | 1.81 | 0.93 | 0.18 |

NOTES:

- 1) Refer to the “EnerGuide Rating System: Energy Advisor Procedures (New Homes)” for details on the test method.
- 2) MURBs may be considered attached or detached, depending on their configuration. For example, a *duplex* is considered a detached building, whereas duplexes in a row configuration are considered an attached building. For more information on MURBs, refer to the “Evaluation Procedures for Low-Rise Multi-Unit Residential and Mixed-Used Buildings.”

4.2.2 Opaque Assemblies

4.2.2.1 Minimum Effective Thermal Resistance of Opaque Assemblies

Effective thermal resistance of *opaque assemblies* shall not be less than those specified in Table 2.

Table 2
Minimum Effective Thermal Resistance of Opaque Assemblies¹
Forming Part of 4.2.2.1

| Building Assembly | Heating Degree Days ² | | | | | |
|--|----------------------------------|----------------|----------------|-----------------|-----------------|-----------------|
| | RSI (R) | | | | | |
| | < 3000 | 3000 - 3999 | 4000- 4999 | 5000- 5999 | 6000- 6999 | ≥ 7000 |
| Ceilings below attics | 6.91 (39.2) | 8.67 (49.2) | 8.67 (49.2) | 10.43 (59.2) | 10.43 (59.2) | 10.43 (59.2) |
| Cathedral ceilings and flat roofs | 4.67 (26.5) | 4.67 (26.5) | 4.67 (26.5) | 5.02 (28.5) | 5.02 (28.5) | 5.02 (28.5) |
| Walls above grade ³ | 2.78 (15.8) | 3.08 (17.5) | 3.08 (17.5) | 3.08 (17.5) | 3.85 (21.9) | 3.85 (21.9) |
| Floors over unheated spaces | 4.67 (26.5) | 4.67 (26.5) | 4.67 (26.5) | 5.02 (28.5) | 5.02 (28.5) | 5.02 (28.5) |
| Foundation walls below or in contact with the ground | 1.99 (11.3) | 2.98 (16.9) | 2.98 (16.9) | 3.46 (19.6) | 3.46 (19.6) | 3.97 (22.5) |
| Unheated floors below frost line | - | - | - | - | - | - |
| Unheated floors on ground above frost line ^{4,5,6} | 1.96 (11.1) | 1.96 (11.1) | 1.96 (11.1) | 1.96 (11.1) | 1.96 (11.1) | 1.96 (11.1) |
| Heated or unheated floors on ground on permafrost ⁵ | - | - | - | - | 4.44 (25.2) | 4.44 (25.2) |
| Heated floors on ground ⁵ | 2.32 (13.2) | 2.32 (13.2) | 2.32 (13.2) | 2.85 (16.2) | 2.85 (16.2) | 2.85 (16.2) |
| Slabs on grade with integral footing ^{4,7,8} | 1.96 (11.1) | 1.96 (11.1) | 1.96 (11.1) | 3.72 (21.1) | 3.72 (21.1) | 4.59 (26.1) |

NOTES:

- 1) Where local building code values are greater, the local code requirements take precedence, per 4.1.1.
- 2) *Heating degree days* as determined by 1.2.2.
- 3) Applies to walls that are not common to another heated unit; equally applicable to all references for 'walls above grade' requirements found throughout this Standard.
- 4) A nominal RSI 1.76 (R10) will meet the RSI 1.96 (R11.1) requirement and a nominal RSI 3.52 (R20) will meet the RSI 3.72 (R 21.1) requirement.
- 5) Applies to the entire area.
- 6) Includes non-structural slab on grade.
- 7) Except where prohibited by structural requirements of the building code in effect, insulation requirements apply to under the entire slab, and to a 900 mm (3 ft.) skirt of the same nominal value.
- 8) Where a slab on grade is also a heated floor, the higher insulation value shall apply.

4.2.2.2 Eligible Insulation Materials

(a) Except as permitted in 4.2.2.2 (b), thermal characteristics of eligible insulation materials shall conform to the requirements of:

- CAN/CGSB-51.25-M87 "Thermal Insulation, Phenolic, Faced"
- CGSB 51-GP-27M-1979 "Thermal Insulation, Polystyrene, Loose Fill"
- CAN/ULC-S701-05 "Thermal Insulation, Polystyrene, Boards and Pipe Covering"
- CAN/ULC-S702-97 "Mineral Fibre Thermal Insulation for Buildings"
- CAN/ULC-S703-01 "Cellulose Fibre Insulation (CFI) for Buildings"
- CAN/ULC-S704-03 "Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced"

- CAN/ULC-S705.1-01 "Thermal Insulation – Spray Applied Rigid Polyurethane Foam, Medium Density – Material - Specification"
- CAN/ULC-S706-02 "Wood Fibre Thermal Insulation for Buildings"
- CAN/ULC-S712.1-10 "Standard for Thermal Insulation – Light Density, Open Cell Spray Applied Semi-Rigid Polyurethane Foam – Material Specification, or
- CAN/ULC-S716.1-11 "Standard for Exterior Insulation and Finish Systems (EIFS) – Materials and Systems"

(b) For a specific insulation product not conforming to the standards listed in 4.2.2.2 (a), the thermal resistance, or long term thermal resistance values where applicable, are permitted to be used as reported by the Canadian Construction Materials Centre (CCMC) in the evaluation of such a product.

4.2.2.3 Wall and Floor Assemblies Below or in Contact With the Ground

(a) Where the distance between the top of a foundation wall and the line of the *finished grade* is more than 600 mm (2 ft.), the effective thermal resistance for the above-ground portion of the foundation wall shall be not less than that required for the thermal resistance for walls above grade per 4.2.2.1.

(b) Except as permitted in 4.2.2.3.(c), the below ground portion of insulation required for foundation walls below or in contact with ground shall extend down to the level of the top of the floor that comprises part of the heated boundary.

(c) A gap of not greater than 150 mm (6") is permitted between the bottom edge of the interior foundation wall insulation and the floor where insulation is provided on the interior face of a foundation wall below or in contact with ground, and where the top of the floor in contact with the ground that comprises part of the heated boundary is equal to or greater than 1.2 m (4 ft.) below finished grade.

(d) The foundation wall insulation is permitted to be split into interior and exterior portions provided the interior and exterior portions each have an effective thermal resistance not less than is required in 4.2.2.1, and they are overlapped a distance of not less than four times the distance separating the planes of insulation.

(e) Except where prohibited by structural requirements of the building code in effect, or, where there is insulation on the exterior of the foundation wall down to the footing, basement floor assemblies where sub-slab insulation has been installed shall have a thermal break between the basement floor slab and foundation walls with a thermal resistance, at a minimum, equivalent to the sub-slab insulation installed.

4.2.2.4 Ceilings Below Attics

For ceilings below attics under sloped roofs, the thermal resistance shall be continuous to the outermost edge of the exterior wall.

4.2.2.5 Rim Joists

Rim joists shall have a thermal resistance not less than that of walls above grade.

4.2.3 Fenestration and Door Systems

4.2.3.1 Fenestration

(a) With the exception of 4.2.3.1(b) and (c), windows and skylights, including tubular skylights, shall be ENERGY STAR qualified for the climate zone in which they are installed.

NOTE: Climate zones for ENERGY STAR fenestration products are defined in "Climate Zones – ENERGY STAR," refer to: <http://oee.nrcan.gc.ca/equipment/windows-doors/1371>.

- (b) Windows in walls below or in contact with the ground, where the distance from the top of the floor in contact with the ground below the window and the line of the *finished ground* is equal to or greater than 1.2 m (4 ft.), need not comply with 4.2.3.1(a) but shall meet the following requirements, at a minimum:
- (i) double-glazed with low-e glass,
 - (ii) inert gas-filled,
 - (iii) have an insulated spacer, and
 - (iv) if the frame or sash is made from metal, it shall be thermally broken.
- (c) Decorative windows, including side lights, integrated glazing in doors, half-circle windows, leaded windows, transoms and other specialty glazing products, need not comply with 4.2.3.1(a) provided that the total glazing area of such decorative glazing does not exceed 1.85 m² (20 ft²).

NOTE: Fenestration in door systems, e.g., integrated glazing, sidelights and transoms, applies only to the door system not covered under 4.2.3.2 (b).

4.2.3.2 Door Systems

- (a) With the exception of 4.2.3.2(b) and (c), *exterior door systems* shall be ENERGY STAR qualified for the climate zone in which they are installed.

NOTE: Climate zones for ENERGY STAR doors are defined in "Climate Zones – ENERGY STAR," refer to: <http://oee.nrcan.gc.ca/equipment/windows-doors/1371>.

- (b) A maximum of one *exterior door system* (to a maximum of one single or one double door) that does not comply with 4.2.3.2(a) is permitted per house.
- (c) Doors to unheated enclosed spaces shall have an insulated core and be installed with weatherstripping.

NOTE: This requirement includes, but is not limited to, doors to cold cellars and doors to attached garages.

4.3 Space Heating and Cooling Equipment

4.3.1 Integrated Mechanical Systems

Where installed, an *integrated mechanical system* (IMS) shall be:

- (a) of the condensing type, and
- (b) tested according to CSA P.10-07 "Performance of Integrated Mechanical Systems for Residential Heating and Ventilation" and meet or exceed the Standard's premium performance requirements.

NOTE: An exemption will be made to the CSA P.10-07 requirement until March 31, 2014.

4.3.2 Combined Space and Water Heating Systems

Where installed, a *combined space and water heating system* shall be:

- (a) of the condensing type, and
- (b) tested according to CSA P.9-11 "Test method for determining the performance of combined space and water heating systems (combos)" (applies to forced-air space heating systems only).

NOTE: An exemption will be made to the CSA P.9-11 equipment until March 31, 2014.

4.3.3 Air-Source Heat Pumps

Where installed, an *air-source heat pump* shall be tested according to CAN/CSA-C656-05 (R2010) "Performance standard for split-system and single package central air conditioners and heat pumps".

4.3.4 Natural Gas or Propane Fireplaces

Where installed, natural gas or propane fireplaces shall be *direct-vent* with spark ignition (also referred to as "intermittent" or "on-demand").

NOTES:

- 1) For eligible products, refer to:
<http://oee.nrcan.gc.ca/residential/business/manufacturers/search/fireplace-search.cfm>
- 2) Standing pilot light types may be used in the performance approach, but the pilot light usage must be accounted for.

4.3.5 Solid-Fuel-Burning Appliances

NOTES:

- 1) Coal products are not permitted.
- 2) When used for primary heating purposes, appliances under 4.3.5 must be modelled by following the performance approach.

4.3.5.1 Indoor Automatically-Fuelled Appliances

Where installed, automatically-fuelled appliances, including pellet stoves, central pellet furnaces and boilers, and pellet fireplaces, shall have:

- (a) a flue/vent that has a minimum vertical rise of 1.5 m (5 ft.), measured from the appliance flue collar to the exterior termination centre line of the flue/vent, and
- (b) no barometric dampers.

4.3.5.2 Indoor Manually-Fuelled Appliances

Where installed, indoor manually-fuelled appliances, including stoves, fireplaces, fireplace inserts, and central furnaces and boilers, shall:

- (a) be certified to:
 - (i) CAN/CSA-B415.1-10 "Performance testing of solid-fuel-burning heating appliances", or
 - (ii) U.S. Environmental Protection Agency (EPA) 40 Code of Federal Regulations (CFR) Part 60 Subpart AAA - Standards of Performance for New Residential Wood Heaters, and
- (b) have no barometric dampers.

4.3.5.3 Outdoor Central Heating Appliances

Where installed, outdoor central heating appliances, such as hydronic heaters and furnaces, shall be certified to:

- (a) CAN/CSA-B415.1-10 "Performance testing of solid-fuel-burning heating appliances", or
- (b) U.S. Environmental Protection Agency (EPA) 40 Code of Federal Regulations (CFR) Part 60 Subpart AAA - Standards of Performance for New Residential Wood Heaters, or
- (c) Phase 2 EPA Hydronic Heater Program (White tag)³.

4.3.5.4 Masonry Heaters

Where installed, masonry heaters shall be constructed with:

- (a) tight-fitting fuel loading doors that are closed during the burn cycle,
- (b) combustion air control providing high-fire burn only,
- (c) a minimum mass of 800 kg (1760 lbs),
- (d) a firebox and heat exchange channels built from refractory components with an overall average wall thickness not exceeding 250 mm (10"),

³ <http://www.epa.gov/burnwise/guidewhiteowhh.html>

- (e) a gas path through the internal heat exchange channels downstream of the firebox with at least one 180-degree change in flow direction before entering the chimney, and
- (f) the length of the shortest single path from the firebox exit to the chimney entrance at least twice the largest firebox dimension.

NOTE: Site-built fireplaces, with the exception of masonry heaters as specified in 4.3.5.4, are not permitted in ESNH houses.

4.4 Drain Water Heat Recovery

Where installed, drain water heat recovery (DWHR) units shall be:

- (a) installed according to the manufacturer's instructions,
- (b) mounted vertically (not to exceed 5 degrees off vertical), and
- (c) installed on a stack that contains at least one shower, and
- (d) be on NRCan's list of approved systems.

NOTE: A list of approved units is found at: <http://oee.nrcan.gc.ca/residential/personal/retrofit-homes/drain.cfm>

4.5 Solar Domestic Hot Water

Where installed, solar domestic hot water (SDHW) units shall be certified to:

- (a) CSA F379 Series-09 "Packaged Solar Domestic Hot Water Systems", or
- (b) CSA F378.1-11 "Glazed and unglazed liquid heating solar collectors - Test methods".

NOTES:

- 1) The CSA F378.1-11 Standard applies to: (a) glazed flat plate liquid heating solar collectors; (b) glazed vacuum tube or vacuum envelope liquid heating solar collectors; (c) unglazed flat plate liquid heating solar collectors; (d) integral collector storage (ICS) systems with time constants of less than 30 minutes; and (e) concentrating collectors with an acceptance angle greater than 60°.
- 2) Products that met CAN/CSA F378-87 (R2004) "Solar Collectors" are also permitted; refer to: http://directories.csa-international.org/cert_rec_srch.asp?sort=name&txtDir=*%26Submit=Search&txtCustomer=%26txtProvState=%26txtCountry=%26txtFile=%26txtMajorClass=8854&txtMinorClass=01
- 3) A performance directory of solar domestic hot water systems certified to CSA F379 can be found at: http://canmetenergy-canmetenergie.nrcan-nrcan.gc.ca/eng/renewables/solar_thermal/sdhw_directory.html

4.6 Venting and Combustion Air Supply of Fuel-Fired Equipment

4.6.1 Natural Gas-Fired and Propane-Fired Equipment

Where installed, natural gas-fired and propane-fired space and water heating equipment shall be:

- (a) equipped with electronic ignition, and
- (b) independently vented with a sealed vent connected to a:
 - (i) *direct-vent* system, or
 - (ii) *mechanically-vented* system.

NOTE: The intent of this requirement is to reduce the possibility for combustion spillage, thereby reducing health and safety risk to the occupants. Naturally-aspirated appliances or appliances with standing pilot lights do not meet this requirement.

4.6.2 Oil-Fired Equipment

Where installed, oil-fired space and water heating equipment shall be independently vented with a sealed-vent connected to a:

- (a) *direct-vent* system,
- (b) forced-draft system, or
- (c) terminally mounted induced-draft power venter.

NOTE: The intent of this requirement is to reduce the possibility for combustion spillage, thereby reducing health and safety risk to the occupants. Naturally-aspirated appliances or barometric dampers do not meet these requirements.

4.6.3 Combustion Air Supply

- (a) Combustion air supply ducts and damper systems shall serve no more than one piece of equipment.
- (b) Combustion air supply for space or water heating equipment terminating in conditioned space shall be equipped with an approved device to control unintended air leakage when air is not required for combustion.

NOTE: This requirement does not apply to natural gas-fired or propane-fired water heating equipment.

4.7 Ventilation and Distribution Systems

4.7.1 Ventilation Systems

4.7.1.1 Principal Ventilation Capacity

The principal ventilation capacity for *residential units* shall be achieved through either a heat recovery ventilator (HRV), an energy recovery ventilator (ERV), or *integrated mechanical system* (IMS).

4.7.1.2 HRV/ERV Requirements

The HRV/ERV shall:

- (a) be certified by the Home Ventilating Institute (HVI) as an HRV or ERV, or be ENERGY STAR qualified,
- (b) be tested at 0 °C and -25 °C,
- (c) be installed such that the supply and exhaust flows are measured and balanced within 10% at high speed, with a label attached to the equipment indicating the installing company and the measured flow rates, and
- (d) be tested at a flow rate not less than that indicated in Table 3, as reported in Section 3 in the Home Ventilating Institute's (HVI) "Certified Home Ventilating Products Directory".

4.7.1.3 IMS Requirements

The ventilation portion of the IMS shall:

- (a) be installed such that the supply and exhaust flows are measured and balanced within 10% at high speed, with a label attached to the equipment indicating the installing company and the measured flow rates,
- (b) be tested at a flow rate not less than that indicated in Table 3.

4.7.1.4 Integrated HRV Air Handler Requirements

Integrated HRV air handlers shall:

- (a) be tested to Section 8 of to CSA P.10-07 "Performance of Integrated Mechanical Systems for Residential Heating and Ventilation", and
- (b) have a defrost mechanism.

4.7.1.5 Ventilation of Public Corridors in MURBs

Public corridors that serve more than one *residential unit* shall:

- (a) have a ventilation rate not less than 0.3 L/s/m² (0.06 cfm/ft²), with ventilation air supplied by one or more HRV/ERVs with an SRE at the design flow rate that is not less than that which is required for the HRV/ERV in an individual *residential unit*, and
- (b) have airtight gaskets or weatherstripping on doors between each *residential unit* and the corridor.

NOTE: The ventilation rate is consistent with ASHRAE 62.1-2010 "Ventilation for Acceptable Indoor Air Quality."

Table 3
Minimum Airflow Rates
Forming Part of 4.7.1.2(d) and 4.7.1.3 (b)

| Number of Bedrooms | Minimum Airflow Rate (at 0 °C) | |
|--------------------|---|-----|
| | L/s | CFM |
| 1 | 16 | 34 |
| 2 | 18 | 38 |
| 3 | 22 | 47 |
| 4 | 26 | 55 |
| 5 | 30 | 64 |
| > 5 | Comply with 9.32.3.1.(1)(a) in 2010 NBC | |

NOTES:

- 1) For a listing of products, refer to Section 3 in the HVI "Certified Home Ventilating Products Directory", available at: <http://hvi.org/proddirectory/index.cfm>.
- 2) For a listing of ENERGY STAR qualified equipment, refer to: http://oee.nrcan.gc.ca/sites/oee.nrcan.gc.ca/files/files/pdf/residential/personal/ESTAR_HRV_List.xls.

4.7.2 Distribution Systems

4.7.2.1 Interconnection to Forced-Air Distribution System

Where a central forced air system is utilized either fully or in part to distribute ventilation air, the principal exhaust fan control shall be interconnected with the forced air distribution system such that switching on the principal exhaust fan operates the forced air distribution fan.

4.7.2.2 Duct Location

All ducts for heating, ventilation and air conditioning shall be located within the heated boundary, where the heated boundary shall have a thermal resistance not less than that provided in Table 2.

NOTES:

- 1) The intent of this requirement is to ensure that there is full insulation between the duct and the exterior surface of the opaque assembly.
- 2) This requirement does not pertain to exhaust-only ventilation.

4.7.2.3 Duct Sealing

- (a) Except for 4.6.5.3(d), 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.

NOTE: See Figure 1 for an illustration of these requirements.

- (b) HRV/ERV, *integrated HRV air handlers*, and IMS connections to the outdoor vent hoods must be sealed and insulated.
- (c) For dedicated fully ducted ventilation ductwork (e.g., HRV/ERV ducts), all manufactured and site assembled joints must be sealed.
- (d) The following joints are exempt from additional sealing: self-sealing manufactured pipe, take-offs, and fittings (with manufactured seal or incorporated gaskets); snap lock and folded seam longitudinal duct joints; and knurled adjustable joints on manufactured elbows.

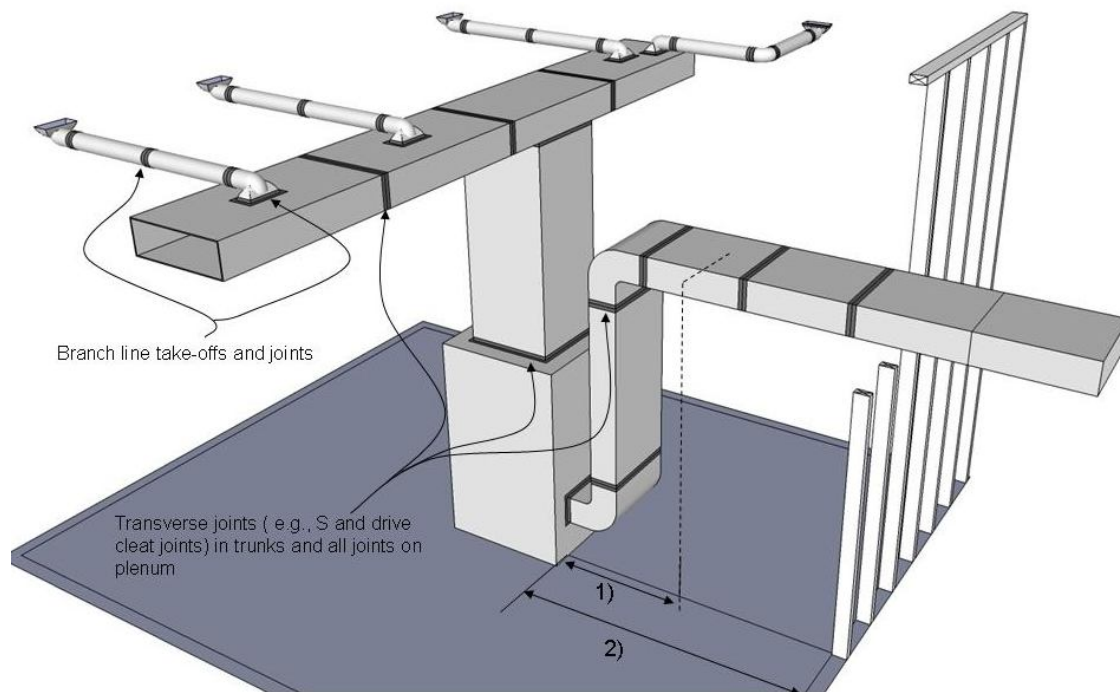


Figure 1: Duct Sealing Requirements
 Forming Part of 4.6.5.3 (a) ii)

4.7.2.4 Solar Hot Water System Distribution

Where distribution piping for solar hot water systems is located in an unconditioned space, they shall be thermally insulated to the greater of:

- (a) the manufacturer's installation specifications, or
- (b) RSI 0.5 (R3)

4.8 Electrical Savings

All ENERGY STAR qualified homes must have new equipment or products installed that provide a minimum of 400 kWh/yr of electrical savings using measures specified in Table 4.

Table 4
Eligible Electrical Savings
Forming Part of 4.8

| Measure | | kWh/yr | Coding |
|---|-------------------------------------|----------------------------------|--------|
| Air Conditioning | | | |
| Options per climate zone | | See relevant tables in Section 6 | |
| Appliances¹ | | | |
| ENERGY STAR qualified dishwasher | | 20 | KA01 |
| ENERGY STAR qualified clothes washer | | 25 | KA02 |
| ENERGY STAR qualified freezer | | 40 | KA03 |
| ENERGY STAR qualified refrigerator | | 50 | KA04 |
| Lighting – ENERGY STAR qualified fixtures or light bulbs² | | | |
| Individual Rooms | Kitchen | 70 | KL01 |
| | Dining | 70 | KL02 |
| | Living room | 40 | KL03 |
| | Family room | 60 | KL04 |
| | Main hallway and bathroom | 50 | KL05 |
| | Bedrooms ³ | 15 | KL06 |
| | Basement | 5 | KL07 |
| 75% of the entire house ⁴ | | 295 | KL08 |
| Entire house ⁴ | | 420 | KL09 |
| Ventilation | | | |
| ENERGY STAR qualified bathroom fan ⁵ | 10 to 80 cfm | 5 | KV01 |
| | >90 cfm | 10 | KV02 |
| ENERGY STAR qualified range hood | | 30 | KV03 |
| HRV/ERV fan efficacy: SRE <75% @0 °C | 0.57 L/s/W (1.2 cfm/W) ⁶ | 110 | KV04 |
| HRV/ERV fan efficacy: SRE ≥75% @0 °C | 0.38 L/s/W (0.8 cfm/W) ⁶ | 30 | KV05 |
| | 0.47 L/s/W (1.0 cfm/W) ⁶ | 140 | KV06 |

NOTES:

- 1) Savings are limited to one appliance per appliance type.
- 2) Where applied, builders must choose from either individual rooms, or 75% of the entire house, or the entire house.
- 3) All bedrooms in the house must comply in order to qualify.
- 4) Applies to all lighting in the house, including decorative, stair and exterior lighting.
- 5) All bathrooms must comply in order to qualify. Where there are fans at both cfm levels, the higher level shall apply.
- 6) Fan efficacy levels are equivalent to Version 1.0, Tier 2 ENERGY STAR specifications.

5 COMPLIANCE OPTIONS

5.1 Performance Approach

5.1.1 General

ENERGY STAR qualified homes built following the performance approach shall comply with 5.1.2 and 5.1.4 in addition to meeting the minimum requirements laid out in Section 4.

5.1.2 Energy Target

ENERGY STAR qualified homes built following the performance approach shall comply with the performance targets that apply to the relevant climate zone and region, as provided in Section 6.

NOTES:

- 1) The evaluation conducted under the Performance Approach is limited to the specific house that is modelled and labelled.
- 2) Performance targets for additional regions are under development and will be added to Section 6 once they are completed.

5.1.3 *Approved Compliance Software*

The energy target in 5.1.2 shall be assessed using HOT2000 Version 10.51, unless otherwise specified in Section 6.

5.1.4 Energy Credits

Where applicable, ENERGY STAR qualified homes following the performance approach shall apply energy credits per NRCan's "New Housing Programs' 2012 Energy Credits."

5.2 Prescriptive Approach

5.2.1 General

ENERGY STAR qualified homes built following the prescriptive approach shall comply with 5.2.2 to 5.2.4 in addition to meeting the minimum requirements laid out in Section 4.

NOTES:

- 1) The Prescriptive Approach allows a builder to choose a Builder Option Package (BOP) that has been pre-determined to meet, on average, the energy performance specifications for an ENERGY STAR qualified new home. No modelling is required under this approach.
- 2) The Prescriptive Approach is only available to detached and attached houses.
- 3) Refer to Section 6 for BOP details. BOPs for additional provinces and territories are under development and will be added to Section 6 once they are completed.

5.2.2 Builder Option Packages

ENERGY STAR qualified homes shall comply with the Builder Option Package (BOP) for the relevant region and climate zone per Section 6.

5.2.3 Effective Thermal Resistance of Opaque Assemblies

Opaque assemblies shall be constructed to achieve the applicable effective thermal resistance levels specified in the applicable BOP, as calculated by following the procedures provided in "ENERGY STAR for New Homes® Tables for Calculating Effective Thermal Resistance of Opaque Assemblies, Effective December 2012" to achieve the effective thermal resistance levels in the applicable BOP.

5.2.4 Window to Wall Ratio

The total area of all windows, sliding glass doors and skylights is limited to a maximum of 20% of the *above grade wall area*. Exceeding the applicable limit precludes use of the prescriptive approach.

NOTE: The total area referred to is the sum of all the areas of the structural rough openings for the windows, sliding glass doors and skylights, as well as transoms and sidelights.

6 REGIONAL SPECIFICATIONS

6.1 Ontario

6.1.1 Climate Zones for Ontario

The climate zones for 6.1.2, 6.1.3 and 6.1.4 are defined by Table 5.

Table 5
ESNH Climate Zones for Ontario
Forming Part of 6.1.1

| Climate Zone | Heating Degree Days ¹ |
|----------------|----------------------------------|
| ESNH ON Zone 1 | <5000 |
| ESNH ON Zone 2 | ≥5000 |

NOTE:

(1) As determined by 1.2.2.

6.1.2 Electrical Savings From Air Conditioning for Ontario

Table 6 shall be used to determine electrical savings from air conditioning for Ontario for determining compliance to 4.8.

Table 6
Electrical Savings from Air Conditioning for Ontario
Forming Part of 4.8 and 6.1.2

| Climate Zone | ENERGY STAR Qualified Air Conditioner (kWh/yr) | | | |
|----------------|---|--------|---------|--------|
| | SEER 14.5 | Coding | SEER 16 | Coding |
| ESNH ON Zone 1 | 65 | KAC01 | 125 | KAC02 |
| ESNH ON Zone 2 | 30 | | 55 | |

6.1.3 Performance Targets for Ontario

For ENERGY STAR qualified homes following the performance approach, the energy targets and *approved compliance software* shall comply with Table 7.

Table 7
Minimum EnerGuide Rating under the Performance Approach for Ontario
Forming Part of 6.1.3

| House Type | HOT2000 version | Minimum ERS Target | |
|--------------------|-----------------|--------------------|----------------|
| | | ESNH ON Zone 1 | ESNH ON Zone 2 |
| Attached, Detached | 9.34c | 83 | 83 |
| MURBs | 10.51 | 81 | 81 |

6.1.4 Builder Option Packages for Ontario

Apply all BOP elements for the applicable climate zone, per Table 8.

Table 8¹
Ontario BOP
Forming Part of 6.1.4

| Item | ESNH ON Zone 1 | | ESNH ON Zone 2 | | Coding |
|--|--|-------------------|-------------------|-------------------|--------|
| | RSI | R | RSI | R | |
| Ceilings below attics | 8.67 | 49.2 | 10.43 | 59.2 | CE101 |
| Cathedral ceilings and flat roofs | 4.87 ² | 27.7 ² | 5.02 | 28.5 | CE102 |
| Walls above grade | 3.08 | 17.5 | 3.08 | 17.5 | CE103 |
| Floors over unheated spaces | 4.87 ² | 27.7 ² | 5.02 | 28.5 | CE104 |
| Foundation walls below or in contact with the ground | 2.98 | 16.9 | 3.46 | 19.6 | CE105 |
| Unheated floors on ground above frost line | 1.96 | 11.1 | 1.96 | 11.1 | CE106 |
| Heated or unheated floors on ground on permafrost | n/a | n/a | 4.44 ³ | 25.2 ³ | CE107 |
| Heated floors on ground | 2.32 | 13.2 | 2.85 | 16.2 | CE108 |
| Slabs on grade with integral footing | 1.96 | 11.1 | 3.72 | 21.1 | CE109 |
| Fenestration | ENERGY STAR Zone B ⁴ | | | | CE110 |
| Space heating | 95% AFUE ENERGY STAR furnace or boiler | | | | CM101 |
| | Air-source heat pump | | | | CM102 |
| | Ground-source heat pump | | | | CM103 |
| Domestic water heating | EF 0.67 ^{5,6} | | | | CM104 |
| Combined space and water heating | 95% AFUE ENERGY STAR boiler | | | | CM105 |
| Ventilation ⁷ | 60% SRE @0 °C and 55% SRE @ -25 °C | | | | CM106 |
| Electrical savings ⁸ | 400 kWh/yr | | | | CK101 |
| Minimum BOP options (per Table 9) ⁹ | 2.4 | | 2.5 | | n/a |

NOTES:

- 1) Thermal resistance requirements are listed in effective RSI (R) values.
- 2) Ontario Building Code Supplementary Standard SB-12, nominal value = R31
- 3) Applies to ≥6000 HDD only, per Table 2.
- 4) Climate zones for ENERGY STAR fenestration products are defined in "Climate Zones – ENERGY STAR," refer to: <http://oee.nrcan.gc.ca/equipment/windows-doors/1371>
- 5) Cannot be used for meeting combined space and water heating configurations.
- 6) An electric water heater may be used in lieu of the EF 0.67 water heater only when used in conjunction with the air source heat pump or ground source heat pump options.
- 7) The SRE @0 °C shall be determined at the airflow rate specified in Table 3.
- 8) Select a minimum of 400 kWh/yr of measures from Table 4 or Table 6.
- 9) Select options from Table 9 such that the points assigned total not less than the amount of points indicated in this table for the applicable climate zone.

Table 9^{1,2}
Ontario BOP Options
Forming Part of 6.1.4

| Category | Item | ESNH ON Zone 1 | ESNH ON Zone 2 | Coding |
|---|--|----------------|----------------|--------|
| Ceilings Below Attic/ Cathedral Ceilings ² | R 42 (nominal) at heel | 0.1 | n/a | OE101 |
| | Attic-R 60 (nominal); flat/cathedral-R 40 (nominal) | 0.1 | n/a | OE102 |
| | R 52 (nominal) at heel w/ R 60 (nominal) in attic; flat/cathedral-R 40 (nominal) | 0.2 | n/a | OE103 |
| Walls Above Grade | RSI 3.41 (R 19.4) | 0.7 | 0.7 | OE201 |
| | RSI 3.59 (R 20.4) | 0.8 | 0.8 | OE202 |
| | RSI 3.90 (R 22.1) | 1.1 | 1.2 | OE203 |
| | RSI 4.03 (R 22.9) | 1.2 | 1.3 | OE204 |
| | RSI 4.48 (R 25.4) | 1.5 | 1.6 | OE205 |
| | RSI 4.79 (R 27.2) | 1.7 | 1.9 | OE206 |
| Foundation Walls | RSI 3.67 (R 20.8) | 0.2 | n/a | OE301 |
| | RSI 3.94 (R 22.4) | 0.4 | n/a | OE302 |
| | RSI 4.19 (R 23.8) | 0.4 | 0.1 | OE303 |
| Unheated Floors Below Frost Line ³ | RSI 0.88 (R 5.0) full slab | 0.1 | 0.1 | OE401 |
| | RSI 1.76 (R 10.0) full slab | 0.3 | 0.2 | OE402 |
| Fenestration ⁴ | ENERGY STAR Zone C | 0.1 | 0.1 | OE501 |
| | ENERGY STAR Zone D | 0.4 | 0.3 | OE502 |
| Airtightness ⁵ | Level 2 | 0.3 | 0.4 | OE601 |
| | Level 3 | 0.7 | 0.8 | OE602 |
| | Level 4 | 1.0 | 1.2 | OE603 |
| Airtightness+ HRV/ERV ^{5,6} | Level 4+ ≥84% SRE @ 0 °C | 1.7 | 1.9 | OEM101 |
| HRV/ERV ⁶ | 65 to <75% SRE @ 0 °C | 0.1 | 0.1 | OM101 |
| | ≥75 to <84% SRE @ 0 °C | 0.3 | 0.2 | OM102 |
| | ≥84% SRE @ 0 °C | 0.5 | 0.4 | OM103 |
| Domestic Water Heating ⁷ | Instantaneous min. EF 0.82 | 0.6 | 0.6 | OM201 |
| | Instantaneous condensing min. EF 0.90 | 0.8 | 0.7 | OM202 |
| | Instantaneous condensing min. EF 0.95 | 0.9 | 0.8 | OM203 |
| | Tank condensing min. TE 90% | 0.7 | 0.7 | OM204 |
| | Tank condensing min. TE 94% | 0.8 | 0.8 | OM205 |
| Combined Space and Water Heating ⁸ | Tank condensing min. TE 90% | -0.4 | -0.4 | OM301 |
| | Tank condensing min. TE 94% | -0.3 | -0.4 | OM302 |
| | Instantaneous min. EF 0.98 | -0.1 | -0.3 | OM303 |
| | Instantaneous min. EF 0.98 and max. 25L storage tank | -0.3 | -0.5 | OM304 |
| SDHW | ≥6000 MJ/yr | 1.0 | 0.9 | OM401 |
| Drain Water Heat Recovery ⁹ | <%42 steady state – one shower | 0.5 | 0.4 | OM501 |
| | <%42 steady state – two showers | 1.0 | 0.8 | OM502 |
| | ≥%42 steady state – one shower | 0.7 | 0.5 | OM503 |
| | ≥%42 steady state – two showers | 1.3 | 1.0 | OM504 |
| Electrical Savings | 150 kWh/yr | 0.1 | 0.1 | OK101 |

NOTES:

- 1) Thermal resistance requirements are listed in effective values, unless otherwise indicated with (nominal) for nominal value. An 'n/a' indicates that an upgrade is not possible, likely due to a higher core BOP requirement.
- 2) Where both attics below ceilings and cathedral or flat roofs are present, both options must be applied.
- 3) Full slab thermal resistance values do not apply to slab on grade foundations.
- 4) Climate zones for ENERGY STAR fenestration products are defined in "Climate Zones – ENERGY STAR," refer to: <http://oee.nrcan.gc.ca/equipment/windows-doors/1371>.
- 5) See Appendix A for equivalent ACH, NLA and NLR values for each level.
- 6) The SRE @0 °C shall be determined at the airflow rate specified in Table 3.
- 7) This option applies only to stand-alone water heaters and not those that form part of a combined space and water heating system.
- 8) Note that these options have negative values. When applying one of these options, additional measures must be chosen in order to meet the total number of required points specified in 6.1.4. These options cannot be used in conjunction with domestic water heater options.
- 9) This option is based on the number of showers served, not the number of DWHR units, with one exception: houses with a total of one shower may claim the points for two showers since all the showers in the house are being served by the DWHR unit. The maximum allowable amount is two showers.

6.2 Saskatchewan

6.2.1 Climate Zones for Saskatchewan

The climate zones for 6.2.2, 6.2.3 and 6.2.4 are defined by Table 10.

Table 10
ESNH Climate Zones for Saskatchewan
Forming Part of 6.2.1

| Region | Heating Degree Days ¹ |
|----------------|----------------------------------|
| ESNH SK Zone 1 | <6000 |
| ESNH SK Zone 2 | ≥6000 |

NOTE:
(1) As determined by 1.2.2.

6.2.2 Electrical Savings Options for Saskatchewan

Table 11 shall be used to determine electrical savings from air conditioning for Saskatchewan for determining compliance to 4.8.

Table 11
Electrical Savings from Air Conditioning for Saskatchewan
Forming Part of 4.8 and 6.2.2

| Climate Zone | ENERGY STAR Qualified Air Conditioner (kWh/yr) | | | |
|----------------|---|--------|---------|--------|
| | SEER 14.5 | Coding | SEER 16 | Coding |
| ESNH SK Zone 1 | 30 | KAC01 | 55 | KAC02 |
| ESNH SK Zone 2 | 20 | | 40 | |

6.2.3 Performance Targets for Saskatchewan

For ENERGY STAR qualified homes following the Performance Approach, the energy targets and *approved compliance software* shall comply with Table 12.

Table 12
Minimum EnerGuide Rating under the Performance Approach for Saskatchewan
Forming Part of 6.2.3

| House Type | HOT2000 version | Minimum ERS Target | |
|------------|-----------------|--------------------|----------------|
| | | ESNH SK Zone 1 | ESNH SK Zone 2 |
| All | 10.51 | 81 | 82 |

6.2.4 Builder Option Packages for Saskatchewan

Apply all core BOP elements for the applicable climate zone, per Table 13.

Table 13¹
Saskatchewan BOP
Forming Part of 6.2.4

| Item | ESNH SK Zone 1 | | ESNH SK Zone 2 | | Coding |
|--|--|------|----------------|------|--------|
| | RSI | R | RSI | R | |
| Ceilings below attics | 10.43 | 59.2 | 10.43 | 59.2 | CE101 |
| Cathedral ceilings and flat roofs | 5.02 | 28.5 | 5.02 | 28.5 | CE102 |
| Walls above grade | 3.08 | 17.5 | 3.85 | 21.9 | CE103 |
| Floors over unheated spaces | 5.02 | 28.5 | 5.02 | 28.5 | CE104 |
| Foundation walls below or in contact with the ground | 3.46 | 19.6 | 3.46 | 19.6 | CE105 |
| Unheated floors on ground above frost line | 1.96 | 11.1 | 1.96 | 11.1 | CE106 |
| Heated or unheated floors on ground on permafrost | n/a | n/a | 4.44 | 25.2 | CE107 |
| Heated floors on ground | 2.85 | 16.2 | 2.85 | 16.2 | CE108 |
| Slabs on grade with integral footing | 3.72 | 21.1 | 3.72 | 21.1 | CE109 |
| Fenestration | ENERGY STAR Zone B ² | | | | CE110 |
| Space heating | 95% AFUE ENERGY STAR furnace or boiler | | | | CM101 |
| | Air-source heat pump | | | | CM102 |
| | Ground-source heat pump | | | | CM103 |
| Domestic water heating | EF 0.67 ^{3,4} | | | | CM104 |
| Combined space and water heating | 95% AFUE ENERGY STAR boiler | | | | CM105 |
| Ventilation ⁵ | 60% SRE @0 °C and 55% SRE @ -25 °C | | | | CM106 |
| Electrical savings ⁶ | 400 kWh/yr | | | | CK101 |
| Minimum BOP options (per Table 14) ⁷ | 2.2 | | 2.1 | | n/a |

NOTES:

- 1) Thermal resistance requirements are listed in effective RSI (R) values.
- 2) Climate zones for ENERGY STAR fenestration products are defined in "Climate Zones – ENERGY STAR," refer to: <http://oee.nrcan.gc.ca/equipment/windows-doors/1371>.
- 3) Cannot be used for meeting combined space and water heating configurations.
- 4) An electric water heater may be used in lieu of the EF 0.67 water heater only when used in conjunction with the air source heat pump or ground source heat pump options.
- 5) The SRE @0 °C shall be determined at the airflow rate specified in Table 3.
- 6) Select a minimum of 400 kWh/yr of measures from Table 4 or 11.
- 7) Select options from Table 14 such that the points assigned total not less than the amount of points indicated in this table for the applicable climate zone.

Table 14¹
Saskatchewan BOP Options
Forming Part of 6.2.4

| Category | Item | ESNH SK Zone 1 | ESNH SK Zone 2 | Coding |
|---|---|----------------|----------------|--------|
| Ceilings Below Attic | R52 (nominal) at heel | n/a | 0.1 | OE101 |
| Walls Above Grade | RSI 3.41 (R 19.4) | 0.7 | n/a | OE201 |
| | RSI 3.59 (R 20.4) | 0.8 | n/a | OE202 |
| | RSI 3.90 (R 22.1) | 1.2 | n/a | OE203 |
| | RSI 4.03 (R 22.9) | 1.3 | n/a | OE204 |
| | RSI 4.48 (R 25.4) | 1.6 | 0.5 | OE205 |
| | RSI 4.79 (R 27.2) | 1.9 | 0.7 | OE206 |
| Foundation Walls | RSI 4.19 (R 23.8) | 0.1 | 0.1 | OE301 |
| Unheated Floors Below Frost Line² | RSI 0.88 (R 5.0) full slab | 0.1 | 0.1 | OE401 |
| | RSI 1.76 (R 10.0) full slab | 0.2 | 0.2 | OE402 |
| Fenestration³ | ENERGY STAR Zone C | 0.1 | n/a | OE501 |
| | ENERGY STAR Zone D | 0.3 | 0.3 | OE502 |
| Airtightness⁴ | Level 2 | 0.4 | 0.5 | OE601 |
| | Level 3 | 0.9 | 0.9 | OE602 |
| | Level 4 | 1.4 | 1.3 | OE603 |
| Airtightness+ HRV/ERV^{4,5} | Level 4 + ≥84% SRE @ 0 °C | 2.0 | 2.1 | OEM101 |
| HRV/ERV⁵ | 65 to <75% SRE @ 0 °C | 0.1 | 0.1 | OM101 |
| | ≥75 to <84% SRE @ 0 °C | 0.2 | 0.3 | OM102 |
| | ≥84% SRE @ 0 °C | 0.3 | 0.4 | OM103 |
| Domestic Water Heating⁶ | <i>Instantaneous</i> min. EF 0.82 | 0.6 | 0.6 | OM201 |
| | <i>Instantaneous</i> condensing min. EF 0.90 | 0.8 | 0.8 | OM202 |
| | <i>Instantaneous</i> condensing min. EF 0.95 | 0.9 | 0.8 | OM203 |
| | Tank condensing min. TE 90% | 0.7 | 0.7 | OM204 |
| | Tank condensing min. TE 94% | 0.8 | 0.8 | OM205 |
| Combined Space and Water Heating⁷ | Tank condensing min. TE 90% | -0.4 | -0.4 | OM301 |
| | Tank condensing min. TE 94% | -0.4 | -0.3 | OM302 |
| | <i>Instantaneous</i> min. EF 0.98 | -0.4 | -0.3 | OM303 |
| | <i>Instantaneous</i> min. EF 0.98 and max. 25L storage tank | -0.5 | -0.4 | OM304 |
| SDHW | ≥6000 MJ/yr | 0.9 | 0.8 | OM401 |
| Drain Water Heat Recovery⁸ | <%42 steady state – one shower | 0.4 | 0.4 | OM501 |
| | <%42 steady state – two showers | 0.8 | 0.7 | OM502 |
| | ≥%42 steady state – one shower | 0.5 | 0.5 | OM503 |
| | ≥%42 steady state – two showers | 1.0 | 1.0 | OM504 |
| Electrical Savings | 150 kWh/yr | 0.1 | 0.1 | OK101 |

NOTES:

- 1) Thermal resistance requirements are listed in effective values, unless otherwise indicated with (nominal) for nominal value. An 'n/a' indicates that an option is not possible, likely due to a higher core BOP requirement.
- 2) Full slab thermal resistance values do not apply to slab on grade foundations.

- 3) Climate zones for ENERGY STAR fenestration products are defined in “Climate Zones – ENERGY STAR,” refer to: <http://oee.nrcan.gc.ca/equipment/windows-doors/1371>
- 4) See Appendix A for equivalent ACH, NLA and NLR values for each level.
- 5) The SRE @0 °C shall be determined at the airflow rate specified in Table 3.
- 6) This option applies only to stand-alone water heaters and not those that form part of a combined space and water heating system.
- 7) Note that these options have negative values. When applying one of these options, additional measures must be chosen in order to meet the total number of required points specified in 6.2.4. These options cannot be used in conjunction with domestic water heater options.
- 8) This option is based on the number of showers served, not the number of DWHR units, with one exception: houses with a total of one shower may claim the points for two showers since all the showers in the house are being served by the DWHR unit. The maximum allowable amount is two showers.

APPENDIX A: EQUIVALENT AIR LEAKAGE METRICS

Table A-1
Equivalent Air Leakage Metrics for Attached Buildings

| Level | ACH | NLA | | NLR | |
|----------------|-----|---------------------------------|--------------------------------------|--------------------|-----------------------|
| | | cm ² /m ² | in ² /100 ft ² | L/s/m ² | cfm50/ft ² |
| 1 ¹ | 3.0 | 2.12 | 3.06 | 1.32 | 0.26 |
| 2 | 2.5 | 1.66 | 2.39 | 1.02 | 0.20 |
| 3 | 2.0 | 1.18 | 1.70 | 0.78 | 0.15 |
| 4 | 1.5 | 0.72 | 1.04 | 0.54 | 0.11 |

NOTE:

- 1) Level 1 represents the core BOP requirement.

Table A-2
Equivalent Air Leakage Metrics for Detached Buildings

| Level | ACH | NLA | | NLR | |
|----------------|-----|---------------------------------|--------------------------------------|--------------------|-----------------------|
| | | cm ² /m ² | in ² /100 ft ² | L/s/m ² | cfm50/ft ² |
| 1 ¹ | 2.5 | 1.26 | 1.81 | 0.93 | 0.18 |
| 2 | 2.0 | 1.00 | 1.44 | 0.75 | 0.15 |
| 3 | 1.5 | 0.75 | 1.08 | 0.57 | 0.11 |
| 4 | 1.0 | 0.49 | 0.71 | 0.38 | 0.07 |

NOTE:

- 1) Level 1 represents the core BOP requirement.