Sustainable Buildings Canada

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BUILDING ENERGY CODE COMPLIANCE RESOURCE GUIDE, PART 9 HOUSING

ONTARIO

With the support of Natural Resources Canada

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NOTE: This document has been formatted in Landscape Orientation to facilitate Web-based viewing.

Introduction

Building Code Officials in Ontario play a crucial role in ensuring that building construction projects comply with the Ontario Building Code (OBC), safeguarding public safety and maintaining the integrity of the built environment. With funding support from Natural Resources Canada[1], Sustainable Buildings Canada (SBC) is developing a series of "Practical Codes Compliance Resource Guides" for Building Officials across Canada. These Guides form part of a package of materials in support of the "Codes Acceleration" Program, funded by Natural Resources Canada. As part of that Program SBC is delivering a series of 1-day demonstration workshops for Building Officials which provide attendees with practical knowledge and examples of strategies and technologies consistent with achieving the various tiers of the NBC/NECB.

This Guide is focused on Part 9 buildings in Ontario and outlines best practices for Energy Code compliance and verification, highlights common deficiencies found in building permit applications, and explores design stage opportunities to streamline the review process through improved communications, detailing and reference materials. The Guide will further support field inspections with verification resources and references to on-line materials. While much of the Guide focuses on the "Performance Path" aspects of the Code, including energy modelling requirements, SBC notes that the issues, challenges and solutions also apply to the Prescriptive Path. We have also included specific direction on the location of pertinent information in the Energy Efficiency Design Summary (EEDS) form as part of this Guide.

The development of the Guide(s) has been overseen by a Technical Advisory Committee (TAC) which has provided insights and guidance, particularly as relates to current challenges facing Building Code Officials. The content of the Guide(s) relied heavily on a roster of subject matter experts and energy modellers who were also key participants in the demonstration workshops.[2] SBC further benefitted from commentary and support from Natural Resources Canada staff. SBC is extremely grateful to all.

This Guide is provided as reference material for Building Officials attending SBC Codes Acceleration Workshops and is not meant to replace regulatory or legislative building codes.[3]

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[1] Funding provided under the Toward Net Zero Homes and Communities Program, Natural Resources Canada

[2] See Appendix B for Committee Advisors and Subject Matter Experts/Energy Modellers

[3] See Appendix A for links to cited reference materials

How to Use this Guide

This Guide includes two sections. The first is intended to provide Building Code Officials with general advice to assist in compliance assessments given the emerging Energy Code landscape. It covers best practices for code compliance, common deficiencies in building permit applications, and design opportunities to ensure timely review. The second section of the Guide presents supporting resources in the form of verification tools and on-line resources (websites), which are compiled to facilitate an understanding of select topics and promote ease of use.

This Guide is not meant to replace the Building Code. It is a resource for reference material to assist in verifying and validating submission information in an increasingly complex code environment. Information contained herein is subject to change with referenced Codes and standards updates.

Best Practices for Code Compliance

The following list was prepared by SBC as a result of consultations with Code officials as part of the demonstration workshop effort. Further insights were provided by the Technical Advisory Committee and the energy modelling community. It is anticipated that these best practices may evolve in response to the roll-out of new Codes.

Thorough Understanding of the applicable Building Code (OBC)

Building Code Officials must possess an in-depth understanding of the OBC, Supplementary Standard SB12, 2016[4] and as harmonization continues, it is expected that Codes Officials will need a similar understanding of the National Building Code (NBC). Regular training and continuous education on Code updates, amendments, and interpretations are vital. Staying current with legislative changes enables officials to apply the Code accurately and consistently.

Effective Communication

Clear, concise communication with applicants, designers, and contractors is essential. Providing detailed feedback on submission deficiencies and required corrections helps applicants understand expectations, reducing the likelihood of clarification requests or resubmissions. Establishing

[4] MMAH: "Supplementary Standard SB-12, 2016 - Energy Efficiency for Housing". Revised July 7, 2016

standardized communication protocols, including pre-submission consultations and facilitated, integrated design collaboration, harmonized reference standards and common drawing details can enhance consistency and improve efficiency.

Use of Information Technology (IT)

Leveraging IT can significantly improve the permit review process. Utilizing digital plan submissions, automated Code compliance software, offsite online inspection and online tracking systems allows for faster, more accurate reviews. Implementing a centralized database for document management can help ensure easy access to project information.

Collaboration and Coordination

Collaborating with other municipal departments and agencies involved in the permit approval process is critical. Establishing inter-departmental communication channels and coordinating reviews can help identify potential issues early, reducing delays and ensuring comprehensive compliance checks.

Standardized Procedures

Developing and adhering to standardized review procedures and checklists helps ensure consistency and thoroughness. These procedures should cover all aspects of the OBC, including structural integrity, fire safety, accessibility, and energy and environmental sustainability. Regularly updating checklists to reflect Code changes is crucial.

Common Deficiencies in Building Permit Applications

Similar to the development of the list of Best Practices, Common deficiencies in Permit Applications were identified as part of the Demonstration Workshop series and collated by SBC. In combination with the Best Practices, this information has been used to develop a set of “Design Opportunities” that will assist with timely and effective reviews of permit applications.

Incomplete or Inaccurate Documentation

One of the most common deficiencies is the submission of incomplete or inaccurate documentation. Missing information, incorrect details, or non-compliance with Code requirements can lead to delays and additional reviews. Ensuring that all required documents and information are provided upfront can expedite the review process. Understanding both energy modelling inputs and outputs will become increasingly important as tiered Energy Codes are implemented. Consistency in professional practices requires oversight and verification.

Environmental and Energy Efficiency Compliance

With growing emphasis on sustainability, non-compliance with environmental and energy efficiency standards is increasingly scrutinized. Common deficiencies include:

- Incorrect or inconsistent area and volume calculations including Fenestration and Door to Wall Ratio (FDWR) floor area and volume.
- Inadequate or incorrectly calculated insulation levels or performance (including the effect of thermal bridging).
- Window performance that does not meet specifications for U value and solar heat gain co-efficient (SHGC), or that is not tested to the applicable standard (NFRC 100 & 200).
- HVAC systems efficiencies and matched certifications (P-9.11, DHW UEF).
    - For example, when combined space heating and domestic hot water heating systems are used; package A1 is employed. Package A4 is required with continuous wall insulation.
- Reference ventilation air assumptions and/or inaccurate air tightness testing procedures and standards.
- Incorrect or insufficient energy modelling.
- Inappropriate standard operating conditions.
- Misunderstanding of and non-compliance with changing Energy Codes and standards.
- Inappropriate or unqualified modelling software.

Incorporating all these elements in sufficient detail into the design and submission documents from the outset is essential for a smooth review process.

Design Opportunities to Ensure Timely Review

Early Engagement with Design Professionals and Code Officials

Engaging with Code users and Building Code Officials early in the design process can identify potential compliance issues before they become problematic. Pre-application meetings with Builder and specifiers, and preliminary reviews can provide valuable feedback and guidance, reducing the likelihood of requiring significant revisions later in the review process.

Integrated Design Approach

Adopting an integrated design approach, where architects, engineers, and other stakeholders collaborate from project inception, and throughout the planning stages, can ensure that all aspects of the Building Code are considered. This holistic approach can streamline the review process and enhance overall compliance.

Quality Control and Peer Review

Implementing a rigorous quality control process and conducting peer reviews of plans can help identify deficiencies before submission. This proactive approach ensures that applications are complete, accurate, and compliant with the OBC, minimizing the need for revisions.

Clear and Detailed Documentation

Providing clear and detailed documentation is essential for a timely review. Builders should be encouraged to include all necessary information through checklists, best practice guides and reference resources. Alongside site layouts, structural details, fire safety measures, and accessibility features, energy simulation modelling and summary reports are required for determining compliance with tiered Energy Codes. Ensuring that documentation is standardized, well-organized and easy to navigate can expedite the review process.

Responsive and Collaborative Attitude

Fostering a responsive and collaborative attitude among all parties involved can significantly impact the review timeline. Promptly addressing review comments, maintaining open lines of communication, and the willingness to make necessary adjustments can expedite the approval process.

Conclusion

By adhering to best practices for Energy Code compliance, addressing common deficiencies, understanding energy performance modelling, and leveraging design opportunities, Building Code Officials in Ontario can help ensure a timely and efficient review of building permit applications. This approach not only enhances the safety and quality of construction projects but also fosters positive relationships between officials, designers, and applicants. Through continuous improvement and collaboration, the building permit review process can become a model of efficiency and excellence.

Resources

This Section has been identified, curated and produced as a result of the consultation work of the Codes Acceleration Fund Building Officials Workshop Project by Sustainable Buildings Canada, in partnership with Natural Resources Canada and Building Officials Association members and staff.

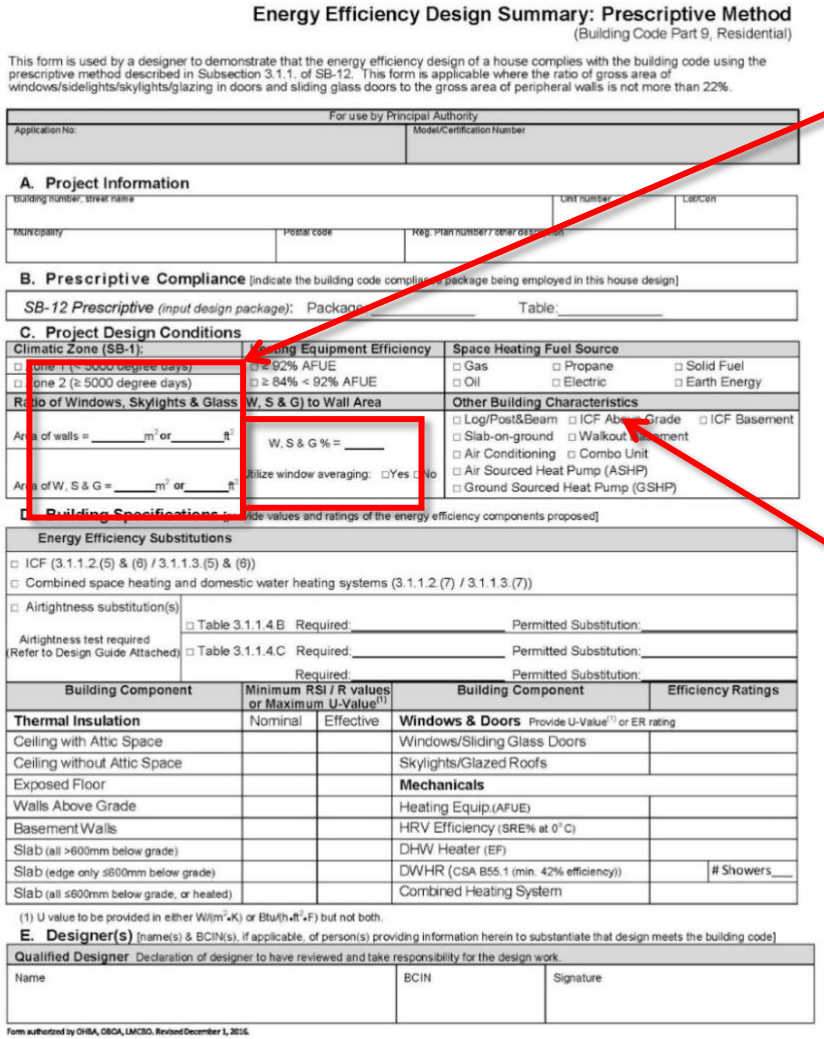
Workshop participants and the SBC CAF Technical Advisory Committee have identified the current gaps in knowledge required to effectively review and approve the next iteration of energy and resource efficiency compliance requirements. Participating Industry Subject Matter experts reviewed these observations and developed the following interim, Ontario-specific set of Best Practices.

As workshops continue to be delivered and additional gaps or barriers are identified, additional material will be developed and curated into a final best practice compendium. The compendium will include codes resources relevant to other regions based on similar Compliance Guides developed over the project period.

The information provided in is subject to change with Codes and Standards updates. Please always refer to the sources referenced.

Energy Efficiency Design Summary Key Highlights

The Energy Efficiency Design Summary (EEDS) is a form used to demonstrate that the energy efficiency design of a house complies with the Building Code. The following provides direction and information on locating and verifying material inputs within the Ontario EEDS that can significantly impact energy efficiency outcomes.



Energy Efficiency Design Summary: Prescriptive Method
(Building Code Part 9, Residential)

This form is used by a designer to demonstrate that the energy efficiency design of a house complies with the building code using the prescriptive method described in Subsection 3.1.1. of SB-12. This form is applicable where the ratio of gross area of windows/sidelights/skylights/glazing in doors and sliding glass doors to the gross area of peripheral walls is not more than 22%.

For use by Principal Authority

Application No: | Model/Certification Number

A. Project Information

Building number, street name | Unit number | Lot/Con

Municipality | Postal code | Reg. Plan number / other description

B. Prescriptive Compliance [indicate the building code compliance package being employed in this house design]

SB-12 Prescriptive (input design package): Package:_____ Table:_____

C. Project Design Conditions

Climatic Zone (SB-1):	Heating Equipment Efficiency	Space Heating Fuel Source
□ Zone 1 (< 5000 degree days)	□ ≥ 92% AFUE	□ Gas □ Propane □ Solid Fuel
□ Zone 2 (≥ 5000 degree days)	□ ≥ 84% < 92% AFUE	□ Oil □ Electric □ Earth Energy
Ratio of Windows, Skylights & Glass (W, S & G) to Wall Area		**Other Building Characteristics**
Area of walls = _____ m^2 or _____ ft^2	W, S & G % = _____	□ Log/Post&Beam □ ICF Above Grade □ ICF Basement □ Slab-on-ground □ Walkout Basement □ Air Conditioning □ Combo Unit □ Air Sourced Heat Pump (ASHP) □ Ground Sourced Heat Pump (GSHP)
Area of W, S & G = _____ m^2 or _____ ft^2	Utilize window averaging: □Yes □No	

D. Building Specifications [provide values and ratings of the energy efficiency components proposed]

Energy Efficiency Substitutions

□ ICF (3.1.1.2.(5) & (6) / 3.1.1.3.(5) & (6))
□ Combined space heating and domestic water heating systems (3.1.1.2.(7) / 3.1.1.3.(7))
□ Airtightness substitution(s)
Airtightness test required (Refer to Design Guide Attached)
□ Table 3.1.1.4.B Required:_____ Permitted Substitution:_____
□ Table 3.1.1.4.C Required:_____ Permitted Substitution:_____
Required:_____ Permitted Substitution:_____

Building Component	Minimum RSI / R values or Maximum U-Value(1)		Building Component	Efficiency Ratings
Thermal Insulation	Nominal	Effective	**Windows & Doors** Provide U-Value(1) or ER rating	
Ceiling with Attic Space			Windows/Sliding Glass Doors	
Ceiling without Attic Space			Skylights/Glazed Roofs	
Exposed Floor			**Mechanicals**	
Walls Above Grade			Heating Equip.(AFUE)	
Basement Walls			HRV Efficiency (SRE% at 0°C)	
Slab (all >600mm below grade)			DHW Heater (EF)	
Slab (edge only ≤600mm below grade)			DWHR (CSA B55.1 (min. 42% efficiency))	# Showers___
Slab (all ≤600mm below grade, or heated)			Combined Heating System	

(1) U value to be provided in either W/(m^2•K) or Btu/(h•ft^2•F) but not both.

E. Designer(s) [name(s) & BCIN(s), if applicable, of person(s) providing information herein to substantiate that design meets the building code]

Qualified Designer Declaration of designer to have reviewed and take responsibility for the design work.		
Name	BCIN	Signature

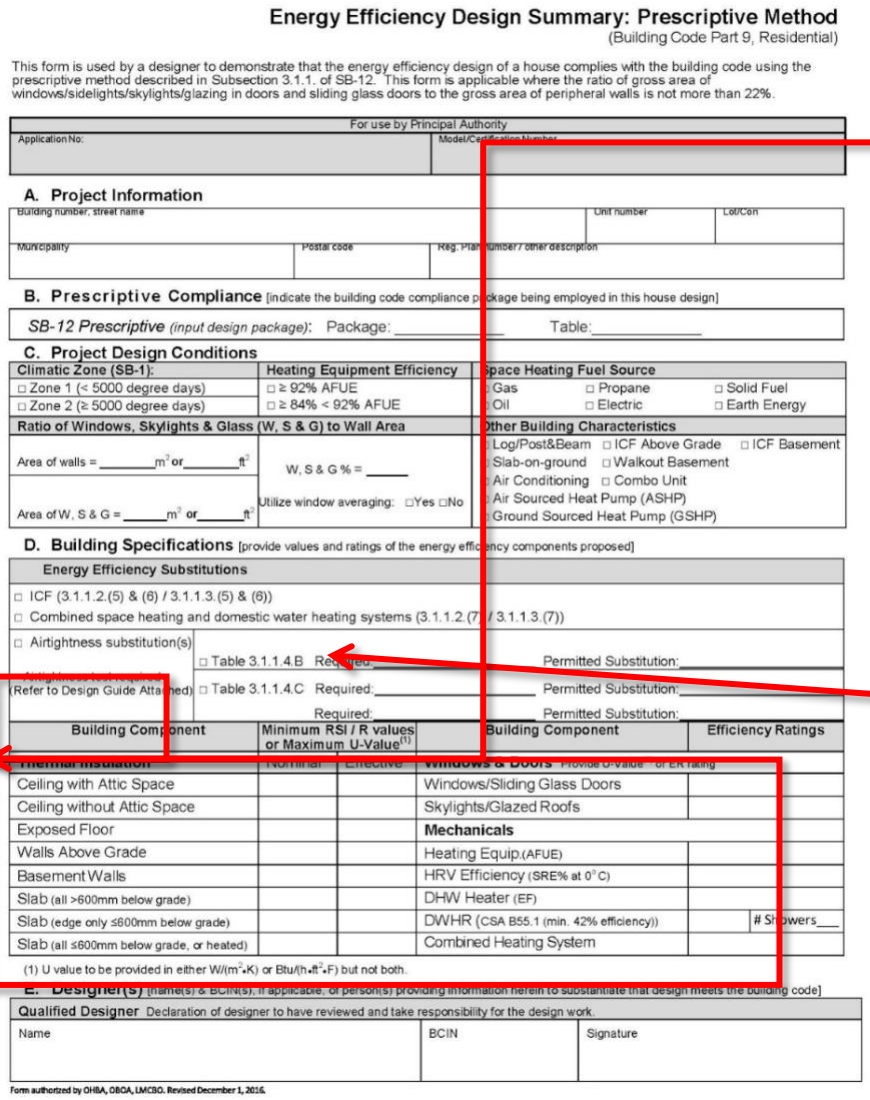
Form authorized by OHBA, OBOA, LMCBO. Revised December 1, 2016.

Project Design Conditions

Climatic Zone: The number of degree days for Ontario cities is contained in Supplementary Standard SB-1 Windows, Skylights and Glass Doors. If the ratio of the total gross area of windows, sidelights, skylights, glazing in doors and sliding glass doors to the total gross area of walls is **more than 17**%, higher efficiency glazing is required. If the ratio is **more than 22%,** the *SB-12 Prescriptive* option may not be used. The total area is the sum of all the structural rough openings. Some exceptions apply; refer to 3.1.1.1. of SB-12 for further details.

Fuel Source and Heating Equipment Efficiency: The fuel source and efficiency of the proposed heating equipment must be specified in order to determine which SB-12 Prescriptive compliance package table applies.

Other Building Characteristics: These construction conditions affect SB-12 Prescriptive compliance requirements.



Energy Efficiency Design Summary: Prescriptive Method
(Building Code Part 9, Residential)

This form is used by a designer to demonstrate that the energy efficiency design of a house complies with the building code using the prescriptive method described in Subsection 3.1.1. of SB-12. This form is applicable where the ratio of gross area of windows/sidelights/skylights/glazing in doors and sliding glass doors to the gross area of peripheral walls is not more than 22%.

For use by Principal Authority

Application No: | Model/Certification Number

A. Project Information

Building number, street name | Unit number | Lot/Con

Municipality | Postal code | Reg. Plan number / other description

B. Prescriptive Compliance [indicate the building code compliance package being employed in this house design]

SB-12 Prescriptive (input design package): Package:_____ Table:_____

C. Project Design Conditions

Climatic Zone (SB-1):	Heating Equipment Efficiency	Space Heating Fuel Source		
□ Zone 1 (< 5000 degree days)	□ ≥ 92% AFUE	□ Gas	□ Propane	□ Solid Fuel
□ Zone 2 (≥ 5000 degree days)	□ ≥ 84% < 92% AFUE	□ Oil	□ Electric	□ Earth Energy

Ratio of Windows, Skylights & Glass (W, S & G) to Wall Area		Other Building Characteristics
Area of walls = _____m^2 or _____ft^2	W, S & G % = _____	□ Log/Post&Beam □ ICF Above Grade □ ICF Basement □ Slab-on-ground □ Walkout Basement □ Air Conditioning □ Combo Unit
Area of W, S & G = _____m^2 or _____ft^2	Utilize window averaging: □Yes □No	□ Air Sourced Heat Pump (ASHP) □ Ground Sourced Heat Pump (GSHP)

D. Building Specifications [provide values and ratings of the energy efficiency components proposed]

Energy Efficiency Substitutions

□ ICF (3.1.1.2.(5) & (6) / 3.1.1.3.(5) & (6))
□ Combined space heating and domestic water heating systems (3.1.1.2.(7) / 3.1.1.3.(7))
□ Airtightness substitution(s)
(Refer to Design Guide Attached) □ Table 3.1.1.4.B Required:_____ Permitted Substitution:_____
□ Table 3.1.1.4.C Required:_____ Permitted Substitution:_____
Required:_____ Permitted Substitution:_____

Building Component	Minimum RSI / R values or Maximum U-Value(1)		Building Component	Efficiency Ratings
Thermal Insulation	Nominal	Effective	**Windows & Doors** Provide U-Value or ER rating	
Ceiling with Attic Space			Windows/Sliding Glass Doors	
Ceiling without Attic Space			Skylights/Glazed Roofs	
Exposed Floor			**Mechanicals**	
Walls Above Grade			Heating Equip.(AFUE)	
Basement Walls			HRV Efficiency (SRE% at 0°C)	
Slab (all >600mm below grade)			DHW Heater (EF)	
Slab (edge only ≤600mm below grade)			DWHR (CSA B55.1 (min. 42% efficiency))	# Showers___
Slab (all ≤600mm below grade, or heated)			Combined Heating System	

(1) U value to be provided in either W/(m^2•K) or Btu/(h•ft^2•F) but not both.

E. Designer(s) [name(s) & BCIN(s), if applicable, of person(s) providing information herein to substantiate that design meets the building code]

Qualified Designer Declaration of designer to have reviewed and take responsibility for the design work.

Name	BCIN	Signature

Form authorized by OHBA, OBOA, LMCBO. Revised December 1, 2015.

Building Specifications

Thermal Insulation: Indicate the RSI or R-value being proposed where these apply to the house design. Under the SB-12 Prescriptive option, alternative ICF wall insulation is permitted in certain conditions, where other design elements meet higher standards ("Allowable trade-offs"). Refer to SB-12 for further details. Where effective insulation values are being used, the Authority Having Jurisdiction may require supporting documentation.

Building Code Requirements for Airtightness In New Houses

Table 3.1.1.4. A (below) provides airtightness targets in three different metrics; ACH, NLA, NLR. Any one of them can be used. The air leakage rates are in Table 3.1.1.4. A are not requirements, but voluntary provisions for when credits for airtightness are claimed. Credit for air tightness allows the designer to substitute the requirements of compliance packages as set out in Table 3.1.1.4.B or 3.1.1.4.C found on the Energy Efficiency Design Summary form.

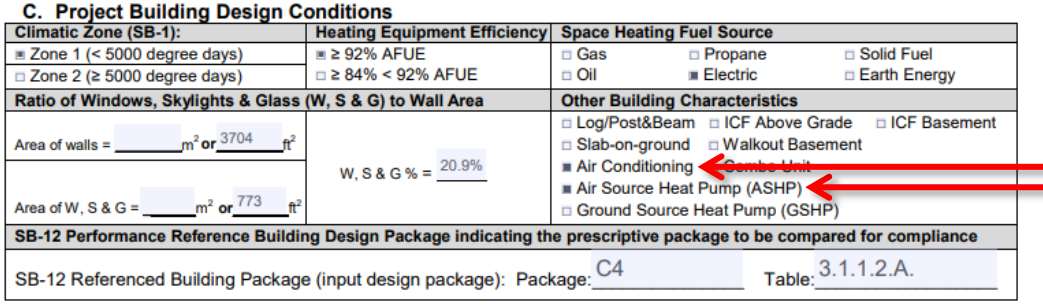
Building Type	Airtightness Targets				
Detached dwelling	ACH @ 50 Pa	NLA @ 10 Pa		NLR @ 50 Pa	
Attached dwelling	2.5	1.26 cm^2 /m^2	1.81 in^2/100ft^2	0.93 L/s/m^2	0.18 cfm50/ft^2
	3.0	2.12 cm^2/m^2	3.06 in^2 /100ft^2	1.32 L/s/m^2	0.26 cfm50/ft^2

OBC Reference Default Air Leakage Rates (Table 3.1.1.4.A)

If the SB-12 Prescriptive option with airtightness credit is being applied, the OBC requires that a blower door test be conducted to verify the air tightness of the house during construction. Results of the airtightness test may need to be submitted to the Authority Having Jurisdiction. Airtightness of less than 2.5 ACH @ 50 Pa (or NLA or NLR equivalent) in the case of detached houses, or 3.0 ACH @ 50 Pa (or NLA or NLR equivalent) in the case of attached houses is necessary to meet the required energy efficiency standard.

HVAC Key Highlights

These links can confirm the efficiency of equipment specified by the designer in the permit documents.



C. Project Building Design Conditions

Climatic Zone (SB-1):	Heating Equipment Efficiency	Space Heating Fuel Source
▣ Zone 1 (< 5000 degree days)	▣ ≥ 92% AFUE	□ Gas □ Propane □ Solid Fuel
□ Zone 2 (≥ 5000 degree days)	□ ≥ 84% < 92% AFUE	□ Oil ■ Electric □ Earth Energy
Ratio of Windows, Skylights & Glass (W, S & G) to Wall Area		**Other Building Characteristics**
Area of walls = _____ m^2 or 3704 ft^2	W, S & G % = 20.9%	□ Log/Post&Beam □ ICF Above Grade □ ICF Basement □ Slab-on-ground □ Walkout Basement ■ Air Conditioning ■ Combo Unit ■ Air Source Heat Pump (ASHP) □ Ground Source Heat Pump (GSHP)
Area of W, S & G = _____ m^2 or 773 ft^2		
SB-12 Performance Reference Building Design Package indicating the prescriptive package to be compared for compliance		
SB-12 Referenced Building Package (input design package): Package: C4 Table: 3.1.1.2.A.		

D. Building Specifications [provide values and ratings of the energy efficiency components proposed, or attach *ENERGY STAR* BOP form

Building Component	Minimum RSI / R values or Maximum U-Value(1)		Building Component	Efficiency Ratings
Thermal Insulation	Nominal	Effective	**Windows & Doors** Provide U-Value(1) or ER rating	
Ceiling with Attic Space	R50		Windows/Sliding Glass Doors	UV: 1.2
Ceiling without Attic Space	R31		Skylights/Glazed Roofs	N/A
Exposed Floor	R31		**Mechanicals**	
Walls Above Grade	R34 SIPs		Heating Equip.(AFUE)	96 AFUE
Basement Walls	R22		HRV Efficiency (SRE% at 0° C)	75%
Slab (all >600mm below grade)	R10		DHW Heater (EF)	UEF 3.11
Slab (edge only ≤600mm below grade)	R10		DWHR (CSA B55.1 (min. 42% efficiency))	58.9% # Showers 2
Slab (all ≤600mm below grade, or heated)	R10		Combined Space / Dom. Water Heating	N/A

(1) U value to be provided in either W/(m^2•K) or Btu/(h•ft^2•F) but not both.

Air Conditioner Database

Quick Search (ahridirectory.org)

Air Source Heat Pump Database

Quick Search (ahridirectory.org)

ASHP (neep.org)

Furnace AFUE Database

Quick Search (ahridirectoy.org)

Combo System TPF Database

Search: Combined space and domestic water heating system | Energy Efficiency Ratings | Natural Resources Canada (nrcan.gc.ca)

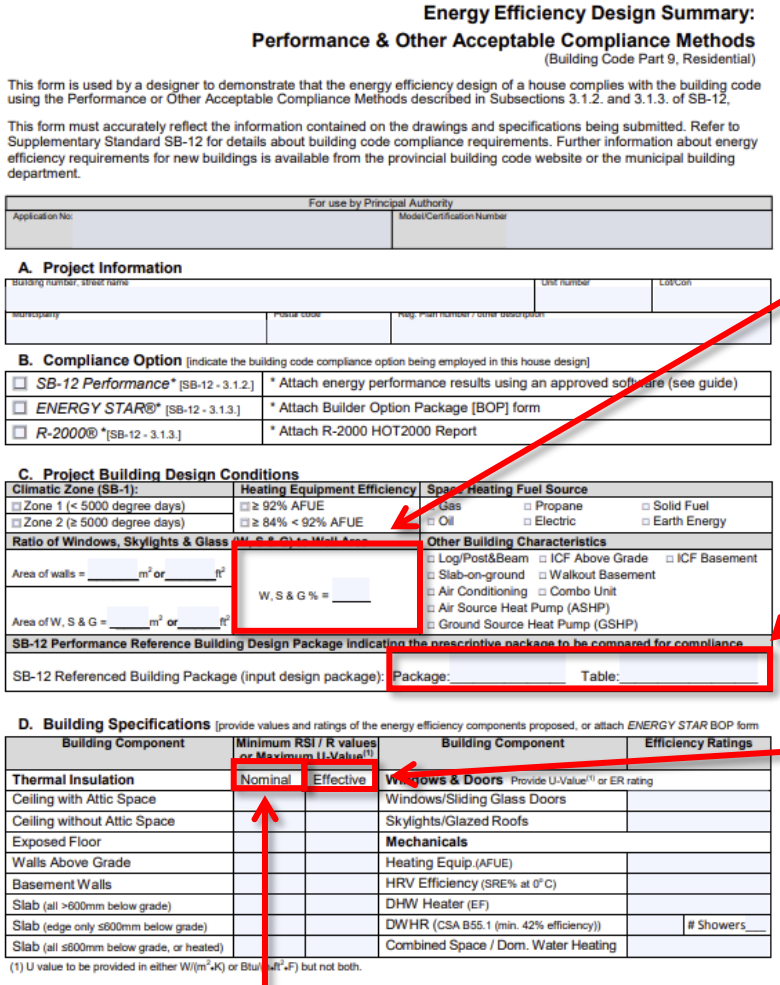
Drain Water Heat Recovery Database

Search: Drain-water heat recovery | Energy Efficiency Ratings | Natural Resources Canada (nrcan.gc.ca)

HRV/ERV Database

Section III - Heat/Energy Recovery Products - Home Ventilating Institute (hvi.org)

Performance EEDS



Energy Efficiency Design Summary:
Performance & Other Acceptable Compliance Methods
(Building Code Part 9, Residential)

This form is used by a designer to demonstrate that the energy efficiency design of a house complies with the building code using the Performance or Other Acceptable Compliance Methods described in Subsections 3.1.2. and 3.1.3. of SB-12,

This form must accurately reflect the information contained on the drawings and specifications being submitted. Refer to Supplementary Standard SB-12 for details about building code compliance requirements. Further information about energy efficiency requirements for new buildings is available from the provincial building code website or the municipal building department.

For use by Principal Authority

Application No: | Model/Certification Number

A. Project Information

Building number, street name | Unit number | Lot/Con

Municipality | Postal code | Reg. Plan number / other description

B. Compliance Option [indicate the building code compliance option being employed in this house design]

☐ *SB-12 Performance** [SB-12 - 3.1.2.]	* Attach energy performance results using an approved software (see guide)
☐ *ENERGY STAR®** [SB-12 - 3.1.3.]	* Attach Builder Option Package [BOP] form
☐ *R-2000®* *[SB-12 - 3.1.3.]	* Attach R-2000 HOT2000 Report

C. Project Building Design Conditions

Climatic Zone (SB-1):	Heating Equipment Efficiency	Space Heating Fuel Source
☐ Zone 1 (< 5000 degree days)	☐ ≥ 92% AFUE	☐ Gas ☐ Propane ☐ Solid Fuel
☐ Zone 2 (≥ 5000 degree days)	☐ ≥ 84% < 92% AFUE	☐ Oil ☐ Electric ☐ Earth Energy

Ratio of Windows, Skylights & Glass (W, S & G) to Wall Area	Other Building Characteristics
Area of walls = _____ m^2 or _____ ft^2	☐ Log/Post&Beam ☐ ICF Above Grade ☐ ICF Basement
W, S & G % = _____	☐ Slab-on-ground ☐ Walkout Basement
Area of W, S & G = _____ m^2 or _____ ft^2	☐ Air Conditioning ☐ Combo Unit
	☐ Air Source Heat Pump (ASHP)
	☐ Ground Source Heat Pump (GSHP)

SB-12 Performance Reference Building Design Package indicating the prescriptive package to be compared for compliance

SB-12 Referenced Building Package (input design package): Package:_____ Table:_____

D. Building Specifications [provide values and ratings of the energy efficiency components proposed, or attach *ENERGY STAR* BOP form

Building Component	Minimum RSI / R values or Maximum U-Value(1)		Building Component	Efficiency Ratings
Thermal Insulation	Nominal	Effective	**Windows & Doors** Provide U-Value(1) or ER rating	
Ceiling with Attic Space			Windows/Sliding Glass Doors	
Ceiling without Attic Space			Skylights/Glazed Roofs	
Exposed Floor			**Mechanicals**	
Walls Above Grade			Heating Equip.(AFUE)	
Basement Walls			HRV Efficiency (SRE% at 0°C)	
Slab (all >600mm below grade)			DHW Heater (EF)	
Slab (edge only ≤600mm below grade)			DWHR (CSA B55.1 (min. 42% efficiency))	# Showers___
Slab (all ≤600mm below grade, or heated)			Combined Space / Dom. Water Heating	

(1) U value to be provided in either W/(m^2•K) or Btu/(ft^2•F) but not both.

Refer to section Window Characteristics on the HOT2000 Report. Please note that the window to wall ratio shown in HOT2000 is determined by interior wall area rather than exterior wall area, which may cause a discrepancy between the two values.

Reference package in OBC, determined by mechanical equipment and climate zone. The Reference House HOT2000 will reflect this package.

Effective RSI/ R-values consider thermal bridging and other heat conduction through other materials that make the assembly.

Nominal RSI/ R-values refer to the rated R-value of the insulation and does not consider thermal bridging, compression, etc.

Building Envelope Section

The following details each part of the building envelope found in Section D: Building Specifications of EED Summary.

Refer to section Window Characteristics and User-Defined Window Codes Schedule to determine modelled values.

D. Building Specifications [provide values and ratings of the energy efficiency components proposed, or attach *ENERGY STAR* BOP form

Building Component	Minimum RSI / R values or Maximum U-Value(1)		Building Component	Efficiency Ratings	
Thermal Insulation	Nominal	Effective	**Windows & Doors** Provide U-Value(1) or ER rating		
Ceiling with Attic Space			Windows/Sliding Glass Doors		
Ceiling without Attic Space			Skylights/Glazed Roofs		
Exposed Floor			**Mechanicals**		
Walls Above Grade			Heating Equip.(AFUE)		
Basement Walls			HRV Efficiency (SRE% at 0° C)		
Slab (all >600mm below grade)			DHW Heater (EF)		
Slab (edge only ≤600mm below grade)			DWHR (CSA B55.1 (min. 42% efficiency))		# Showers___
Slab (all ≤600mm below grade, or heated)			Combined Space / Dom. Water Heating		

(1) U value to be provided in either W/(m^2•K) or Btu/(h•ft^2•F) but not both.

Refer to section Building Assembly Details in the Proposed House HOT2000 Report, both nominal and effective R / RSI-values will be shown.

Refer to section Domestic Water Heating System for both the DHW efficiency and Drain Water Heat Recovery system.

Refer to section Space Heating system and Domestic water heating system to determine if the system is a combination system

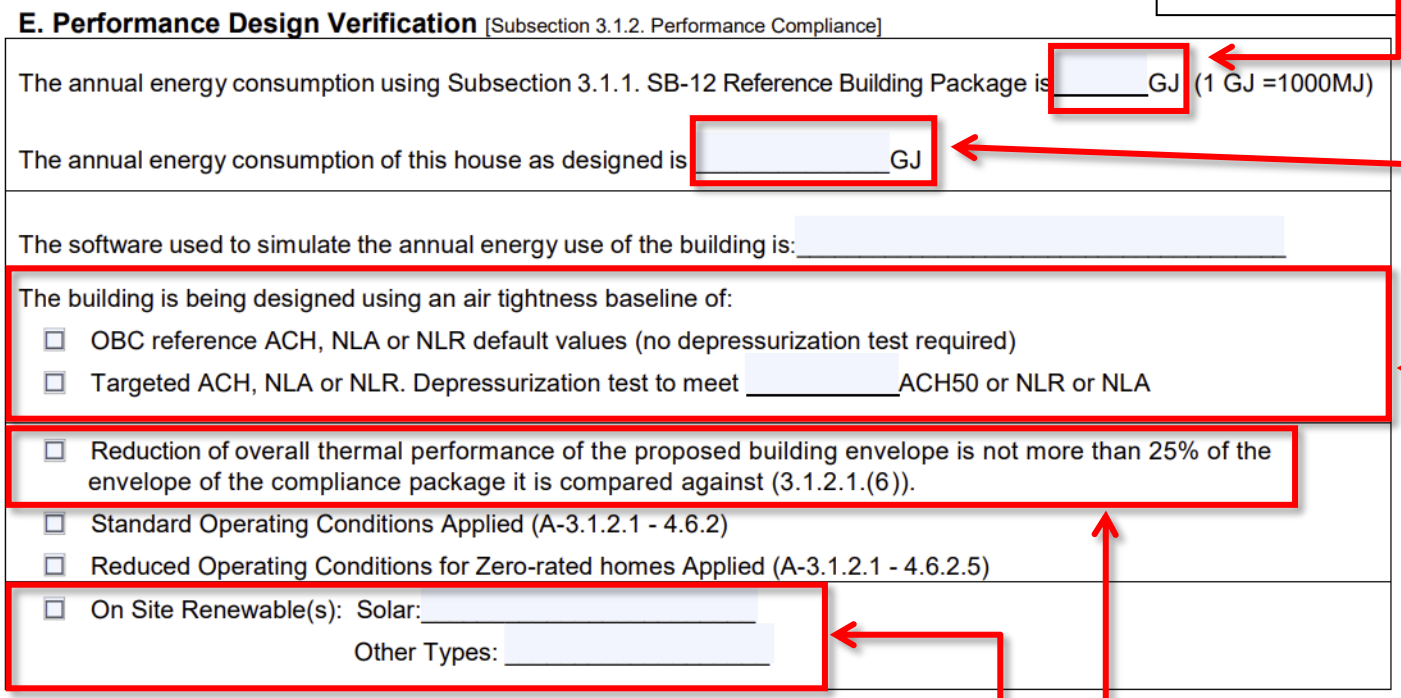
Refer to section Central ventilation system to determine efficiency of HRV/ERV.

Refer to section Space Heating System to determine efficiency of heating system modelled as well as fuel source.

Performance Design Verification

The following is a breakdown of several key components of section E. Performance Design verification of the EED Summary.

Can be calculated by adding all component energy consumption annually found in section Monthly Estimated Energy Consumption by Device (MJ) for the Reference House HOT2000 Report.



E. Performance Design Verification [Subsection 3.1.2. Performance Compliance]

The annual energy consumption using Subsection 3.1.1. SB-12 Reference Building Package is _____GJ (1 GJ =1000MJ)

The annual energy consumption of this house as designed is _____GJ

The software used to simulate the annual energy use of the building is:_____

The building is being designed using an air tightness baseline of:

- ☐ OBC reference ACH, NLA or NLR default values (no depressurization test required)
- ☐ Targeted ACH, NLA or NLR. Depressurization test to meet _____ACH50 or NLR or NLA

- ☐ Reduction of overall thermal performance of the proposed building envelope is not more than 25% of the envelope of the compliance package it is compared against (3.1.2.1.(6)).
- ☐ Standard Operating Conditions Applied (A-3.1.2.1 - 4.6.2)
- ☐ Reduced Operating Conditions for Zero-rated homes Applied (A-3.1.2.1 - 4.6.2.5)

- ☐ On Site Renewable(s): Solar:_____
  Other Types: _____

Can be calculated by adding all component energy consumption annually found in section Monthly Estimated Energy Consumption by Device (MJ) for the Proposed House HOT2000 Report.

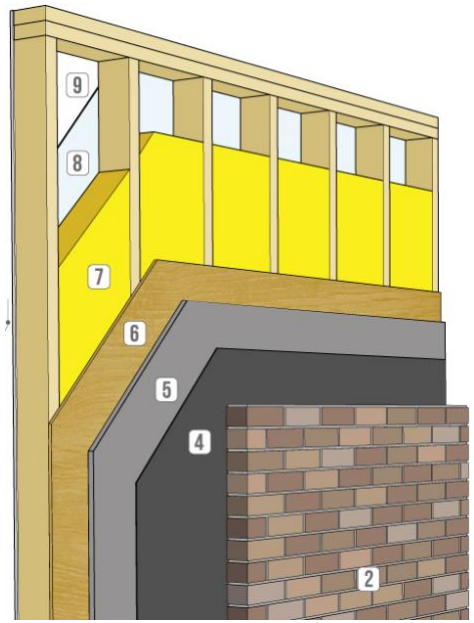
Refer to section Air Leakage and Mechanical Ventilation in the HOT2000 Report.

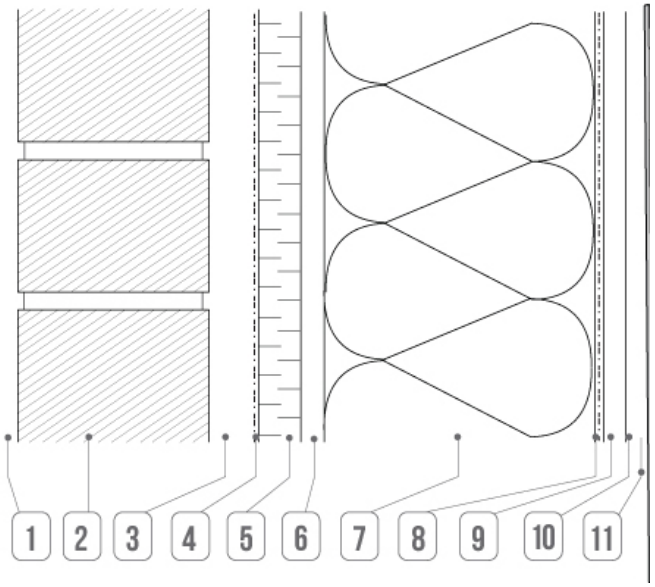
Can be calculated using the Gross Space Heat Loss values for both the Reference and Proposed home, located in the section of Annual Space Heating Summary.

Can be calculated using the Gross Space Heat Loss values for both the Reference and Proposed home, located in the section of Annual Space Heating Summary.

Calculating Effective R and RSI Wall Thermal Values incl. Advanced Framing:

This section provides guidance on calculating effective R and RSI vales for wall assemblies. This information is used to verify assembly R and RSI values found in Section D of the Ontario EEDS form.

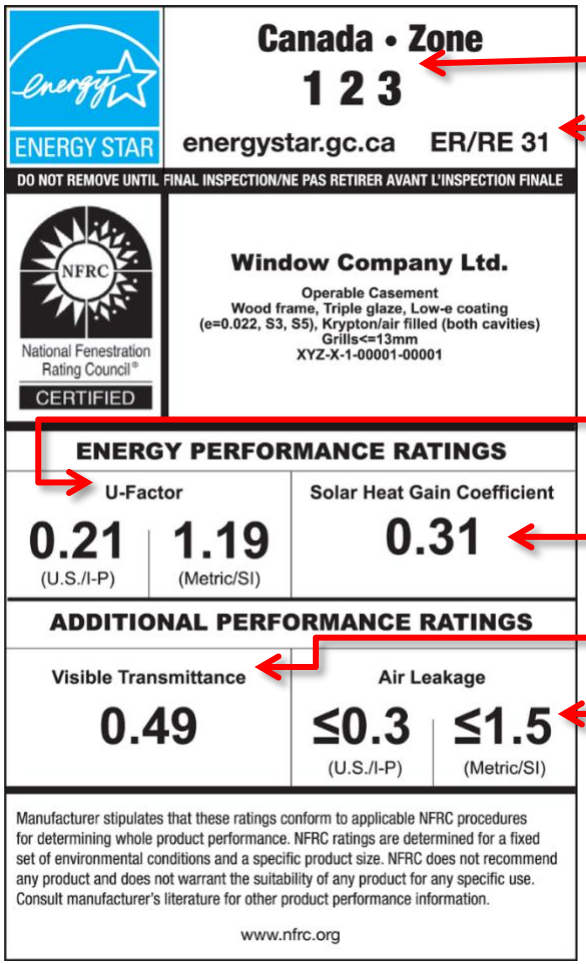




WALL ASSEMBLY COMPONENTS[1]		RSI	R
1	exterior air film	0.03	0.17
2	fired clay brick 4" (102 mm)[2]	0.07	0.40
3	more than 3/4" (20mm +) air space	0.18	1.02
4	spun bonded polyolefin (house wrap)	0.00	0.00
5	1" (25.4mm) extruded polystyrene type 3/4	0.89	5.05
6	3/8" (9.5 mm) OSB sheathing	0.09	0.53
7	2x6 framing filled with R22 batt @ 16" o.c.	2.55	14.48
8	polyethylene	0.00	0.00
9	1/2" (12.7mm) gypsum board	0.08	0.45
10	finish: 1 coat latex primer and latex paint	0.00	0.00
11	interior air film	0.12	0.68
Effective RSI / R Value of Entire Assembly		4.01	22.78
Centre of Cavity RSI / R Value		5.33	30.30
Installed Insulation RSI / R Value(nominal)		4.76	27.05
Effective RSI / R Value of Assembly with Advanced Framing (advanced framing as defined by NBC9.36.2.4.(1))		4.17	23.69

Fenestration Compliance Labels

The ENERGY STAR fenestration compliance label is a voluntary program that tests, certifies, and labels windows and doors based on their energy performance. The following is a high-level explanation on key parts of the ENERGY STAR label. This label is used to verify information found in Section D of the EEDS Form. Energy Star compliance shown below is *if* the product meets Energy Star requirements. The label connects to the A440S1-17 standard, which is the Canadian supplement to the NAFS-17 (North American Fenestration Standard), harmonized between the U.S. and Canada in 2014.



Homes requiring an Energy Star-certified product (compliance shown relative to Climate Zones (Energy Star)

ER Compliance Path (High Solar Gain Products): Higher Number provides more solar heat gain to augment heating loads

Whole window U-value in BTU/hr/s.f or W/ m2 K

Solar Heat Gain Coefficient (< 0.30 = low solar gain, 0.30-0.40 mid solar gain, 0.40-0.53 high solar gain(ER))

VLT = Visible Light Transmittance (whole window value)

Window Air Leakage - does not take into account quality of installation re: air and water tightness

CSA-A440 Equivalencies

Air tightness ratings are A1, A2, A3. The tests measure the maximum air leakage rate.

Maximum air leakage rate per lenght of crack

	m³/h/m	cu.ft./hr/ft
A1	2.79	30.03
A2	1.65	17.76
A3	0.55	5.92

Airtightness Levels/Test Methodologies & Points (NBC)

This set of tables aligns with Table 3.1.1.4A (page 11 of this document) and translates the various metrics used to discuss whole-building air-tightness. Testing to these levels of performance allows the Constructor to access points (NBC 9.36) for better-than-code air tightness performance. Air-tightness levels align with ASHRAE Climate Zones (4 through 8) to allocate points towards achieving better-than-code performance. Note that to apply these points, a whole-building blower door test must be performed by a certified EA, with results submitted to the municipality.

Prescriptive Tiers – Airtightness Testing
(Ontario SB12 Table 3.1.2.1 & ENERGY STAR Table A-2)

AIRTIGHTNESS LEVEL DETACHED	ACH50	NLA CM/ M^2	NLA IN^2 /100FT^2	NLR L/ $S.M^2$	CFM 50/ FT^2
1	3.0	2.12	3.05	1.32	0.26
2	2.5	1.26	1.81	0.93	0.18
3	2.0	0.96	1.38	0.71	0.14
4	1.5	0.72	1.04	0.53	0.10
5	1.0	0.48	0.69	0.35	0.070

Note: Airtightness level can be achieved by meeting any one of these airtightness metrics

AIRTIGHTNESS LEVEL (TABLE 9.36.6.4-A)	ECP ZONE 4	ECP ZONE 5	ECP ZONE 6	ECP ZONE 7A	ECP ZONE 7B	ECP ZONE 8
1	-	-	-	-	-	-
2	2.0	3.4	3.5	4.6	6.1	6.1
3	4.0	6.7	7.0	9.3	12.1	12.11
4	5.9	10.1	10.5	13.9	18.0	18.0
5	7.6	13.0	13.4	17.8	22.7	22.7

Table 9.36.8.8

- **2.5 ACH (level 2) = 3.4 pts**
- **2.0 ACH (level 3) = 6.7 pts**
- **1.5 ACH (Level 4) = 10.1 pts**

Solar Ready Key Highlights

Solar ready houses generally have very minimal changes to a standard design. The most important points of inspection are the upgraded roof trusses and conduit installation. There should be conduit installed within the envelope from the electrical room to the attic, visible above the insulation, and two pieces of conduit through the wall from the electrical room to the exterior adjacent to the utility meter. All conduit should be capped/sealed until future use. A Solar Ready PV Checklist may be provided by the builder and should be affixed to the wall of the electrical room for the home buyer.

Permit Submission

Roof

- Plan designates area for solar installation
- Truss design identifies Solar Ready trusses

Electrical

- Conduit (2-inch) within envelope to attic/roof
- 1m² wall space near electrical panel designated for Solar Equipment
- Two conduits (1 ¼-inch) terminating nearby the utility electrical meter

Inspection

Roof

- Top cords constructed with 2 x 6 lumber
- Top cords may be stamped SR

Electrical

- Conduit visible above attic insulation (sealed)
- 1m² (3’ x 3’) clear wall space near electrical panel
- Two utility connection conduits through exterior wall nearby the utility electrical meter (sealed)

NRCan PV Ready Checklist to be provided to Building Permit Office & Home Buyer

NRCan Reporting Tool Summary

The NRCan reporting tool is an energy audit tool that extracts and presents summary information from a HOT2000 house energy modelling file. It replaces the Full House Report generated by HOT2000. The following in a breakdown of core sections of the reporting tool and where to find information to validate EEDS entries.

National Building Code, Section 9.36 - Performance Modeling Report

V1.2

PROJECT INFORMATION			
Building Permit # / Project Name:		Building Type:	Apartment Row
Identifier:	Example - Happy Builder	Number of Units:	10
Builder:	Happy Builder	Conditioned Floor Area (m^2)	114.5
Project Address:	123	Heating Degree Days (HDD):	6010
Municipality:	Prince Albert	Number of Storeys:	Three storeys
Postal Code:	S0K 0X0	House Volume (m^3)	334.28
SIMULATION TOOL			
Name:	HOT2000	Version:	11.13
Adaptations (if applicable) :	N/A	Weather Location:	PRINCE ALBERT
Ruleset	EnerGuide Rating System 2020 NBC	Climatic Data:	Wth2020.dir
ADMINISTRATIVE DETAILS			
Energy Modeler:	Energy Modeller	Contact information:	
Company:	Awesome Company	NRCan Registration Number:	
I certify that this report was produced using an EnerGuide file modeled in accordance with clause 9.36.5.3. 1) b) of the 2020 NBC and submitted to NRCan	No Batch Number:	Date: Signature:	

PERFORMANCE METRICS		
Metrics	**Proposed House**	**Reference House (EUM Budget)**
NBC Annual Energy Consumption	**43.17 GJ**	**50.76 GJ (68.07 GJ)**
Annual Gross Space Heat Loss	**47.98 GJ**	**54.08 GJ (63.26 GJ)**
Design Heating Load	**5721.28 W**	**6432.16 W**
Design Cooling Load	**1587.07 W**	**1824.31 W (1725 W)**
ACH @ 50 Pa	**2.5 ACH**	**2.5 ACH**
NLA (cm^2/m^2)	**1.59**	
NLR ($L/s/m^2$)	**0**	
GHG (t/year)	**5.6**	**3.13**

Thermal Energy Demand Intensity (TEDI) - kWh/(m^2•year) :	68	Overall Percent Improvement:	14.96 (36.58)
Mechanical End-Use Intensity (MEUI) - kWh/(m^2•year):	105	Percent Heat Loss Reduction:	11.28 (24.15)
Greenhouse Gas Intensity (GHGI) - kg of CO_2/(m^2•year) :	23	Openable Window Area (%)	0 -
Renewable Energy Generation – GJ :	0.0		

If a project is to be labelled with an EnerGuide label, this section will say “Yes”.

Note the volume <300m^3 or >300m^3 for Tiered.

Registered Energy Advisors will provide their qualifications here.

Peak Cooling Load (Proposed must be less than the Reference House).

Please note the air-leakage rate in the Proposed House and whether an air-tightness test will be required. *Using this tool requires air-leakage testing through the ERS Pathway.

Please note these outputs and cross reference it to your jurisdictions’ Tiered Energy Code req’s. Disregard number in the parenthesis (this is in relation in to *NBC2025*).

NRCan Reporting Tool Summary Cont.

BUILDING ENVELOPE

Above-Ground Opaque Assemblies

Assembly	Description	Effective RSI (m^2-K)/W	Area (m^2)
Overall Walls		3.06	64.11
Main	2x6/R20B/24"OC/Vinyl	3.06	64.11
Overall Headers		3.76	7.68
Rim Joist	R20B/Vin	3.76	7.68
Overall Floors		0	0
Overall Ceilings		65535	0

Below-Grade Opaque Assemblies

Assembly	Description	Effective RSI (m^2-K)/W	Area (m^2)
Overall Foundation Walls		3.35	79.23
Foundation	Exterior: User specified; Interior: 2x4/2"/R20B/24"OC	Exterior: 0; Interior: 3.19	79.23
Overall Slab		1.76	58.69
Foundation	Unheated slab below frost line	1.76	58.69

Fenestration and Doors

Component	Type	U-value W/(m^2-K)	SHGC	Area (m^2)
Main	Wall	-	-	-
Kitchen	1 x Reference	0.62	0.2	1.49
Kitchen 2	2 x Reference	0.62	0.16	0.56
Main Floor Living	1 x Reference	0.62	0.22	3.9
Powder	1 x Reference	0.62	0.16	0.56
Front Door	User specified	1.37	-	2.03
Lite	1 x Reference	0.62	0.08	0.19
Rear	User specified	0.93	-	2.03
Lite	1 x Reference	0.62	0.08	0.19
Foundation	Wall	-	-	-
Bsmnt	1 x Reference	0.62	0.19	1.24
Bsmnt 2	1 x Reference	0.62	0.19	1.24
			FDWR	17%

MECHANICAL SYSTEMS

Component	Type	Energy Source	Performance Rating	Capacity of Equipment
Space Heating System 1	Furnace - Condensing	Natural gas	96 (Efficiency)	7 kW
Space Heating System 2	-	-	-	-
Air Conditioning	Central split system	Electric	14.5 (SEER)	-
Domestic Hot Water	Direct vent (sealed)	Natural gas	0.7 (UEF)	189.3 L
DWHR	-	-	-	-
Ventilation	Utility	Electric	22.65 L/s (Exhaust Flow Rate)	

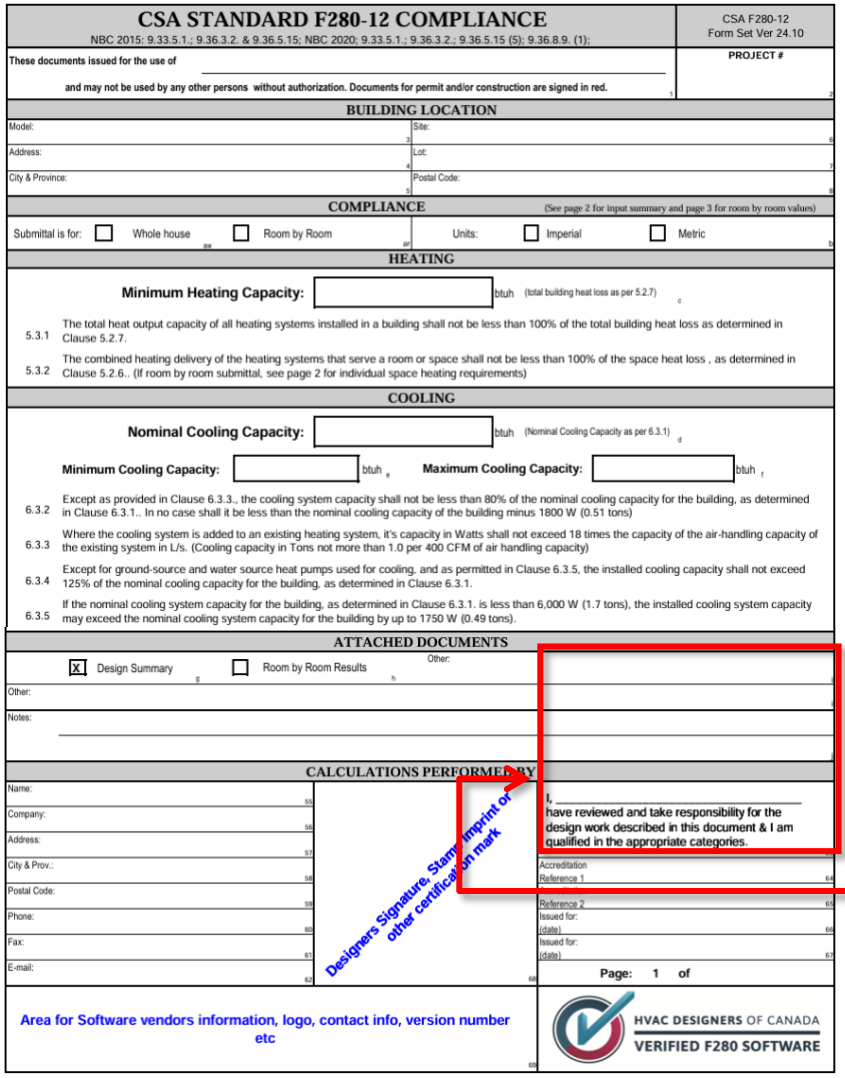
Appendix A - Code Details		
Wall		
2x6/R20B/24"OC/Vinyl		
	Structure Type	Wood frame
	Component Type Size	38x140 mm (2x6 in)
	Spacing	600 mm (24 in)
	Insulation Layer1	RSI 3.52 @ 152 mm (R 20 @ 6.0'') batt
	Insulation Layer2	None
	Interior	12 mm (0.5 in) gypsum board

The assembly configurations can be requested by the Building Official to be cross - referenced with the drawing if "User Specified".

Window specifications modelled must match the window/door specifications provided and intended to be installed by the builder.

CSA Standard F280-12 Compliance Form

This form provides guidelines for contractors and installers on heating and cooling system capacity for appliances used in Part 9 homes to ensure the output capacity of these systems creates a safe and comfortable living



CSA STANDARD F280-12 COMPLIANCE

NBC 2015: 9.33.5.1.; 9.36.3.2. & 9.36.5.15; NBC 2020; 9.33.5.1.; 9.36.3.2.; 9.36.5.15 (5); 9.36.8.9. (1);

CSA F280-12
Form Set Ver 24.10

These documents issued for the use of _____

and may not be used by any other persons without authorization. Documents for permit and/or construction are signed in red.

PROJECT #

BUILDING LOCATION

Model: | Site:
Address: | Lot:
City & Province: | Postal Code:

COMPLIANCE (See page 2 for input summary and page 3 for room by room values)

Submittal is for: ☐ Whole house ☐ Room by Room | Units: ☐ Imperial ☐ Metric

HEATING

Minimum Heating Capacity: _____ btuh (total building heat loss as per 5.2.7)

5.3.1 The total heat output capacity of all heating systems installed in a building shall not be less than 100% of the total building heat loss as determined in Clause 5.2.7.

5.3.2 The combined heating delivery of the heating systems that serve a room or space shall not be less than 100% of the space heat loss , as determined in Clause 5.2.6.. (If room by room submittal, see page 2 for individual space heating requirements)

COOLING

Nominal Cooling Capacity: _____ btuh (Nominal Cooling Capacity as per 6.3.1)

Minimum Cooling Capacity: _____ btuh **Maximum Cooling Capacity:** _____ btuh

6.3.2 Except as provided in Clause 6.3.3., the cooling system capacity shall not be less than 80% of the nominal cooling capacity for the building, as determined in Clause 6.3.1.. In no case shall it be less than the nominal cooling capacity of the building minus 1800 W (0.51 tons)

6.3.3 Where the cooling system is added to an existing heating system, it's capacity in Watts shall not exceed 18 times the capacity of the air-handling capacity of the existing system in L/s. (Cooling capacity in Tons not more than 1.0 per 400 CFM of air handling capacity)

6.3.4 Except for ground-source and water source heat pumps used for cooling, and as permitted in Clause 6.3.5, the installed cooling capacity shall not exceed 125% of the nominal cooling capacity for the building, as determined in Clause 6.3.1.

6.3.5 If the nominal cooling system capacity for the building, as determined in Clause 6.3.1. is less than 6,000 W (1.7 tons), the installed cooling system capacity may exceed the nominal cooling system capacity for the building by up to 1750 W (0.49 tons).

ATTACHED DOCUMENTS

☒ Design Summary ☐ Room by Room Results Other:

Other:

Notes:

CALCULATIONS PERFORMED BY

Name:
Company:
Address:
City & Prov.:
Postal Code:
Phone:
Fax:
E-mail:

Designers Signature, Stamp, Imprint or other certification mark

I, _____ have reviewed and take responsibility for the design work described in this document & I am qualified in the appropriate categories.

Accreditation
Reference 1
Reference 2
Issued for: (date)
Issued for: (date)

Page: 1 of

Area for Software vendors information, logo, contact info, version number etc

HVAC DESIGNERS OF CANADA
VERIFIED F280 SOFTWARE

Designer accreditation and HRAI/TECA certification numbers.

environment. The form does not detail design and installation of space heating and cooling systems, but is based on best engineering practices described in building codes and standards. The F280-12 compliance form is compatible to be used in conjunction with C22.2 NO. 280-13 Electric Vehicle Supply Equipment.

Important Clauses

Heating: 5.3.1 The total heat output capacity of all heating systems installed in a building shall not be less than 100% of the total building heat loss as determined in Clause 5.2.7.

Cooling 6.3.2: Except as provided in clause 6.3.3, the cooling system capacity shall not be less than 80% of the nominal cooling capacity for the building, as determined in clause 6.3.1. It is important to note that the system cannot exceed 125% or nominal capacity unless a ground source/water source heat pump is being used. In no case shall it be less than the nominal cooling capacity of the building minus 1800 W (0.51 tons).

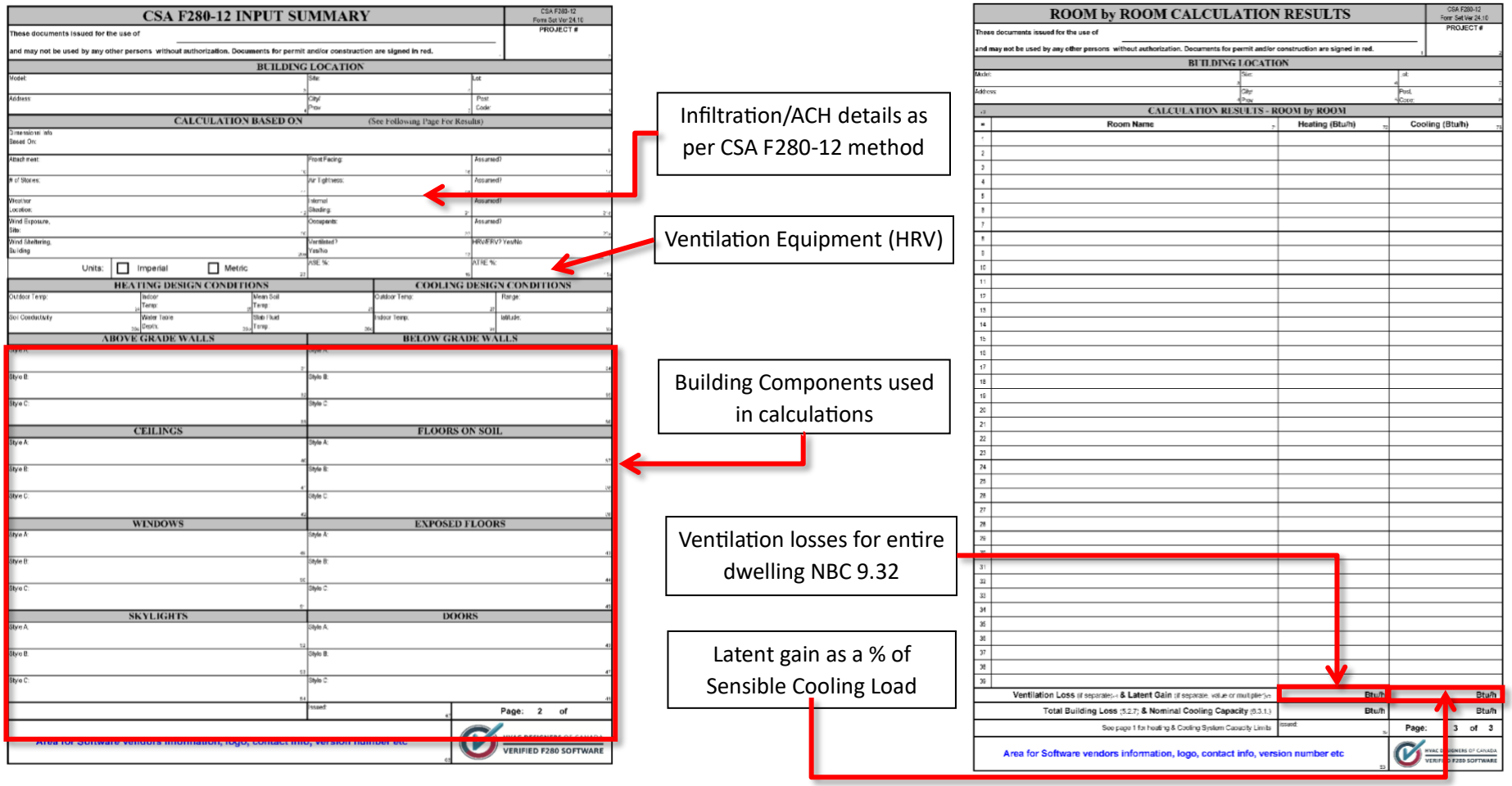
F280-12 Input Summary

The input summary is intended to allow contractors and installers to note all the details of the building that will be used to calculate he heating and cooling capacity. For the calculation results, we list the room-by-room loss and gain. The lower section has spaces for ventilation and latent gains when added separately. Adding the room totals, ventilation and latent will give the whole home loss and gain to help size the appliances.

F280-12 Calculation Results

The room-by-room calculation results list each room along with their heating and cooling capacity.

These are used to calculate the heating and cooling ventilation loss, latent gain, total building loss and Nominal Cooling Capacity.



APPENDIX A: REFERENCES

1. Directory of Certified Product Performance: https://www.ahridirectory.org/
2. Air Source Heat Pump Database: https://ashp.neep.org/#!/
3. Combo System TPF Database: https://oee.nrcan.gc.ca/pml-lmp/index.cfm?action=app.search-recherche&appliance=P9COMBO&_gl=1*1gklcmb*_ga*MTI3NDk1NzA1LjE2ODU1MzU5NDY.*_ga_C2N57Y7DX5*MTY4NTUzNTk0NS4xLjEuMTY4NTUzNjI2MC4wLjAuMA..
4. Drain Water Heat Recovery Database: https://oee.nrcan.gc.ca/pml-lmp/index.cfm?language_langue=en&action=app%2Esearch-recherche&appliance=DWHR&attr=0&_gl=1*3x7ewp*_ga*Mjk1OTU3NDk0LjE3Mjk3MTA2NDE.*_ga_C2N57Y7DX5*MTczODg2NzcyNy4zLjAuMTczODg2NzcyNy4wLjAuMA..
5. Residential Boilers (AHRI Directory): https://ahridirectory.org/search/25
6. PV Ready Checklist: https://publications.gc.ca/collections/collection_2021/rncan-nrcan/M154-122-2019-eng.pdf
7. Variable Refrigerant Flow (VRF) Air-Conditioners and Heat Pumps (AHRI Directory): https://ahridirectory.org/search/72
8. Water-Source Heat Pumps (AHRI Directory): https://ahridirectory.org/search/73
9. Residential Water Heaters (AHRI Directory): https://ahridirectory.org/search/24
10. Unitary Large Equipment (AHRI Directory): https://ahridirectory.org/search/3
11. HVI Certified Products, Heat/Energy Recovery Products: https://www.hvi.org/hvi-certified-products-directory/section-iii-hrv-erv-directory-listing/
12. Air-to-Air Energy Recovery Ventilators Packages (AHRI Directory): https://ahridirectory.org/search/39

APPENDIX B: TECHNICAL ADVISORY COMMITTEE AND SUBJECT MATTER EXPERTS/ENERGY MODELLERS

Technical Advisory Committee Members

Name	Affiliation
Adam Barker	EQ Building Performance Inc
Larry Brydon	Sustainable Buildings Canada
Raymond Boulet	Natural Resources Canada
Matt Farrell	Alliance of Canadian Building Officials Associations
Claude Lawrenson	National Home Inspector Certification Council
Dave Potter	Town of Newmarket (Retired)
Michael Singleton	Sustainable Buildings Canada
Ryan Sheppard	Saskatchewan Building Officials Association

Subject Matter Experts/Energy Modellers

Name	Affiliation
Alex Blue	Evoke Buildings Inc
Adam Jones	Sustainable Buildings Canada
Jerry Li	A&J Energy Consultants Inc
Alex Lukachko	University of Toronto
David Petersen	Ouside In Design + Build
Cara Sloat	Hammerschlag and Joffe Inc
Adam Sylvestre	Sustainable HVAC Design Inc
Jack Zhou	A&J Energy Consultants Inc