

9.36 Energy Code User Guide

Introduction

Section 9.36 Div B of the Alberta Building Code (ABC) 2014 details energy efficiency requirements for housing and small buildings. It includes three options for compliance: Prescriptive, Trade-Off, and Performance Compliance.

To facilitate compliance, The City of Medicine Hat has updated its [Residential Building Permit Application Checklist](#) outlining the requirements and compliance options for ABC 9.36. This guide provides information and direction on how to complete the new checklist. A completed Residential Building Permit Application Checklist is required for all relevant Building Permit applications starting November 01, 2016.

Completing the 9.36 portion of the Residential Building Permit Application Checklist

Basic Building Information

Regardless of the compliance path chosen, certain information is required for all buildings seeking compliance with ABC 9.36. This information must be completed for all projects and be consistent with the accompanying drawings.

| Building Type | Compliance Options | | |
|--|-----------------------|----------------------|------|
| | Part 9 - Prescriptive | Part 9 - Performance | NECB |
| - Houses, houses with secondary suites, - Buildings containing only dwelling units with common spaces \leq 20% floor area | ✓ | ✓ | ✓ |
| - Purely residential buildings - Any building, where all non-residential portions (not F2) have a floor area \leq 300 m ² | ✓ | | ✓ |
| - Any building where non-residential occupancies have a floor area > 300m ² - Buildings containing F2 occupancies (any size) | | | ✓ |

Basic information includes:

- **Occupancy Type** – Residential Occupancies up to 4 Units. Buildings containing more than 5 dwelling units may require professional involvement and/or may require compliance with the NECB 2011. Please contact Safety Codes Services as 403-529-8205 if you need additional information regarding your project.
- **Climate Zone** – Medicine Hat located in Climate zone 6 (refer to Appendix C of Div B).
- **Building Area** – This is as defined in 1.4.1.2 of Div A of the ABC 2014.
Building area means the greatest horizontal area of a *building* above *grade* within the outside surface of exterior walls or within the outside surface of exterior walls and the centre line of *firewalls*.
- **Floor Area** – This is as defined in 1.4.1.2 of Div A of the ABC 2014.
Floor area means the space on any *storey* of a *building* between exterior walls and required *firewalls*, including the space occupied by interior walls and *partitions*, but not including *exits*, *vertical service spaces*, and their enclosing assemblies.

Selecting a Compliance Path

Select only one compliance path; multiple compliance paths are not permitted on a single building.

Specific requirements associated with the individual compliance paths are found on the checklist, and explained in greater detail below.

Prescriptive Compliance Path

This section describes the minimum information that must be included for prescriptive compliance. It may take the form of notes or additional drawings. If the proposed assemblies and components meet the required values of 9.36.2 – 9.36.4, you will have demonstrated compliance.

9.36.2 – Building Envelope

9.36.2.2 – Determination of Thermal Characteristics of Material, Components and Assemblies

The thermal characteristics of materials for walls, windows, and doors shall be determined by calculations or testing.

The drawings shall include detailed drawings or summaries pages showing:

- the effective RSI value of opaque (solid) assemblies (walls, floors and ceilings) separating conditioned spaces from unconditioned spaces or the exterior,
- the thermal transmittance (U-Value) for all windows and doors,
- Type of Air and Vapour Barrier being proposed, and
- Indicate types and RSI values of all thermal insulation. If sprayfoam is being used, the drawings shall include product specific information and where the foam is being installed in the building.

9.36.2.9 – Airtightness

The leakage of air into and out of the conditioned spaces shall be controlled a continuous air barrier system in accordance to sentences (2) to (6).

The drawings shall include sufficient details to ensure compliance:

- across construction, control and expansion joints,
- across junctions between different building material and assemblies, and
- around penetrations through all building assemblies.

The following areas must be detailed on the drawings:

- Foundation to main floor connections
- Floor to Exterior Wall assemblies
- Wall to ceiling connections
- Floor assemblies between conditioned and unconditioned spaces (i.e. exterior cantilevers floors over attached garage)
- Window, door, and access penetrations
- All mechanical penetrations including, but not limited to, Gas and Electrical service pipes, HVAC venting, device boxes, Plumbing stacks/vents etc.

These details must be specific to the air barrier system proposed (Exterior, Interior, or a combination). Remember, when an air barrier system consists of poly, all joints must be lapped not less than 50mm, sealed with an approved sealant, and be structurally supported.

9.36.3 – HVAC Requirements

The drawings shall include sufficient information and details to ensure compliance.

- HVAC systems and ducts shall be sized in accordance with good construction practice as described in 9.32 and 9.33. Heat loss calculations may be provided with the permit application, or the HVAC contractor can provide a Verification of Compliance once the work is completed.
- Ducts that are located in unconditioned spaces must be insulated to the same thermal resistance as above grade exterior walls, and have all joints sealed.
- Details must be provided when a HRV is installed.
- All equipment installed must meet the energy efficiency requirements identified in Table 9.36.3.10. These performance requirements must be shown on the drawings provided in support of a Building Permit Application.
- Any proposed Solar Thermal Systems must be identified.

9.36.4 – Service Water Heating Systems

The drawings shall include sufficient information and details to ensure compliance.

- All equipment installed must meet the energy efficiency requirements identified in Table 9.36.4.2. These performance requirements must be shown on the drawings provided in support of a Building Permit Application.
- Identify the required piping insulation within 2m of the storage tank.
- Any proposed Solar Domestic Hot Water Systems must be identified as per 9.36.4.3.

Trade-off Path

A second compliance path allows applicants to ‘trade-off’ building envelope requirements, subject to limitations found in ABC 9.36.2.11. These include:

- Total areas must be the same for both parts of the calculation.
- You may only trade-off between assemblies from the building envelope, not HVAC or Hot Water.
- You may only trade opaque for opaque assemblies OR transparent for transparent assemblies.
- If you trade windows for windows, they must be on the same elevation.

Demonstrating compliance under the trade off path requires all the information for prescriptive compliance, with the additional requirements of:

- Trade off calculations must be submitted
- Using a hatch, shading, or other mean, the trade-off areas must be indicated on the accompanying drawing submission.

9.36.5 – Energy Performance Compliance Path

Performance Compliance path employs a computer simulation software or calculations to compare a proposed design with a hypothetical reference building to show that the proposed design will use less energy over the course of an operational year. ABC 9.36.5 outlines the procedures for performing this comparison.

The 9.36 Project Summary requires a number of values to be provided in order to allow verification of the model inputs. A brief outline of some of these inputs and their requirements follows:

Reference Model

The reference model must be constructed according to 9.36.5.13. – 9.36.5.16 in the Reference building.

Airtightness, SHGC (Solar Heat Gain Co-efficient), Thermal Mass, and Solar Absorbance must use values specified in 9.36.5.14.

FDWR (limits on fenestration to gross wall area) for the Reference building is based on the FDWR of the proposed building, according the to the following table:

| Buildings Containing 1 or 2 Dwelling Units | |
|---|--------------------------|
| Actual FDWR | FDWR for Reference Model |
| <17 | 17 |
| 17-22 | Match actual FDWR |
| >22 | 22 |
| Buildings containing More Than 2 Dwelling units | |
| Actual FDWR | FDWR for Reference Model |
| 0-40 | Match actual FDWR |
| >40 | 40 |

NOTE: For the purposes of the reference building, the area of glazing arrived at above shall be divided equally among the elevations of the building in the model. The following boxes on the form allow you to indicate the areas entered in the model for each elevation.

HVAC System efficiency is to be indicated based on the required efficiency rating from table 9.36.3.10 for the type and size of equipment specified in the proposed design. If the proposed design equipment is not included in the table, then the reference house should be based on a gas fired warm air furnace with an efficiency of 92%.

Space Cooling Efficiency, if installed, shall meet the efficiency value for the relevant type of equipment as found in table 9.36.3.10.

Service Water Heater Efficiency shall be indicated as the value shown in table 9.36.4.2, or if appropriate 9.36.5.16, and shall be the same type, size, and fuel type as the proposed house.

Ventilation Rate shall be set at the value derived from table 9.32.3.3 based on the number of bedrooms.

Proposed Model

Airtightness for the proposed house is a choice to be made by the designer.

| Chosen Airtightness level | Construction Requirements |
|---------------------------|---|
| 3.2 | Install an Air Barrier system in accordance with 9.25.3 |
| 2.5 | Install an Air Barrier system in accordance with 9.36.2.10 |
| <2.5 | Conduct a blower door test to verify that the specified air leakage rate has been achieved. |

NOTE: The results of this test must be supplied to the Building Inspector prior to occupancy. Should the blower door test indicate that the air leakage rate is greater than that specified at permit stage, then along with the blower door results, a revised model report using the actual test value will need to be submitted to the Building Inspector prior to occupancy.

SHGC will be based on the specification of the actual windows proposed for the house and calculated in accordance with 9.36.2.2.

Thermal Mass can be calculated for the proposed house in accordance with 9.36.5.10 or the default value of 0.06 may be used.

Solar Absorbance is held constant between the proposed and reference models, and therefore should be 0.4.

FDWR will be entered as the actual value calculated, and distributed in the model per the design. The following boxes on the form allow you to indicate the areas for each elevation and should reflect the drawings.

HVAC System Efficiency will be the efficiency of the actual specified equipment.

Space Cooling Efficiency shall be the efficiency of the actual proposed equipment, if installed.

Service Water Heater Efficiency will be the efficiency of the actual specified equipment.

Ventilation Rate may be set at a proposed value but may not be less than that derived from table 9.32.3.3, based on the number of bedrooms.

Performance Data Summary

Enter the energy use values generated by the reference and proposed models. Compliance is demonstrated when the Calculated Energy use is equal to, or less than, the Target Energy Use.

Software

The software used to perform the energy simulation will be detailed here. No specific software package is mandated, however, whichever software is chosen must have been tested to ANSI/ASHRAE 140, and have any changes or variations made to/within the software listed.

Declaration

Code requires a declaration be made that the calculations have been completed in compliance with all the rules outlined in 9.36.5. In order that the Safety Codes officer can discuss anything arising from the calculations, contact information shall be provided for the person who prepared them.

Should the project be particularly complex, or the calculations have significant deficiencies, the Safety Codes Officer may request a professional stamp and signature accompany the calculations.