

Section 9.36. Energy Efficiency

The objective of this Code is to limit the probability that, as a result of the design or construction of the building, resources will be used in a manner that will have an unacceptable effect on the environment. The risks of unacceptable effect on the environment due to use of resources addressed in this Code are those caused by excessive use of energy.

This section applies to:

- Part 9 Group C buildings
- Part 9 Group D, E or F3 buildings whose floor area is less than or equal to 300 m² (excluding parking garages serving residential occupancies), and
- Mixed use Part 9 Group C and D, E or F3 where the non-residential portion is less than or equal to 300 m².

Does not apply to:

- Temporary buildings, including construction camps,
- Buildings other than Group C where the combined floor area exceeds 300 m²,
- Group F2 occupancies,
- Buildings or portions of buildings that are not required to be conditioned spaces (ie. seasonal dwellings), and
- Farm buildings.

Climate Zone for Winnipeg, Manitoba: Zone 7A

Heating Degree-Days (@18°C): 5000 to 5999 – Winnipeg is 5670

9.36.2. Building Envelope

- This Subsection is concerned with energy loss due to heat transfer and air leakage through
 - a. Materials,
 - b. Components, and
 - c. Assemblies
- Applies between conditioned space and unconditioned space, exterior air or ground.
- Also applies between conditioned spaces and adjoining storage garage, even if storage garage is heated.

Scope and Application – Article 9.36.2.1.

Required effective thermal resistance of above ground opaque assemblies in buildings with a Heat-Recovery Ventilator (HRV) in Zone 7A:

Ceilings below attics: RSI-8.50 (R48.3)

Cathedral ceilings and flat roofs: RSI-5.02 (R28.5)

Walls: RSI-2.8 (R15.9)

Floors over unheated spaces: 5.02 (R28.5)

Prescriptive Path

Based on typical construction methods for new SFDs:

Standard attic (using HOT 2000) with minimum 12" heel height, 10.5" blown-in cellulose insulation, R12 insulation provides roughly RSI-8.63 (R48.97). **Compliant.**

Standard exterior wall assembly of 2x6 @ 16" o.c. and R20 insulation and stucco exterior provides roughly RSI-2.65 (R15.03). **Not compliant.**

Standard exterior wall assembly of 2x6 @ 24" o.c. and R20 insulation and stucco exterior provides roughly RSI-2.90 (R16.4). **Compliant.** [See MB Amendment Table A-9.36.2.2.(4.1)A.]

Advanced framing exterior wall assembly of 2x6 @ 24" o.c. and R20 insulation and stucco exterior provides roughly RSI-2.87 (R16.31). **Compliant.** (Note: advanced framing may require engineering)

Typical 200mm concrete foundation wall, 25mm air space, 2x4 @ 24" o.c. with R20 insulation in framing cavity provides RSI-2.8 (R15.9). **Compliant.**

OR choose a common above-ground and foundation wall assembly listed in Tables A-9.36.2.2.(4.1)A. and A-9.36.2.2.(4.1)B. (results from HOT 2000)

Tall wall

- Note ⁽³⁾ of Table 9.36.2.6B. of the MB Amendment states walls exceeding the maximum unsupported height listed in Table 9.23.10.1. (ie. Tall Walls) are permitted to have a RSI (R-value) of 0.03 (R0.17) lower than indicated. Therefore RSI-2.77 (R15.73).
- A typical tall wall assembly of 2x6 @ 12" o.c. with R20 insulation and stucco exterior finish provides roughly RSI-2.75 (R15.60). **Not compliant**
- Applicant shall provide an assembly that meets minimum RSI value. Alternatively, applicant can provide trade-off calculation method.

Rim Joists

- Effective thermal resistance of rim joists shall be not less than that required for above-ground walls in Table 9.36.2.6.A. or 9.36.2.6.B., as applicable.

Fenestration, Doors and Skylights – Article 9.36.2.7.

- As per Table 9.36.2.7.A. of the NBC, fenestration and doors require a maximum U-value of 1.60 W/(m²*K) and a minimum energy rating of 25.
- Can be achieved by using non-metallic frames, triple glazing, 12.7 mm insulated spacer, argon, 1 low-e coating **OR** double pane with an argon fill, insulated spacer and coating [See A-9.36.2.7.(1) and (2)]. Consult with your window supplier to ensure that your proposed windows meet these requirements.

- As per Table 9.36.2.7.B. of the NBC, skylights require an overall thermal transmittance not greater than 2.70 W/(m²*K)
- Storm windows and storm doors are exempted from this requirement.

Airtightness – Article 9.36.2.9.

- Article 9.36.2.9. requires
 - a. Air barrier systems to be continuous across typical penetrations and junctions,
 - b. Windows, doors and skylights to comply with minimum air leakage requirements based on NAFS standards,
 - c. Vehicle access doors (separating conditioned space from unconditioned space/exterior) to provide weather-stripping,
 - d. Fireplaces to have a device that restricts air movement through the chimney (when not in use), and
 - e. Airtightness (blower) tests be performed should visual examination/inspection be unable to confirm compliance.

Construction of Air Barrier – Article 9.36.2.10.

- Rigid panel type materials – joints to be sealed
- Timber jogs – joints must be sealed
- Flexible sheet material – lapped 50 mm, sealed and structurally supported
- Sealant materials must be non-hardening and conform to the applicable CAN/ULC standards
- Electrical penetrations must be constructed airtight by sealing or covering and sealing
- Foundation wall and sill plate, sill plate and rim joist, rim joist and subfloor, subfloor and bottom plate – joints and junctions sealed or covered and sealed
- Interfaces between opaque assemblies and windows, doors or skylight joints and junctions sealed

Trade-off Option

- Apply to above-ground building envelope assemblies and components within a single building only.
- Limitations are as follows:
 - a. Cannot trade off airtightness measures, doors, and access hatches
 - b. Walls and attic roofs cannot be reduced below 55% of required RSI-value
 - c. Other opaque assemblies cannot be reduced below 60% of required RSI-values
 - d. Cannot be applied to heated assemblies (ie. Embedded heating cables)
 - e. Cannot be applied to components and assemblies already exempted (ie. Site-built windows, glass block and storm doors)
- Three trade-off options
 - a. Opaque to opaque,
 - b. Transparent to transparent, and
 - c. Opaque to transparent.

Energy Performance Compliance

- Covered in Subsection 9.36.5.
- Modeling of energy performance of non-compliant components, systems and assemblies by including other more energy efficient systems to compensate.
- Proposed house shall meet or exceed the Code requirements for a replica of the house with prescriptive components.
- Shall be designed by professional experienced in the work involved.

9.36.3. HVAC Requirements

- Ducts and Plenums carrying conditioned air outside of insulation must be insulated to Above Ground Wall Insulation requirements of 9.36.2. and have all joints sealed – 9.36.3.2.
- Ducts and openings that discharge air to outdoors must have a motorized damper and gravity or spring operated backflow damper – 9.36.3.3.
- Every intake duct must be equipped with a motorized damper except where HVAC is required to run continuously - 9.36.3.3.
- Piping for heating or AC system must be located on warm side of insulation or be Insulated to Above Ground Wall Insulation requirements of 9.36.2. - 9.36.3.4.
- Thermostatic controls must activate within +/- 0.5⁰C and systems must prevent simultaneously heating and cooling – 9.36.3.6.
- Controls are required when humidification is included in an HVAC system – 9.36.3.7.
- Spaces containing indoor pools or hot tubs must use an HRV and be able to recover 40% of heat from exhausted air – 9.36.3.8.
- Heat Recovery Ventilators are required on the primary exhaust of a self-contained mechanical ventilation – 9.36.3.8.1. (Current requirement)
- HVAC Equipment must meet the efficiency requirements of 9.36.3.10. (Current requirement)
- Natural Gas and Propane fireplaces must be Direct Vent without a standing Pilot Light. Pilot on Demand, interrupted or intermittent ignition systems are acceptable – 9.36.3.10.
- Solar Thermal HVAC systems must conform to manufacturer’s instructions and be installed in a conditioned space – 9.36.3.11.

9.36.4. Service Water Heating Systems

- Service Water Heating systems must conform to manufacturer’s instructions and be installed in a conditioned space – 9.36.4.3.
- For Service Water Heating systems, the first 2 meters of outlet piping must have 12mm of piping insulation - 9.36.4.4.
- All piping from a continuous recirculating Service Water Heating systems must be insulated - 9.36.4.4.
- If the piping for a Service Water Heating system is in unconditioned space, it must be insulated to Above Ground Wall Insulation requirements of 9.36.2. - 9.36.4.4.
- A Drain Water Heat Recovery unit must be installed on a drain of at least one shower within the dwelling unit – 9.36.4.7 (MBC)

- Drain Water Heat Recovery units are not required where there are no showers within the dwelling unit, or there are no stories beneath any of the showers in the dwelling unit – 9.36.4.7 (MBC)
- Drain Water Heat Recovery units must installed upright, within a conditioned space, have a cold water inlet at the bottom and downstream of a water softener – 9.36.4.7 (MBC)
- The efficiency of the Drain Water Heat Recovery unit shall not be less than 42% - 9.36.4.7 (MBC)

