



Guide for Designing Energy-Efficient Building Enclosures for Wood-Frame Multi-Unit Residential Buildings in Marine to Cold Climate Zones in North America

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Material: CLT (Cross-Laminated Timber)
Light Frame (Lumber+Panels)

Application: Walls

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Design and Systems

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Residential Buildings
Energy Efficiency
Building Code

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Summary:

The Guide for Designing Energy-Efficient Building Enclosures for Wood-Frame Multi-Unit Residential Buildings in Marine to Cold Climate Zones in North America was developed by FPInnovations in collaboration with RDH Building Engineering Ltd., the Homeowner Protection Office, Branch of BC Housing, and the Canadian Wood Council.

The project is part of efforts within the Advanced Building Systems Program of FPInnovations to assemble and add to the knowledge base regarding Canadian wood products and building systems. The team of the Advanced Building Systems Program works with members and partners of FPInnovations to address critical technical issues that threaten existing markets for wood products or which limit expansion or access to such new markets. This guide was developed in response to the rapidly changing energy-efficiency requirements for buildings across Canada and the United States.

This guide serves two major objectives:

To assist architects, engineers, designers and builders in improving the thermal performance of building enclosures of wood multi-unit residential buildings (MURBs), in response to the increasingly stringent requirements for the energy efficiency of buildings in the marine to cold climate zones in North America (U.S. DOE/ASHRAE and NECB Climate Zones 5 through 7 and parts of Zone 4);

To advance MURB design practices, construction practices, and material use based on best knowledge, in order to ensure the durable performance of wood-frame building enclosures that are insulated to higher levels than traditional wood-frame construction.

The major requirements for thermal performance of building enclosures are summarized (up to February 2013), including those for the following codes and standards:

2011 National Energy Code of Canada for Buildings (2011 NECB);

2013 interim update of the 2010 National Building Code of Canada (2010 NBC, Section 9.36–Energy Efficiency);

2012 International Energy Conservation Code (2012 IECC);

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 90.1– Energy Standard for Buildings Except Low-Rise Residential Buildings (2004, 2007, and 2010 versions).

In addition to meeting the requirements of the various building codes and standards, a building may need to incorporate construction practices that reflect local preferences in material use, design and construction.

Regional climate differences will also affect design solutions.

This guide primarily addresses above-grade walls, below-grade walls and roofs of platform wood-frame construction. It also includes information regarding thermal performance of cross-laminated timber (CLT) assemblies as well as the use of non-bearing wood-frame exterior walls (infill walls) in wood post-and-beam and concrete structures.

Examples of thermal resistance calculations, building assemblies, critical interface detailing, and appropriate material selection are provided to help guide designers and builders meet the requirements of the various energy-efficiency codes and standards, achieve above-code performance, and ensure long-term durability. This guide builds on the fundamentals of building science and on information contained within the Building Enclosure Design Guide: Wood-Frame Multi-Unit Residential Buildings, published by the Homeowner Protection Office, Branch of BC Housing.

This guide is based on the best current knowledge and future updates are anticipated. The guide is not intended to be a substitute for professional advice that considers specific building parameters.

Online Access: Free

Resource Link

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