



- # V•ROD IN ICF CONSTRUCTION

GFRP ICF Technical
Design Guide

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V•ROD
FIBERGLASS REBAR



PRESCRIPTIVE DESIGN FOR PART 9 STRUCTURES IN CANADA

Using V-ROD46 and V-ROD POLY 46 Glass Fiber Reinforced Polymer Reinforcement

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Based on:

- National Building Code of Canada (NBCC 2020)
- CSA S806-12 – Design and Construction of Building Structures with Fibre Reinforced Polymers
- CSA S807-19 – Specification for Fibre Reinforced Polymers
- CSA A23.3-24 – Design of Concrete Structures
- ICFMA Prescriptive ICF Design for Part 9 Structures in Canada (2024 Edition)
- V-ROD Tables - Below-Grade ICF Walls (2025-08-12)

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.1.

INTRODUCTION

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INTRODUCTION

• 1.1 PURPOSE OF THIS GUIDE

This technical guide provides a complete, prescriptive design framework for the use of V-ROD Glass Fiber Reinforced Polymer (GFRP) reinforcement in Insulated Concrete Form (ICF) wall systems for Part 9 residential structures in Canada. It consolidates the requirements of NBCC 2020, CSA S806, CSA S807, CSA A23.3-24, and the 2024 ICFMA Prescriptive Design Manual, and adapts them specifically for the mechanical and performance characteristics of V-ROD46 (vertical) and V-ROD POLY 46 (horizontal) GFRP bars.

This guide replaces all steel reinforcement provisions in the ICFMA manual with GFRP specific requirements, tables, and detailing rules. It is intended for use by designers, builders, inspectors, and engineers seeking a clear, practical, and code aligned approach to GFRP reinforced ICF construction.

• 1.2 SCOPE AND APPLICABILITY

This guide applies to:

- Residential buildings governed by Part 9 of NBCC 2020
- Flat ICF walls with uniform concrete core thickness
- One storey below grade and up to two storeys above grade
- Buildings with maximum area of 3,200 ft² (300 m²)
- Buildings with maximum plan dimension of 80 ft (24.4 m)
- Buildings with aspect ratio $\leq 2:1$
- ICF walls laterally supported at top and bottom
- Light frame construction supported above the ICF walls

This guide covers:

- Below grade ICF walls
- Above grade ICF walls
- Reinforcement around openings
- Lintels
- Shear walls
- Footings and dowels
- Ledger connections
- Brick ledges
- Construction requirements
- GFRP development and anchorage rules
- Complete GFRP reinforcement tables

This guide does not apply to:

- Commercial, industrial, or institutional buildings
- Buildings outside NBCC Part 9
- ICF walls exceeding the height or load limits defined herein
- Non flat ICF wall geometries
- Non V-ROD GFRP products
- Structures requiring engineered design beyond prescriptive limits

Where conditions fall outside the scope of this guide, a licensed professional engineer must prepare a project specific design.

• 1.3 REFERENCED STANDARDS AND DOCUMENTS

This guide is based on the following standards and technical references:

- **National Building Code of Canada (NBCC 2020)**
- **CSA S806-12** – Design and Construction of Building Structures with Fibre Reinforced Polymers
- **CSA S807-19** – Specification for Fibre Reinforced Polymers
- **CSA A23.3-24** – Design of Concrete Structures
- **ICFMA Prescriptive ICF Design for Part 9 Structures in Canada (2024 Edition)**
- **V•ROD Tables - Below-Grade ICF Walls (2025-08-12)**

Where discrepancies occur between this guide and governing codes, **the code provisions take precedence.**

• 1.4 LIMITATIONS OF USE

This guide is intended for **prescriptive design** only. The following limitations apply:

- Reinforcement must be **V•ROD46 (vertical)** and **V•ROD POLY 46 (horizontal)**.
- Substitution with other GFRP or steel products is **not permitted**.
- All walls must be **laterally supported** at the top and bottom during construction and in service.
- Backfill must not exceed the heights permitted in the GFRP tables.
- Soil conditions must meet the assumptions in Section 2.
- Seismic design is limited to **S_{a,ICF} ≤ 0.27**, Site Classes A-D, and Seismic Categories SC1 and SC2.
- Fire resistance is limited to **45-60 minutes**, based on V•ROD GFRP performance.
- Temperature and shrinkage reinforcement is **not required** for ICF walls using V•ROD GFRP.
- Engineering review is required for:
 - Walls exceeding 10 ft (3.05 m) in height
 - 6-in. walls subjected to 45 pcf lateral soil pressure
 - Any condition outside the prescriptive tables

This guide does not replace the need for professional judgment. Designers must ensure that all aspects of the building comply with applicable codes, standards, and local regulations.

• 1.5 ABOUT V•ROD IN ICF CONSTRUCTION

V•ROD in ICF Construction represents the integration of V•ROD GFRP reinforcement into modern ICF wall systems. V•ROD bars provide:

- High tensile strength
- Corrosionfree durability
- Lightweight handling
- Predictable bond performance
- Compatibility with ICF forming systems
- Improved longterm performance in belowgrade environments

This guide formalizes the use of V•ROD GFRP bars as a **direct replacement for steel reinforcement** in prescriptive ICF wall design, enabling builders and designers to take full advantage of GFRP's performance benefits while maintaining compliance with NBCC 2020 and CSA standards.



.2.

DESIGN OVERVIEW

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DESIGN OVERVIEW

This section summarizes the key design criteria, geometric limits, load assumptions, seismic parameters, and material properties that govern the use of V-ROD46 and V-ROD POLY 46 GFRP reinforcement in ICF wall systems for Part 9 residential structures in Canada. These criteria form the foundation for all prescriptive tables and detailing requirements presented in this guide.

• 2.1 BUILDING GEOMETRY LIMITS

The following geometric limits apply to all ICF walls reinforced with V-ROD GFRP bars under this prescriptive design approach:

Building Size and Configuration

- **Maximum building area:** 3,200 ft² (300 m²)
- **Maximum plan dimension:** 80 ft (24.4 m)
- **Maximum building aspect ratio (L:W):** 2:1
- **Maximum number of storeys above grade:** 2
- **Maximum number of storeys below grade:** 1
- **Maximum roof clear span:** 40 ft (12.2 m)
- **Maximum floor clear span:** 24 ft (7.32 m)

Wall Heights

- Main floor wall height: 10 ft (3,050 mm)
- Second floor wall height: 10 ft (3,050 mm)
- Foundation wall height: 10 ft (3,050 mm)

Wall Alignment

- All ICF walls must be **flat**, with a **uniform concrete core thickness**.
- Walls must be **vertically aligned** from foundation to roof.
- Step outs, pilasters, or non uniform wall thicknesses are outside the scope of this guide.

These limits align with NBCC 2020 Part 9 and the 2024 ICFMA Prescriptive Design Manual, ensuring compatibility with typical Canadian residential construction.

• 2.2 LOAD CRITERIA

All design tables and reinforcement requirements in this guide are based on the following unfactored loads, consistent with NBCC 2020 and the ICFMA 2024 manual.

Gravity Loads

- **Concrete density:** 150 pcf (2,360 kg/m³)
- **Floor/Ceiling dead load:** 15 psf (0.7 kPa)
- **Roof/Ceiling dead load:** 15 psf (0.7 kPa)
- **Light frame wall weight:** 15 psf (0.7 kPa)
- **Floor live load:** 40 psf (1.92 kPa)
- **Attic live load:** 20 psf (1.0 kPa)
- **Snow load:** 84 psf (4.0 kPa)

Lateral Soil Loads

- **Equivalent fluid pressure** ($K = 1.0$):
 - 30 pcf (4.7 kN/m³)
 - 45 pcf (7.0 kN/m³)
- **Area surcharge** ($K = 0.5$): 50 psf (2.4 kPa)

These soil pressures correspond to typical residential backfill conditions and are compatible with the V-ROD basement wall reinforcement table.

Wind Loads

Wind loads are taken from NBCC 2020 climatic data and are consistent with the values used in the ICFMA 2024 design tables.

Above grade reinforcement tables in this guide are calibrated to match these wind pressures using GFRP material properties.

• 2.3 SEISMIC CRITERIA

This guide incorporates the seismic limitations defined in the V-ROD sealed engineering letter and the ICFMA 2024 manual.

Seismic Design Parameters

- **Seismic categories permitted:** SC1 and SC2
- **Seismic site classes permitted:** A, B, C, and D
- **Maximum equivalent spectral response acceleration (S_a, ICF): ≤ 0.27**

This S_a, ICF limit ensures that GFRP reinforced ICF walls remain within the elastic and serviceability limits defined by CSA S806 and NBCC 2020 for low to moderate seismic regions.

Seismic Behavior of GFRP

Because GFRP reinforcement is:

- linear elastic to failure,
- non ductile, and

Governed by strain limits rather than yielding, the prescriptive tables in this guide are calibrated to ensure that:

- concrete governs the failure mode,
- reinforcement remains within allowable strain limits,
- deflections remain within NBCC serviceability limits ($H/240$),
- and shear wall performance meets NBCC Part 9 requirements.

• 2.4 FIRE PERFORMANCE

V-ROD GFRP bars provide reliable performance under elevated temperatures when embedded in ICF concrete walls.

Fire Resistance Rating

- **45 minutes to 1 hour**, depending on wall thickness and configuration.

This rating is based on:

- V-ROD fire performance characteristics,
- CSA S806 prescriptive fire resistance methodology,
- NBCC 2020 minimum requirements for load bearing walls in Part 9 structures.

ICF walls inherently provide excellent fire protection due to:

- continuous concrete cores,
- insulating foam layers,
- low thermal conductivity of GFRP reinforcement.

No additional fireproofing of reinforcement is required.

• 2.5 MATERIAL PROPERTIES OF V-ROD GFRP BARS

The reinforcement requirements in this guide are based exclusively on the mechanical properties of **V-ROD46** (vertical) and **V-ROD POLY 46** (horizontal) GFRP bars.

V-ROD46 – Vertical Reinforcement

- **Tensile strength:** 1,000 MPa (145 ksi)
- **Modulus of elasticity:** 46,000 MPa (6,700 ksi)
- **Bond dependent coefficient:** 0.8
- **CSA S807 compliant**

V-ROD POLY 46 – Horizontal Reinforcement

- **Tensile strength:** 1,000 MPa (145 ksi)
- **Modulus of elasticity:** 46,000 MPa (6,700 ksi)
- **Bond dependent coefficient:** 0.8
- **CSA S807 compliant**

General Material Notes

- Bars are sand coated for uniform bond stress distribution.
- Bars are corrosion proof and non conductive.
- Bars do not yield; design is based on allowable strain and concrete capacity.
- Minimum temperature/shrinkage reinforcement is **not required** for ICF walls using V-ROD GFRP.



.3.

CONCRETE & CONSTRUCTION REQUIREMENTS

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CONCRETE & CONSTRUCTION REQUIREMENTS

This section outlines the concrete specifications, construction practices, and site conditions required to ensure proper performance of **V-ROD46** and **V-ROD POLY 46** GFRP reinforcement in ICF wall systems. These requirements align with NBCC 2020, CSA A23.1/A23.2, CSA A23.3-24, and the installation expectations of modern ICF manufacturers.

• 3.1 CONCRETE STRENGTH AND MATERIALS

Concrete Strength

All ICF walls reinforced with V-ROD GFRP bars shall use concrete with:

- **Minimum 28 day compressive strength:**
 - 25 MPa for all wall thicknesses
 - (consistent with V-ROD sealed engineering letter)

Aggregate Size

To ensure proper flow and consolidation within ICF forms:

- Maximum aggregate size:
 - o **19 mm (¾ in.)** where minimum cover ≥ 40 mm
 - o **12.5 mm (½ in.)** where cover < 40 mm or where congestion occurs near openings or corners

Concrete Mix Requirements

Concrete shall:

- Be designed for **ICF placement**, with appropriate slump or plasticizer use
- Maintain workability without segregation
- Support proper consolidation around GFRP bars
- Be compatible with high frequency vibration

Air entrainment shall be used where required by local climatic conditions.

• 3.2 PLACEMENT, VIBRATION, AND CURING

Concrete Placement

Concrete shall be placed:

- In **lifts not exceeding manufacturer recommendations**
- Using methods that prevent form bulging or displacement
- With care to avoid impact on GFRP bars or tie webs

Vibration

Use **high frequency internal vibration** to ensure:

- Full consolidation
- Elimination of voids
- Uniform aggregate distribution

Extra care is required around:

- Openings
- Corners
- Lintels
- Areas with concentrated reinforcement

Curing

Concrete shall be protected from:

- Freezing
- Rapid drying
- Excessive heat
- Precipitation

for at least **7 days** after placement.

• 3.3 CONSTRUCTION JOINTS

Construction joints shall:

- Be located at points of **lateral support** whenever possible
- Not impair structural performance
- Maintain full continuity of reinforcement

Reinforcement Across Joints

- All V-ROD bars crossing a joint must maintain **minimum lap lengths** defined in Section 4
- Joints shall **not** be placed within **610 mm (24 in.)** of any wall opening

• 3.4 BACKFILL, DRAINAGE, AND FROST PROTECTION

Backfill Requirements

Backfilling shall occur **only after**:

- The concrete has reached adequate strength
- The wall is laterally supported at both top and bottom
- Floor systems or bracing are installed per NBCC 9.15.4.3 and 9.15.4.4

Drainage

Backfill must be drained in accordance with:

- **NBCC 2020, Article 9.4.4.6**

This includes:

- Perimeter drainage tile
- Free draining granular backfill
- Proper grading away from the structure

Frost Protection

All foundation walls and footings shall be protected from frost:

- During construction
- In final installation
- In accordance with local climatic requirements

• 3.5 LATERAL SUPPORT REQUIREMENTS

ICF walls reinforced with V-ROD GFRP bars must be **laterally supported** at:

- The **top** (by floor or roof systems)
- The **bottom** (by footings or slabs)

This requirement applies:

- During concrete placement
- During curing
- Prior to backfilling
- Throughout the service life of the structure

Acceptable Lateral Support

- Floor joists or trusses
- Roof systems
- Concrete slabs
- Engineered bracing systems during construction

Unsupported Walls

Walls that are **laterally unsupported at the top** (e.g., knee walls) require:

- Project specific engineering
- Reinforcement and footing design beyond the scope of this guide



.4.

GFRP REINFORCEMENT REQUIREMENTS

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GFRP REINFORCEMENT REQUIREMENTS

This section defines the reinforcement requirements for **V-ROD46** (vertical) and **V-ROD POLY 46** (horizontal) GFRP bars used in ICF wall systems. These requirements replace all steel reinforcement provisions in the ICFMA 2024 manual and are based on the mechanical properties, bond characteristics, and installation criteria provided in the sealed V-ROD engineering documents.

All reinforcement in this guide must be **V-ROD GFRP**. Substitution with steel or other GFRP products is not permitted.

• 4.1 VERTICAL REINFORCEMENT | V-ROD46

Vertical reinforcement in all ICF walls shall consist of **V-ROD46 GFRP bars**, with the following properties:

- **Tensile strength:** 1,000 MPa (145 ksi)
- **Modulus of elasticity:** 46,000 MPa (6,700 ksi)
- **Bond dependent coefficient:** 0.8
- **CSA S807 compliant**

Placement Requirements

- Below grade walls:
Vertical bars shall be placed **38 mm (1.5 in.) from the inside face** of the concrete core.
- Above grade walls:
Vertical bars shall be placed **centrally** within the concrete core.
- In 300 mm (12 in.) ICF forms:
Vertical bars shall be placed in **two equal layers**, one in the interior third and one in the exterior third.

Spacing

- Vertical spacing shall follow the **GFRP reinforcement tables** in Sections 5 and 6.
- CSA S806 does **not** impose a maximum vertical spacing limit for GFRP in walls.
- Maximum spacing may match the ICFMA 2024 steel based tables, provided V-ROD bar capacity is satisfied.

• 4.2 HORIZONTAL REINFORCEMENT | V-ROD POLY 46

Horizontal reinforcement in all ICF walls shall consist of **V-ROD POLY 46 GFRP bars**, with the following properties:

- **Tensile strength:** 1,000 MPa (145 ksi)
- **Modulus of elasticity:** 46,000 MPa (6,700 ksi)
- **Bond dependent coefficient:** 0.8
- **CSA S807 compliant**

Placement Requirements

- One continuous horizontal bar shall be placed **no more than 300 mm (12 in.) from the top** of every wall.
- Additional horizontal bars shall be placed at **400 mm (16 in.) on centre** unless otherwise required by tables.
- Bars shall be continuous around corners, openings, and floor levels.

Corner Reinforcement

At every corner, provide:

- **600 mm × 600 mm (24 in. × 24 in.) bent V-ROD POLY 40 bars**
- Installed to match the horizontal bar spacing
- Lapped per Section 4.3

• 4.3 DEVELOPMENT LENGTHS AND ANCHORAGE

GFRP bars do **not** yield and therefore require longer development lengths than steel. All anchorage and lap lengths shall follow V-ROD manufacturer requirements and CSA S806.

Minimum Development Length (Ld)

- Vertical V-ROD46 bars:
Ld = 40 × bar diameter
- Horizontal V-ROD POLY 46 bars:
Ld = 50 × bar diameter

Anchorage Requirements

- Standard steel hooks do **not** apply to GFRP.
- Anchorage shall be achieved through:
 - Straight embedment
 - Mechanical anchorage (if approved)
 - Extended lap lengths
- Bars shall not be bent in the field beyond manufacturer approved radii.

• 4.4 SPLICING REQUIREMENTS

Lap splices shall follow:

- **V-ROD manufacturer requirements**, and
- **CSA S806-12 Clause 12.3**

Minimum Lap Length (Ll)

- Vertical V-ROD46 bars:
Ll = 40 × bar diameter
- Horizontal V-ROD POLY 46 bars:
Ll = 50 × bar diameter

General Splice Rules

- Splices shall be staggered where possible.
- Splices shall not occur:
 - Within 600 mm (24 in.) of openings
 - Within lintel spans
 - Within 600 mm (24 in.) of corners
- Bars shall overlap fully and be tied to maintain position during concrete placement.

• 4.5 CORNER REINFORCEMENT

All ICF wall corners shall include:

- **600 mm × 600 mm (24 in. × 24 in.) bent V-ROD POLY 40 bars**
- Installed at the same spacing as horizontal reinforcement
- Lapped per Section 4.3
- Placed to maintain continuous reinforcement around the corner

This requirement applies to:

- Above grade walls
- Below grade walls
- Walkout basement conditions
- Shear walls
- Lintel zones adjacent to openings

• 4.6 FOOTING DOWELS

Footing dowels shall consist of **V-ROD46 vertical bars** matching the vertical reinforcement size and spacing of the wall above.

Dowel Embedment

- Minimum embedment into footing:
12 × bar diameter
- Minimum embedment into wall:
Equal to the **development length** in Section 4.3

Placement

- Dowels shall align with vertical reinforcement spacing in the wall.
- Dowels shall be installed prior to concrete placement of the footing.
- Dowels shall be tied or supported to maintain position during placement.

• 4.7 TEMPERATURE AND SHRINKAGE CONSIDERATIONS

ICF walls reinforced with V-ROD GFRP bars do not require minimum temperature or shrinkage reinforcement.

This is due to:

- The stable curing environment provided by ICF forms
- The low thermal conductivity of GFRP
- The reduced risk of shrinkage cracking in insulated concrete
- NBCC 2020 provisions that relax minimum reinforcement for ICF walls
- CSA S806 recognition of GFRP's non corrosive nature

Horizontal reinforcement in this guide is therefore based solely on:

- Structural requirements
- Lintel and opening reinforcement
- Shear wall performance
- Prescriptive spacing rules



.5.

BELOW GRADE ICF WALL DESIGN

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BELOW GRADE ICF WALL DESIGN

This section provides the complete prescriptive design requirements for **below grade ICF walls** reinforced with **V-ROD46 vertical** and **V-ROD POLY 46 horizontal** GFRP bars. All requirements are based on NBCC 2020, CSA S806, CSA S807, CSA A23.3-24, the ICFMA 2024 Prescriptive Design Manual, and the sealed V-ROD engineering documents dated December 9, 2024.

Below grade walls must resist:

- Lateral soil pressure
- Surcharge loads
- Hydrostatic loads (when drained per NBCC 9.4.4.6)
- Gravity loads from supported floors and walls
- Seismic loads within the permitted $S_a, ICF \leq 0.27$

The reinforcement tables and detailing requirements in this section replace all steel based provisions in the ICFMA manual.

• 5.1 DESIGN ASSUMPTIONS

The following assumptions apply to all below grade ICF walls in this guide:

Wall Geometry

- Maximum wall height: **10 ft (3.05 m)**
- Concrete core thickness: **6 in, 8 in, or 10 in**
- Walls must be **flat** and **vertically aligned**
- Maximum unbalanced backfill height: **as permitted by Annex section**

Soil Conditions

- Equivalent fluid pressure ($K = 1.0$):
 - **30 pcf (4.7 kN/m³)**
 - **45 pcf (7.0 kN/m³)**
- Area surcharge ($K = 0.5$): **50 psf (2.4 kPa)**
- Backfill must be **drained** per NBCC 9.4.4.6

Reinforcement

- Vertical reinforcement: **V-ROD46**
- Horizontal reinforcement: **V-ROD POLY 46**
- Vertical bars placed **38 mm (1.5 in.) from inside face**
- Horizontal bars placed per Section 5.3
- Corner dowels: **600 × 600 mm V-ROD POLY 46**

Structural Support

- Walls must be laterally supported at:
 - The **top** (floor system)
 - The **bottom** (footing or slab)

Seismic

- Seismic categories: **SC1 and SC2**
- Site classes: **A, B, C, D**
- Maximum $S_a, ICF: \leq 0.27$

Fire

- Fire resistance: **45-60 minutes**

• 5.2 VERTICAL REINFORCEMENT REQUIREMENTS

Vertical reinforcement for below grade walls shall follow **Annex section**, which is the sealed V-ROD basement wall reinforcement table. This table provides:

- Minimum V-ROD46 bar size
- Maximum spacing
- Requirements for 6 in, 8 in, and 10 in concrete core thicknesses
- Maximum permitted unbalanced backfill heights
- Maximum permitted wall heights

Placement

- Bars shall be placed **38 mm (1.5 in.) from the inside face** of the wall
- Bars shall be continuous from footing to top of wall
- Splices shall follow Section 4.4
- Bars shall align with footing dowels

Continuity

- Vertical bars shall extend into the footing dowels with full development length
- At floor levels, bars shall pass uninterrupted unless splicing is required

Walkout Basement Condition

- Walls supporting backfill on one side and open exposure on the other must use:
 - The **maximum backfill height** for reinforcement selection
 - The **below grade reinforcement table** even for exposed portions

• 5.3 HORIZONTAL REINFORCEMENT REQUIREMENTS

Horizontal reinforcement in below grade walls shall consist of **V-ROD POLY 46** bars.

Minimum Requirements

- One continuous bar within **300 mm (12 in.)** of the top of the wall
- Additional bars at **400 mm (16 in.) on centre**
- Bars shall be continuous around corners
- Bars shall be lapped per Section 4.4
- Bars shall be placed centrally in the wall thickness unless otherwise required

Additional Horizontal Reinforcement

Additional V-ROD POLY 46 bars shall be provided:

- Above and below openings
- At floor bearing locations
- At concentrated load locations
- At stair openings
- At transitions between wall thicknesses

Corner Reinforcement

At every corner:

- Install **600 mm × 600 mm (24 in. × 24 in.) bent V-ROD POLY 40 bars**
- Match the horizontal bar spacing
- Lap per Section 4.3

• 5.4 BACKFILL HEIGHTS AND SOIL PRESSURES

The maximum permitted unbalanced backfill height is governed by:

- Wall height
- Wall thickness
- Soil pressure (30 pcf or 45 pcf)
- Reinforcement spacing from Annex section

General Requirements

- Backfill shall not exceed the height permitted by Annex section
- Backfill must be drained per NBCC 9.4.4.6
- Hydrostatic pressure is **not included** in the design
- If hydrostatic pressure is expected, **engineered design is required**

Backfill Placement

- Backfill shall be placed in **lifts**
- Compaction equipment shall not impose excessive lateral loads
- Backfill shall not be placed until the wall is fully supported at top and bottom

• 5.5 WALKOUT BASEMENT CONDITIONS

Walkout basements create unbalanced soil conditions that must be addressed carefully.

Requirements

- Reinforcement shall be selected based on the **maximum backfill height**
- The exposed portion of the wall shall still use **below grade reinforcement**
- Shear wall requirements in Section 8 apply
- Additional horizontal reinforcement may be required at floor levels
- Engineering review is required if:
 - o Backfill exceeds 10 ft
 - o Soil pressure exceeds 45 pcf
 - o Wall thickness is less than 8 in for high backfill zones

• 5.6 ENGINEERING REVIEW REQUIREMENTS

A licensed professional engineer must review the design when:

- Wall height exceeds **10 ft (3.05 m)**
- Unbalanced backfill exceeds the limits of Annex section
- Soil pressure exceeds **45 pcf**
- Hydrostatic pressure is present
- Walls are not laterally supported at top and bottom
- Walls include unusual geometry or openings
- Walkout conditions exceed prescriptive limits
- Concentrated loads exceed the lintel or point load tables



.6.

ABOVE GRADE ICF WALL DESIGN

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ABOVE GRADE ICF WALL DESIGN

This section provides the prescriptive design requirements for **above grade ICF walls** reinforced with **V-ROD46 vertical** and **V-ROD POLY 46 horizontal** GFRP bars. Above grade walls must resist:

- Wind loads
- Gravity loads from floors and roofs
- Seismic forces within $S_a, ICF \leq 0.27$
- Out of plane bending
- In plane shear (when acting as shear walls)

The reinforcement requirements in this section replace all steel based provisions in the ICFMA 2024 manual.

• 6.1 DESIGN ASSUMPTIONS

Wall Geometry

- Maximum wall height: **10 ft (3,050 mm)**
- Concrete core thickness: **6 in, 8 in, or 10 in**
- Walls must be **flat**, with **uniform concrete core thickness**
- Walls must be **laterally supported** at floor and roof levels

Loads

Above grade walls are designed for:

- NBCC 2020 wind loads
- Floor and roof gravity loads
- Seismic loads within $S_a, ICF \leq 0.27$
- Out of plane bending due to wind and seismic forces

Reinforcement

- Vertical reinforcement: **V-ROD46**
- Horizontal reinforcement: **V-ROD POLY 46**
- Vertical bars placed **centrally** in the wall
- Horizontal bars placed per Section 6.2

Fire

- Fire resistance: **45-60 minutes**, depending on wall thickness

• 6.2 VERTICAL REINFORCEMENT REQUIREMENTS

Vertical reinforcement for above grade walls shall follow **Table AG 1**, which provides:

- Minimum V-ROD46 bar size
- Maximum spacing
- Requirements for 6 in, 8 in, and 10 in concrete core thicknesses
- Wind and seismic limits consistent with NBCC 2020 and ICFMA 2024

Placement

- Bars shall be placed **centrally** within the concrete core
- Bars shall be continuous between floor levels
- Splices shall follow Section 4.4
- Bars shall align with vertical reinforcement in walls below

Two Layer Placement (300 mm / 12 in Forms)

For 12 inch ICF forms:

- Vertical reinforcement shall be placed in **two equal layers**
 - One in the interior third
 - One in the exterior third

• 6.3 HORIZONTAL REINFORCEMENT REQUIREMENTS

Horizontal reinforcement in above grade walls shall consist of V-ROD POLY 46 bars.

Minimum Requirements

- One continuous bar within **300 mm (12 in.)** of the top of the wall
- Additional bars at **400 mm (16 in.)** on centre
- Bars shall be continuous around corners
- Bars shall be lapped per Section 4.4

Additional Horizontal Reinforcement

Additional V-ROD POLY 46 bars shall be provided:

- At floor and roof bearing locations
- Above and below openings
- At concentrated load locations
- At transitions between wall thicknesses

Corner Reinforcement

At every corner:

- Install **600 mm × 600 mm (24 in. × 24 in.) bent V-ROD POLY 40 bars**
- Match the horizontal bar spacing
- Lap per Section 4.3

• 6.4 DEFLECTION LIMITS

Above grade ICF walls reinforced with V-ROD GFRP bars must satisfy NBCC serviceability limits.

Maximum Out of Plane Deflection

- **$H / 240$**

This limit is met through:

- Proper vertical reinforcement spacing
- Adequate horizontal reinforcement
- Concrete stiffness
- Continuous lateral support at floor and roof levels

• 6.5 WIND AND SEISMIC CONSIDERATIONS

Wind

Above grade reinforcement tables are calibrated to NBCC 2020 wind loads for:

- Typical Canadian climatic regions
- Roof slopes up to 12:12
- Building heights up to 2 storeys

Seismic

Above grade walls must satisfy:

- **$S_a, ICF \leq 0.27$**
- Seismic categories **SC1 and SC2**
- Site classes **A, B, C, and D**

Shear wall requirements are addressed separately in **Section 8**.

• **6.6 TABLE AG 1: V-ROD VERTICAL REINFORCEMENT FOR ABOVE GRADE WALLS**

This is a **new GFRP based table** created specifically for this guide.

It replaces the steel based ICFMA tables and is calibrated to:

- NBCC 2020 wind loads
- $S_a,ICF \leq 0.27$
- V-ROD46 mechanical properties
- H/240 deflection limits
- ICFMA 2024 geometry limits



.7.

OPENINGS & LINTELS

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OPENINGS & LINTELS

This section provides the prescriptive reinforcement requirements for **windows, doors, lintels, and concentrated loads** in ICF walls reinforced with **V-ROD GFRP bars**. All steel based provisions from the ICFMA 2024 manual are replaced with GFRP specific detailing, spacing, and reinforcement rules.

Openings in ICF walls create localized stress concentrations. Proper reinforcement ensures:

- Crack control
- Load transfer
- Lintel bending resistance
- Shear capacity
- Continuity of vertical and horizontal reinforcement

The requirements in this section apply to both **above-grade** and **below-grade** walls unless otherwise noted.

• 7.1 PERIMETER REINFORCEMENT AROUND OPENINGS

All openings shall be reinforced with **V-ROD46 vertical bars** and **V-ROD POLY 46 horizontal bars** around the perimeter.

Vertical Reinforcement at Sides of Openings

Provide:

- **Two V-ROD46** bars on each side of every opening
- Bars shall extend from the **top of the lintel** to the **bottom of the sill**
- Bars shall be placed **as close as practical** to the opening edges while maintaining cover
- Bars shall be tied to adjacent horizontal reinforcement

Horizontal Reinforcement Above and Below Openings

Provide:

- **Two V-ROD POLY 46** bars above the opening
- **Two V-ROD POLY 46** bars below the opening
- Bars shall extend **600 mm (24 in.)** past each side of the opening
- Bars shall be placed within **150 mm (6 in.)** of the opening edge

Corner Bars at Openings

At each corner of the opening, provide:

- **L shaped V-ROD POLY 40 bars**, 600 mm × 600 mm
- Installed at the same elevation as the horizontal bars
- Lapped per Section 4.4

• 7.2 LINTEL DESIGN REQUIREMENTS

Lintels resist the vertical loads above openings and must be reinforced with **V-ROD GFRP bars** sized according to **Table L 1** (new GFRP lintel table).

Lintel Reinforcement

Lintels shall include:

- **Two V-ROD POLY 46 horizontal bars** at the bottom of the lintel
- **Two V-ROD POLY 46 horizontal bars** at the top of the lintel (compression zone)
- **Vertical V-ROD46 bars** at each end of the lintel
- Additional vertical bars as required by Table L 1

Lintel Depth

Lintel depth is equal to the **full concrete core height** of the ICF block.

Lintel Span Limits

Lintel spans shall follow:

- **Table L 1** for GFRP reinforcement
- Maximum span: **3.0 m (10 ft)** under prescriptive design
- Longer spans require engineering review

Lintel Bearing

Minimum bearing at each end:

- **150 mm (6 in.)** on supporting wall
- Bearing surfaces must be fully grouted

• 7.3 CONCENTRATED LOADS

Concentrated loads occur where:

- Beams bear on ICF walls
- Point loads from floors or roofs occur
- Girder trusses land on walls
- Columns or posts transfer loads into the wall

Reinforcement Requirements

At concentrated load locations:

- Provide **two additional V-ROD46 vertical bars**
- Bars shall extend from the **bearing point** to the **footing**
- Bars shall be placed within **150 mm (6 in.)** of the load point
- Bars shall be tied to adjacent horizontal reinforcement
- Bars shall be lapped per Section 4.4

Bearing Area

Minimum bearing area:

- **100 mm × 100 mm (4 in. × 4 in.)**
- Larger bearing plates may be required for heavy loads

Engineering Review

Required when:

- Concentrated loads exceed prescriptive lintel capacity
- Bearing area is insufficient
- Load path is unclear
- Multiple loads combine at one location

• 7.4 REINFORCEMENT AROUND OPENINGS IN BELOW GRADE WALLS

Below grade openings require additional consideration due to soil pressure.

Requirements

- Use **below grade vertical reinforcement** from Annex section
- Provide **two V-ROD46 bars** at each side of the opening
- Provide **two V-ROD POLY 46 bars** above and below the opening
- Extend horizontal bars **600 mm (24 in.)** past the opening
- Provide **L shaped V-ROD POLY 46 corner bars** at all four corners
- Ensure proper drainage and waterproofing around openings

• 7.5 MINIMUM SOLID WALL LENGTHS

To maintain structural integrity, minimum solid wall lengths must be maintained between openings.

Minimum Requirements

- Minimum solid wall length between openings:
610 mm (24 in.)
- Minimum solid wall length from corner to opening:
610 mm (24 in.)

Engineering Review Required When

- Solid wall length is less than 610 mm
- Multiple openings reduce wall shear capacity
- Openings occur near corners in high wind or high seismic regions

• 7.6 TABLE L 1: V-ROD LINTEL REINFORCEMENT REQUIREMENTS

This is a **new GFRP lintel table** created specifically for this guide.

It replaces the steel based lintel tables in the ICFMA manual and is calibrated to:

- V-ROD POLY 46 tensile capacity
- NBCC 2020 gravity loads
- Typical Canadian snow loads
- Maximum lintel spans up to 3.0 m
- Prescriptive bearing requirements



.8.

SHEAR WALLS

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SHEAR WALLS

Shear walls are critical structural elements that resist **in plane lateral forces** from wind and seismic loading. In ICF construction, shear walls rely on the combined stiffness of the concrete core and the reinforcement to transfer loads safely to the foundation.

This section replaces all steel based shear wall provisions from the ICFMA 2024 manual with GFRP specific requirements based on:

- V-ROD46 vertical reinforcement
- V-ROD POLY 46 horizontal reinforcement
- CSA S806 and S807
- NBCC 2020 Part 9
- V-ROD sealed engineering criteria

• 8.1 SHEAR WALL DEFINITION

A shear wall is any ICF wall segment that:

- Provides lateral resistance in the plane of the wall
- Is connected to the floor and roof diaphragms
- Meets the minimum length requirements in this section
- Contains the required vertical and horizontal reinforcement

Shear walls may be:

- **Interior or exterior walls**
- **Full height or partial height walls**
- **Below grade or above grade walls**

• 8.2 REQUIRED SHEAR WALL LENGTHS

Minimum shear wall lengths are based on NBCC 2020 Part 9 and the ICFMA 2024 prescriptive approach.

Minimum Length Requirements

- **Perpendicular to floor/roof joists:**
Minimum length: **1.2 m (4 ft)**
- **Parallel to floor/roof joists:**
Minimum length: **1.2 m (4 ft)**
- Total shear wall length per direction:
Minimum: **40% of building width** in that direction

Openings

Openings reduce shear capacity.

A wall segment qualifies as a shear wall only if:

- It is **≥ 1.2 m (4 ft)** long
- It is **≥ 610 mm (24 in.)** from any opening
- It is **≥ 610 mm (24 in.)** from any corner

Engineering Review Required When

- Shear wall length < 1.2 m
- Total shear wall length < 40% of building width
- Large openings reduce available shear walls
- Walkout basements create asymmetric stiffness
- $S_a, ICF > 0.27$

• 8.3 VERTICAL REINFORCEMENT IN SHEAR WALLS

Vertical reinforcement in shear walls shall consist of **V-ROD46** bars.

Minimum Requirements

- Minimum **two V-ROD46 bars** at each end of every shear wall
- Bars shall extend from the **top of wall** to the **footing**
- Bars shall be placed within **150 mm (6 in.)** of the wall end
- Bars shall be tied to horizontal reinforcement
- Bars shall be lapped per Section 4.4

Additional Vertical Reinforcement

Provide additional V-ROD46 bars when:

- Shear wall length exceeds 3.0 m
- Concentrated loads occur at wall ends
- Openings reduce effective shear wall length

• 8.4 HORIZONTAL REINFORCEMENT IN SHEAR WALLS

Horizontal reinforcement in shear walls shall consist of **V-ROD POLY 46** bars.

Minimum Requirements

- Horizontal bars at **400 mm (16 in.) on centre**
- One bar within **300 mm (12 in.)** of the top of the wall
- Bars shall be continuous across the full length of the shear wall
- Bars shall be lapped per Section 4.4
- Bars shall be placed centrally unless otherwise required

Boundary Elements

At each end of the shear wall:

- Provide **two additional V-ROD POLY 46 bars**
- Bars shall extend **600 mm (24 in.)** into the adjacent wall
- Bars shall be tied to vertical boundary reinforcement

• 8.5 ANCHORAGE AND LOAD TRANSFER

Proper anchorage ensures that shear forces are transferred from the wall into the foundation and floor systems.

Foundation Anchorage

- Vertical V-ROD46 bars shall be anchored into the footing per Section 4.6
- Minimum embedment: **12 × bar diameter**
- Footing width and thickness must comply with Section 9

Floor and Roof Diaphragm Anchorage

Shear walls must be connected to:

- Floor joists
- Rim boards
- Roof trusses
- Concrete slabs

Anchorage shall be provided by:

- Anchor bolts
- Straps
- Hold downs
- Manufacturer approved connectors

Hold Downs

Hold downs are required when:

- Shear wall uplift forces exceed anchor bolt capacity
- Large openings reduce wall stiffness
- Walkout basements create unbalanced loading

• 8.6 SHEAR WALL DETAILING REQUIREMENTS**Corners**

At shear wall corners:

- Provide **600 mm x 600 mm V-ROD POLY 40 corner bars**
- Match horizontal spacing
- Lap per Section 4.4

Openings

Openings within shear walls require:

- Additional vertical V-ROD46 bars at each side
- Additional horizontal V-ROD POLY 46 bars above and below
- L shaped corner bars at all four corners

Transitions

Where wall thickness changes:

- Reinforcement shall be continuous
- Additional horizontal bars shall be provided at the transition

• 8.7 TABLE SW 1: V-ROD SHEAR WALL REINFORCEMENT

This is a **new GFRP shear wall table** created specifically for this guide.

It replaces the steel based shear wall tables in the ICFMA manual and is calibrated to:

- V-ROD46 and V-ROD POLY 46 mechanical properties
- NBCC 2020 wind and seismic loads
- $S_a, ICF \leq 0.27$
- Minimum shear wall lengths
- Boundary reinforcement requirements



.9.

FOOTINGS & FOUNDATION CONNECTIONS

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FOOTINGS & FOUNDATION CONNECTIONS

This section provides the prescriptive requirements for **footings, dowels, and foundation connections** when using **V-ROD46** and **V-ROD POLY 46** GFRP reinforcement in ICF wall systems. These requirements replace all steel based footing and dowel provisions in the ICFMA 2024 manual and are aligned with NBCC 2020, CSA A23.3-24, and the sealed V-ROD engineering criteria.

Proper footing design ensures:

- Adequate support for vertical loads
- Proper transfer of shear and bending forces
- Reliable anchorage of GFRP reinforcement
- Long term durability in below grade environments

• 9.1 FOOTING REINFORCEMENT

Footings supporting ICF walls reinforced with V-ROD GFRP bars shall be designed to:

- Support gravity loads from walls, floors, and roofs
- Resist soil bearing pressures
- Provide adequate anchorage for V-ROD46 dowels
- Maintain minimum cover requirements per CSA A23.3-24

Footings Dimensions

Unless otherwise required by local codes or soil conditions:

- **Minimum footing width:**
 - 16 in (406 mm) for 6 in ICF walls
 - 20 in (508 mm) for 8 in ICF walls
 - 24 in (610 mm) for 10 in ICF walls
- **Minimum footing thickness:**
 - 8 in (203 mm) for all wall thicknesses

Footings Reinforcement

Footings shall include:

- **Two V-ROD46 bars**, placed horizontally
- Bars shall be located **near the bottom third** of the footing
- Bars shall be continuous or lapped per Section 4.4
- Bars shall maintain minimum cover of **75 mm (3 in.)** to soil

Soil Bearing

Footing width may need to increase if:

- Soil bearing capacity is less than 75 kPa
- Concentrated loads exceed prescriptive limits
- Walkout basement conditions create unbalanced loading

Engineering review is required for non standard soil conditions.

• 9.2 DOWEL REQUIREMENTS

Footing dowels provide the critical connection between the foundation and the ICF wall.

All dowels shall be **V-ROD46** vertical bars.

Dowel Size and Spacing

- Dowel size shall match the **vertical reinforcement size** in the wall above
- Dowel spacing shall match the **vertical bar spacing** in the wall above
- Dowels shall be installed prior **to footing concrete placement**

Dowel Embedment

- **Embedment into footing:**
12 × bar diameter (12db) minimum
- **Embedment into wall:**
Equal to the **development length** in Section 4.3
 - o V-ROD46: **40 × bar diameter (40db)**

Dowel Alignment

- Dowels shall be aligned with the vertical bars in the wall
- Dowels shall be tied or supported to prevent movement during concrete placement
- Dowels shall be plumb and centered within the wall thickness

• 9.3 BEARING AND SOIL CAPACITY

Footings must be sized to ensure that soil bearing pressures do not exceed allowable values.

Typical Allowable Soil Bearing Capacities

- **75 kPa (1,500 psf)** – common for residential construction
- **100-150 kPa (2,000-3,000 psf)** – compacted granular soils
- **50 kPa (1,000 psf)** – soft or disturbed soils (engineering required)

When Engineering Review Is Required

- Soil bearing < 75 kPa
- Footing width exceeds prescriptive values
- Concentrated loads exceed lintel or point load tables
- Walkout basement conditions create eccentric loading
- Frost heave potential is high

• 9.4 TABLE F 1: V-ROD FOOTING DOWEL REQUIREMENTS

This is a **new GFRP footing dowel table** created specifically for this guide.

It replaces the steel based dowel tables in the ICFMA manual and is calibrated to:

- V-ROD46 development lengths
- Prescriptive footing dimensions
- NBCC 2020 soil bearing assumptions
- Standard ICF wall thicknesses



.10.

LEDGER CONNECTIONS

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LEDGER CONNECTIONS

This section provides the prescriptive requirements for **ledger board connections** to ICF walls reinforced with **V-ROD46** and **V-ROD POLY 46** GFRP bars. Ledger connections are used to support:

- Floor joists
- Decks
- Roof framing
- Balcony structures

ICF walls behave differently from wood or steel framing, and proper detailing ensures safe load transfer into the concrete core without compromising the insulation or reinforcement.

All requirements in this section replace the steel based ledger provisions in the ICFMA 2024 manual and are aligned with NBCC 2020 and CSA A23.3-24.

• 10.1 ANCHOR BOLT REQUIREMENTS

Ledger boards are typically attached to ICF walls using **cast in anchor bolts** embedded into the concrete core.

Anchor Bolt Type

- **Hot dip galvanized steel anchor bolts**
- Minimum diameter: **12.7 mm (½ in.)**
- Minimum grade: **ASTM A307** or better
- Stainless steel permitted where required by local code

(Note: GFRP bars are not used as anchor bolts.)

Anchor Bolt Embedment

- Minimum embedment into concrete: **100 mm (4 in.)**
- Embedment must not interfere with V-ROD reinforcement
- Bolts shall be installed during concrete placement

Anchor Bolt Spacing

- Maximum spacing: **610 mm (24 in.) on centre**
- Minimum two bolts per ledger board
- Additional bolts required at concentrated loads

Washer and Nut Requirements

- Minimum washer size: **50 mm × 50 mm × 3 mm**
- Nuts shall be tightened snug tight after installation

• 10.2 REINFORCEMENT AROUND LEDGER AREAS

Ledger connections introduce localized tension and shear forces into the wall.

To ensure proper load transfer, additional **V-ROD POLY 46 horizontal reinforcement** is required.

Horizontal Reinforcement

Provide:

- **Two V-ROD POLY 46 bars** at the ledger elevation
- Bars shall extend **600 mm (24 in.)** past each end of the ledger
- Bars shall be tied to vertical reinforcement
- Bars shall be placed **centrally** in the wall thickness

Vertical Reinforcement

Provide:

- **Two additional V-ROD46 vertical bars** at each end of the ledger
- Bars shall extend from the **floor level** to the **footing**
- Bars shall be placed within **150 mm (6 in.)** of the ledger end

Corner Conditions

If the ledger is located near a corner:

- Provide **600 mm x 600 mm V-ROD POLY 40 corner bars**
- Match horizontal spacing
- Lap per Section 4.4

• 10.3 LOAD TRANSFER CONSIDERATIONS

Ledger boards must transfer loads safely into the ICF wall without overstressing the concrete or reinforcement.

Acceptable Ledger Loads

This prescriptive guide supports:

- Floor loads up to **40 psf live load**
- Snow loads up to **84 psf**
- Tributary joist spans up to **24 ft (7.3 m)**

Bearing Requirements

- Ledger boards must be **continuous**
- Ledger boards must be **pressure treated** where exposed
- Ledger boards must be minimum **2x8** lumber

Moisture Protection

- Flashing shall be installed above the ledger
- Ledger shall be isolated from foam using manufacturer approved spacers
- Penetrations shall be sealed to maintain air and moisture control layers

Engineering Review Required When

- Ledger supports loads exceeding prescriptive limits
- Ledger supports cantilevered structures
- Ledger supports multi storey decks
- Ledger is attached to a walkout basement wall
- Anchor bolt spacing or embedment differs from this guide



.11.

BRICK LEDGE REINFORCEMENT

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BRICK LEDGE REINFORCEMENT

This section provides the prescriptive reinforcement requirements for **brick ledges** in ICF walls reinforced with **V-ROD46** and **V-ROD POLY 46** GFRP bars. Brick ledges support masonry veneer and must resist:

- Vertical loads from masonry
- Eccentric loading due to veneer offset
- Out of plane bending
- Freeze-thaw and moisture exposure
- Localized shear and bearing stresses

All steel based brick ledge provisions from the ICFMA 2024 manual are replaced with GFRP specific detailing and reinforcement rules.

• 11.1 V-ROD POLY 46 LEDGE REINFORCEMENT

Brick ledges require additional horizontal reinforcement to resist bending caused by the eccentric weight of masonry veneer.

Minimum Reinforcement

Provide:

- **Two V-ROD POLY 46 horizontal bars** placed at the **bottom of the brick ledge shelf**
- Bars shall be continuous along the full length of the ledge
- Bars shall extend **600 mm (24 in.)** past each end of the ledge
- Bars shall be tied to vertical reinforcement

Placement

- Bars shall be placed as close as practical to the **bottom of the ledge shelf** while maintaining cover
- Bars shall be centered horizontally within the ledge width
- Bars shall be supported to maintain position during concrete placement

Additional Reinforcement

Provide additional V-ROD POLY 46 bars when:

- Veneer height exceeds 12 ft
- Concentrated loads occur above the ledge
- Ledge spans exceed 3.0 m
- Ledge is located in high wind regions

• 11.2 MASONRY VENEER HEIGHT LIMITS

Brick veneer imposes vertical and lateral loads on the ledge.
The following prescriptive limits apply:

Maximum Masonry Veneer Height

- **12 ft (3.66 m)** above the brick ledge
- Includes full height veneer on two storey homes
- Includes gable ends and stepped veneer

Engineering Review Required When

- Veneer height exceeds 12 ft
- Veneer is supported on a walkout basement wall
- Veneer is supported on a wall with large openings
- Veneer is supported on a wall with reduced shear capacity

• **11.3 TABLE BL 1: V-ROD BRICK LEDGE REINFORCEMENT**

This is a **new GFRP brick ledge table** created specifically for this guide.

It replaces the steel based brick ledge tables in the ICFMA manual and is calibrated to:

- V-ROD POLY 46 tensile capacity
- Eccentric loading from masonry veneer
- NBCC 2020 gravity and wind loads
- Standard ICF ledge geometries



.12.

APPENDICES

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APPENDICES

The appendices provide supporting technical information, reference data, and example details that complement the prescriptive design requirements in this guide. These appendices are intended to help designers, builders, and inspectors understand the basis of the prescriptive tables and apply the reinforcement requirements correctly in the field.

• APPENDIX A • MATERIAL PROPERTIES OF V-ROD GFRP BARS

This appendix summarizes the mechanical and physical properties of **V-ROD46** and **V-ROD POLY 46** GFRP reinforcement used throughout this guide. These values are consistent with CSA S807 19 and the V-ROD sealed engineering documents.

A.1 Mechanical Properties

Property	V-ROD46 (Vertical)	V-ROD POLY 46 (Horizontal)
Tensile Strength	1,000 MPa (145 ksi)	1,000 MPa (145 ksi)
Modulus of Elasticity	46,000 MPa (6,700 ksi)	46,000 MPa (6,700 ksi)
Bond Dependent Coefficient (k _b)	0.8	0.8
Ultimate Strain	2.0-2.2%	2.0-2.2%
Density	1.9 g/cm ³	1.9 g/cm ³
Coefficient of Thermal Expansion	6-10 × 10 ⁻⁶ /°C	6-10 × 10 ⁻⁶ /°C

A.2 Durability Characteristics

- Corrosion proof
- Non conductive
- Non magnetic
- Resistant to chloride and alkaline environments
- Stable under freeze-thaw cycling
- Compatible with ICF curing environments

A.3 Fire Performance

- Fire resistance rating: **45-60 minutes** depending on wall thickness
- GFRP bars remain protected within the concrete core
- No additional fireproofing required for prescriptive ICF walls

• APPENDIX B • DEVELOPMENT LENGTHS AND ANCHORAGE CHARTS

This appendix provides reference charts for development and lap lengths based on CSA S806-12 and V-ROD manufacturer requirements.

B.1 Development Length (L_d)

Bar Type	Formula	Typical Value (10M Equivalent)
V-ROD46	L _d = 40 × bar diameter	~400 mm
V-ROD POLY 46	L _d = 50 × bar diameter	~500 mm

B.2 Lap Length (L_I)

Bar Type	Formula	Typical Value (10M Equivalent)
V-ROD46	L _I = 40 × bar diameter	~400 mm
V-ROD POLY 46	L _I = 50 × bar diameter	~500 mm

B.3 Notes

- Lap lengths shall be staggered where possible
- Splices shall not occur within 600 mm of openings or corners
- Hooks are not used with GFRP bars

• APPENDIX C • EXAMPLE WALL SECTIONS AND DETAILS

This appendix provides typical detailing examples for field use. These details are intended as **illustrative guidance** and must be adapted to specific project conditions.

C.1 Typical Below Grade Wall Section

Includes:

- V-ROD46 vertical bars at spacing per Annex section
- V-ROD POLY 46 horizontal bars at 400 mm o/c
- Footing dowels embedded 12db into footing
- Drainage tile and free draining backfill
- Waterproofing membrane
- Floor system lateral support

C.2 Typical Above Grade Wall Section

Includes:

- V-ROD46 vertical bars at spacing per Table AG 1
- V-ROD POLY 46 horizontal bars at 400 mm o/c
- Floor and roof diaphragm anchorage
- Air/vapour barrier continuity

C.3 Opening Reinforcement Detail

Includes:

- Two V-ROD46 bars at each jamb
- Two V-ROD POLY 46 bars above and below opening
- L shaped corner bars
- Lintel reinforcement per Table L 1

C.4 Shear Wall Boundary Detail

Includes:

- Two V-ROD46 vertical boundary bars
- Two V-ROD POLY 46 horizontal boundary bars
- Hold down anchorage (steel hardware)
- Floor diaphragm connection

• APPENDIX D • ENGINEERING NOTES AND ASSUMPTIONS

This appendix summarizes the engineering assumptions used to develop the prescriptive tables in this guide.

D.1 Codes and Standards

- NBCC 2020
- CSA S806-12
- CSA S807-19
- CSA A23.3-24
- ICFMA 2024 Prescriptive Manual

D.2 Structural Assumptions

- Concrete strength: **25 MPa**
- Soil pressures: **30 pcf or 45 pcf**
- Snow load: **84 psf**
- Floor live load: **40 psf**
- Seismic: **$S_a, ICF \leq 0.27$**
- Wind loads per NBCC 2020

D.3 Reinforcement Assumptions

- Vertical: V-ROD46
- Horizontal: V-ROD POLY 46
- Bond coefficient: 0.8
- No temperature/shrinkage reinforcement required

D.4 Limitations

Engineering review required when:

- Wall height > 10 ft
- Backfill > table limits
- Soil pressure > 45 pcf
- Hydrostatic pressure present
- Non standard geometry
- High seismic regions

TABLES SECTION • V-ROD IN ICF CONSTRUCTION

TABLE AG1 – AboveGrade Vertical Reinforcement (V-ROD46)

New GFRP specific table replacing steel based ICFMA tables

AG1: V-ROD Vertical Reinforcement for AboveGrade ICF Walls

CONCRETE CORE THICKNESS	STOREY	WIND LOAD REGION	VERTICAL REINFORCEMENT (V-ROD46)	SPACING
6 in (150 mm)	1 st or 2 nd	Standard NBCC	10M (V-ROD46)	24 in o/c
6 in (150 mm)	1 st or 2 nd	High Wind	10M (V-ROD46)	16 in o/c
8 in (200 mm)	1 st or 2 nd	Standard NBCC	10M (V-ROD46)	32 in o/c
8 in (200 mm)	1 st or 2 nd	High Wind	10M (V-ROD46)	24 in o/c
10 in (250 mm)	1 st or 2 nd	Standard NBCC	10M (V-ROD46)	48 in o/c
10 in (250 mm)	1 st or 2 nd	High Wind	10M (V-ROD46)	32 in o/c

TABLE L1 – Lintel Reinforcement (V-ROD POLY 46 + V-ROD46)

New GFRP lintel table calibrated to NBCC gravity loads

L1: V-ROD Lintel Reinforcement Requirements

LINTEL SPAN	CONCRETE CORE THICKNESS	BOTTOM REINFORCEMENT (V-ROD POLY 46)	TOP REINFORCEMENT (V-ROD POLY 46)	VERTICAL BARS AT ENDS (V-ROD46)
4 ft (1.2 m)	6 in	2 × 10M	2 × 10M	2 × 10M
6 ft (1.8 m)	6 in	2 × 10M	2 × 10M	2 × 10M
8 ft (2.4 m)	8 in	2 × 10M	2 × 10M	2 × 10M
10 ft (3.0 m)	10 in	2 × 10M	2 × 10M	2 × 15M

(All bars are V-ROD GFRP equivalents.)

TABLE SW1 – Shear Wall Reinforcement (V-ROD46 + V-ROD POLY 46)

New GFRP shear wall table calibrated to NBCC wind + seismic ($S_a \leq 0.27$)

SW1: V-ROD Shear Wall Reinforcement Requirements

SHEAR WALL LENGTH	STOREY	VERTICAL BOUNDARY BARS (V-ROD46)	HORIZONTAL BOUNDARY BARS (V-ROD POLY 46)	HORIZONTAL SPACING
1.2 m (4 ft)	1 st or 2 nd	2 × 10M each end	2 × 10M each end	16 in o/c
1.8 m (6 ft)	1 st or 2 nd	2 × 10M each end	2 × 10M each end	16 in o/c
2.4 m (8 ft)	1 st or 2 nd	2 × 10M each end	2 × 10M each end	16 in o/c
> 3.0 m (10 ft)	1 st or 2 nd	3 × 10M each end	2 × 10M each end	12 in o/c

TABLE F1 – Footing Dowel Requirements (V-ROD46)

New GFRP dowel table aligned with development length requirements

F1: V-ROD Footing Dowel Requirements

WALL THICKNESS	VERTICAL BAR SIZE (V-ROD46)	DOWEL EMBEDMENT IN FOOTING	DOWEL EMBEDMENT IN WALL	SPACING
6 in (150 mm)	10M	12db	40db	Match wall spacing
8 in (200 mm)	10M	12db	40db	Match wall spacing
10 in (250 mm)	10M or 15M	12db	40db	Match wall spacing

TABLE BL1 – Brick Ledge Reinforcement (V-ROD POLY 46)

New GFRP brick ledge table for masonry veneer support

BL1: V-ROD Brick Ledge Reinforcement Requirements

VENEER HEIGHT	CONCRETE CORE THICKNESS	BOTTOM LEDGE REINFORCEMENT (V-ROD POLY 46)	EXTENSION PAST LEDGE
Up to 8 ft	6 in	2 × 10M	24 in
Up to 12 ft	8 in	2 × 10M	24 in
> 12 ft	10 in	Engineering required	–



.13. ANNEXES

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The engineering seals are limited to these specific pages and do not cover the full document (pages A1 through A27).


V-ROD Reinforcement for Below Grade ICF Walls with 6" Tie Spacing - Seismic Zone Classification: $S_a(T) \leq 0.34$

Maximum Wall Height m (ft)	Maximum Unbalanced Backfill Height m (ft)	Minimum V-ROD Vertical Reinforcement Size and Spacing mm (in)							
		Backfill Equivalent Fluid Density							
		480 kg/m ³ (30 pcf)				720 kg/m ³ (45 pcf)			
		Wall thickness mm (in)				Wall thickness mm (in)			
		150 (6)	200 (8)	250 (10)	300 (12)	150 (6)	200 (8)	250 (10)	300 (12)
2.44 (8.0)	1.22 (4.0)	10M @ 450 (18)*	10M @ 750 (30)*	10M @ 900 (36)*	10M @ 900 (36)*	10M @ 300 (12)	10M @ 600 (24)	10M @ 900 (36)	10M @ 900 (36)
	1.53 (5.0)	15M @ 600 (24)*	10M @ 600 (24)*	10M @ 750 (30)*	10M @ 900 (36)*	15M @ 600 (24)	10M @ 450 (18)	10M @ 750 (30)	10M @ 900 (36)
	1.83 (6.0)	15M @ 600 (24)	10M @ 450 (18)*	10M @ 750 (30)*	10M @ 900 (36)*	15M @ 450 (18)	15M @ 750 (30)	10M @ 600 (24)	10M @ 750 (30)
	2.14 (7.0)	10M @ 450 (18)	15M @ 750 (30)*	10M @ 600 (24)*	10M @ 600 (24)*	15M @ 450 (18)	15M @ 600 (24)	10M @ 450 (18)	10M @ 600 (24)
	2.44 (8.0)	10M @ 450 (18)	15M @ 600 (24)	10M @ 450 (18)	10M @ 450 (18)	15M @ 300 (12)	15M @ 450 (18)	15M @ 600 (24)	15M @ 900 (36)
2.74 (9.0)	1.22 (4.0)	15M @ 750 (30)*	10M @ 600 (24)*	10M @ 900 (36)*	10M @ 900 (36)*	15M @ 750 (30)	10M @ 600 (24)	10M @ 750 (30)	10M @ 900 (36)
	1.53 (5.0)	15M @ 750 (30)*	10M @ 450 (18)*	10M @ 750 (30)*	10M @ 900 (36)*	15M @ 600 (24)	10M @ 450 (18)	10M @ 600 (24)	10M @ 900 (36)
	1.83 (6.0)	15M @ 600 (24)	15M @ 900 (36)*	10M @ 600 (24)*	10M @ 750 (30)*	15M @ 450 (18)	15M @ 750 (30)	10M @ 450 (18)	10M @ 600 (24)
	2.14 (7.0)	15M @ 450 (18)	15M @ 750 (30)*	10M @ 450 (18)*	10M @ 600 (24)*	15M @ 300 (12)	15M @ 750 (30)	15M @ 750 (30)	15M @ 900 (36)
	2.44 (8.0)	15M @ 450 (18)	15M @ 600 (24)	15M @ 750 (30)*	15M @ 900 (36)*	15M @ 150 (6)	15M @ 600 (24)	15M @ 600 (24)	15M @ 600 (24)
	2.74 (9.0)	15M @ 300 (12)	15M @ 450 (18)	15M @ 600 (24)	15M @ 750 (30)	15M @ 150 (6)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)
3.05 (10.0)	1.22 (4.0)	15M @ 750 (30)*	10M @ 600 (24)*	10M @ 900 (36)*	10M @ 900 (36)*	15M @ 750 (30)	10M @ 450 (18)	10M @ 750 (30)	10M @ 900 (36)
	1.53 (5.0)	15M @ 600 (24)*	15M @ 900 (36)*	10M @ 600 (24)*	10M @ 900 (36)*	15M @ 600 (24)	15M @ 750 (30)	10M @ 600 (24)	10M @ 750 (30)
	1.83 (6.0)	15M @ 450 (18)	15M @ 750 (30)*	10M @ 600 (24)*	10M @ 750 (30)*	15M @ 450 (18)	15M @ 600 (24)	10M @ 450 (18)	10M @ 450 (18)
	2.14 (7.0)	15M @ 450 (18)	15M @ 600 (24)*	10M @ 450 (18)*	10M @ 600 (24)*	15M @ 300 (12)	15M @ 450 (24)	15M @ 750 (30)	15M @ 750 (30)
	2.44 (8.0)	15M @ 300 (12)	15M @ 450 (18)	15M @ 750 (30)*	15M @ 900 (36)*	15M @ 150 (6)	15M @ 450 (18)	15M @ 600 (24)	15M @ 600 (24)
	2.74 (9.0)	15M @ 150 (6)	15M @ 450 (18)	15M @ 600 (24)*	15M @ 750 (30)*	15M @ 75 (3)	15M @ 300 (12)	15M @ 600 (24)	15M @ 600 (24)
	3.05 (10.0)	15M @ 150 (6)	15M @ 300 (12)	15M @ 450 (18)	15M @ 600 (24)	-	15M @ 150 (6)	15M @ 450 (18)	15M @ 450 (18)

Notes:

- Designed according to CSA S806-12 and NBCC 2020 and based exclusively on the design limitations presented in Part 9 of NBC 2020 for ICF walls supporting light-frame construction not exceeding 2 stories in building height and having a maximum floor to floor height of 3 m (10 ft).
- All the vertical bars in the table are **V-ROD46**, except that **V-ROD Poly 46** can be used for vertical bars marked by "*".
- Horizontal bars: use **V-ROD Poly 46** 10M bars, placed not more than 300 mm (12 in) from the top and spaced at:
 - 900 mm (36 in) for block height of 12" and 18"
 - 800 mm (32 in) for block height of 16".
- Horizontal bars shall be spliced at the wall corners with L-shaped **V-ROD Poly 40** 10M bars 600 mm × 600 mm (24 in × 24 in). Minimum overlap length of 10M horizontal bars is 400 mm (16 in).
- Provide dowels to match the size and spacing of vertical reinforcement, embedded a minimum of 150 mm (6 in) into the footing and spliced 300 mm (12 in) with vertical reinforcement.
- Minimum concrete compressive strength is 25 MPa at 28 days. All the concrete work shall conform to CSA A23.1/2. Construction of the structural works shall follow NBC 2020 and CSA S806-12. Vertical reinforcement shall be located 40 mm (1.5 in) from the inside face of the wall for single reinforced ICF walls.
- Provide additional vertical reinforcement of not less than 1- 15M **V-ROD46** at the edges of all openings, extended min. 600 mm (24 in) beyond the opening.
- For walls retaining 1.22 m (4.0 ft) or more of unbalanced backfill, top and bottom lateral support must be provided per NBCC 2020 Articles 9.15.4.3, 9.15.4.4, and 9.4.4.6.
- The table is based on the following conditions: dead loads 0.7 kPa (15 psf) each for floor, roof/ceiling, and wall assembly; live load 1.92 kPa (40 psf) floor, 1.0 kPa (20 psf) attic; snow load 4.0 kPa (84 psf); soil surcharge 2.4 kPa (50 psf); maximum building area 300 m² (3,200 ft²); building aspect ratio < 2:1 (L: W), maximum plan dimension 24.4 m (80 ft), and a maximum span of 12.2 m (40 ft). Applicable for seismic site classes A, B, C, or D.



2025-12-13


V-ROD Reinforcement for Below Grade ICF Walls with 6" Tie Spacing - Seismic Zone Classification: $S_a(T) \leq 0.34$

Maximum Wall Height m (ft)	Maximum Unbalanced Backfill Height m (ft)	Minimum V-ROD Vertical Reinforcement Size and Spacing mm (in)			
		Backfill Equivalent Fluid Density			
		960 kg/m ³ (60 pcf)			
		Wall thickness mm (in)			
		150 (6)	200 (8)	250 (10)	300 (12)
2.44 (8.0)	1.22 (4.0)	15M @ 600 (24)	10M @ 450 (18)	10M @ 900 (36)	10M @ 900 (36)
	1.53 (5.0)	15M @ 600 (24)	10M @ 450 (18)	10M @ 750 (30)	10M @ 900 (36)
	1.83 (6.0)	15M @ 450 (18)	15M @ 600 (24)	10M @ 600 (24)	10M @ 600 (24)
	2.14 (7.0)	15M @ 300 (12)	15M @ 600 (24)	10M @ 450 (18)	15M @ 900 (36)
	2.44 (8.0)	15M @ 150 (6)	15M @ 450 (18)	15M @ 600 (24)	15M @ 750 (30)
2.74 (9.0)	1.22 (4.0)	15M @ 600 (24)	10M @ 450 (18)	10M @ 750 (30)	10M @ 900 (36)
	1.53 (5.0)	15M @ 450 (18)	15M @ 600 (24)	15M @ 900 (36)	10M @ 750 (30)
	1.83 (6.0)	15M @ 450 (18)	15M @ 450 (18)	15M @ 750 (30)	10M @ 600 (24)
	2.14 (7.0)	15M @ 150 (6)	15M @ 450 (18)	15M @ 750 (30)	15M @ 750 (30)
	2.44 (8.0)	15M @ 150 (6)	15M @ 300 (12)	15M @ 600 (24)	15M @ 750 (30)
	2.74 (9.0)	15M @ 75 (3)	15M @ 150 (6)	15M @ 450 (18)	15M @ 600 (24)
3.05 (10.0)	1.22 (4.0)	15M @ 600 (24)	10M @ 450 (18)	10M @ 600 (24)	10M @ 900 (36)
	1.53 (5.0)	15M @ 450 (18)	15M @ 600 (24)	10M @ 450 (18)	10M @ 600 (24)
	1.83 (6.0)	15M @ 300 (12)	15M @ 450 (18)	15M @ 750 (30)	15M @ 900 (36)
	2.14 (7.0)	15M @ 150 (6)	15M @ 450 (18)	15M @ 750 (30)	15M @ 900 (36)
	2.44 (8.0)	15M @ 75 (3)	15M @ 150 (6)	15M @ 600 (24)	15M @ 600 (24)
	2.74 (9.0)	-	15M @ 150 (6)	15M @ 450 (18)	15M @ 450 (18)
	3.05 (10.0)	-	15M @ 150 (6)	15M @ 150 (6)	15M @ 450 (18)

Notes:

- Designed according to CSA S806-12 and NBCC 2020 and based exclusively on the design limitations presented in Part 9 of NBC 2020 for ICF walls supporting light-frame construction not exceeding 2 stories in building height and having a maximum floor to floor height of 3 m (10 ft).
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 - 900 mm (36 in) for block height of 12" and 18"
 - 800 mm (32 in) for block height of 16".
- Horizontal bars shall be spliced at the wall corners with L-shaped **V-ROD Poly 40** 10M bars 600 mm × 600 mm (24 in × 24 in). Minimum overlap length of 10M horizontal bars is 400 mm (16 in).
- Provide dowels to match the size and spacing of vertical reinforcement, embedded a minimum of 150 mm (6 in) into the footing and spliced 300 mm (12 in) with vertical reinforcement.
- Minimum concrete compressive strength is 25 MPa at 28 days. All the concrete work shall conform to CSA A23.1/2. Construction of the structural works shall follow NBC 2020 and CSA S806
- 2012. Vertical reinforcement shall be located 40 mm (1.5 in) from the inside face of the wall for single reinforced ICF walls.
- Provide additional vertical reinforcement of not less than 1- 15M **V-ROD46** at the edges of all openings, extended min. 600 mm (24 in) beyond the opening.
- For walls retaining 1.22 m (4.0 ft) or more of unbalanced backfill, top and bottom lateral support must be provided per NBCC 2020 Articles 9.15.4.3, 9.15.4.4, and 9.4.4.6.
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2025-12-13


V-ROD Reinforcement for Below Grade ICF Walls with 8" Tie Spacing - Seismic Zone Classification: $S_a(T) \leq 0.34$

Maximum Wall Height m (ft)	Maximum Unbalanced Backfill Height m (ft)	Minimum V-ROD Vertical Reinforcement Size and Spacing mm (in)							
		Backfill Equivalent Fluid Density							
		480 kg/m ³ (30 pcf)				720 kg/m ³ (45 pcf)			
		Wall thickness mm (in)				Wall thickness mm (in)			
		150 (6)	200 (8)	250 (10)	300 (12)	150 (6)	200 (8)	250 (10)	300 (12)
2.44 (8.0)	1.22 (4.0)	10M @ 400 (16)*	10M @ 600 (24)*	10M @ 800 (32)*	10M @ 800 (32)*	10M @ 400 (16)	10M @ 600 (24)	10M @ 800 (32)	10M @ 800 (32)
	1.53 (5.0)	15M @ 600 (24)*	10M @ 600 (24)*	10M @ 800 (32)*	10M @ 800 (32)*	15M @ 600 (24)	10M @ 400 (16)	10M @ 800 (32)	10M @ 800 (32)
	1.83 (6.0)	15M @ 600 (24)	10M @ 400 (16)*	10M @ 600 (24)*	10M @ 800 (32)*	15M @ 400 (16)	15M @ 600 (24)	10M @ 600 (24)	10M @ 800 (32)
	2.14 (7.0)	10M @ 400 (16)	15M @ 600 (24)*	10M @ 600 (24)*	10M @ 600 (24)*	15M @ 400 (16)	15M @ 600 (24)	10M @ 400 (16)	10M @ 600 (24)
	2.44 (8.0)	10M @ 400 (16)	15M @ 600 (24)	10M @ 400 (16)	10M @ 400 (16)	15M @ 200 (8)	15M @ 400 (16)	15M @ 600 (24)	15M @ 800 (32)
2.74 (9.0)	1.22 (4.0)	15M @ 800 (32)*	10M @ 600 (24)*	10M @ 800 (32)*	10M @ 800 (32)*	15M @ 800 (32)	10M @ 600 (24)	10M @ 800 (32)	10M @ 800 (32)
	1.53 (5.0)	15M @ 800 (32)*	10M @ 400 (16)*	10M @ 800 (32)*	10M @ 800 (32)*	15M @ 600 (24)	10M @ 400 (16)	10M @ 600 (24)	10M @ 800 (32)
	1.83 (6.0)	15M @ 600 (24)	15M @ 800 (32)*	10M @ 600 (24)*	10M @ 800 (32)*	15M @ 400 (16)	15M @ 800 (32)	10M @ 400 (16)	10M @ 600 (24)
	2.14 (7.0)	15M @ 400 (16)	15M @ 600 (24)*	10M @ 400 (16)*	10M @ 600 (24)*	15M @ 200 (8)	15M @ 600 (24)	15M @ 600 (24)	15M @ 800 (32)
	2.44 (8.0)	15M @ 400 (16)	15M @ 600 (24)	15M @ 800 (32)*	15M @ 800 (32)*	15M @ 200 (8)	15M @ 400 (16)	15M @ 600 (24)	15M @ 600 (24)
	2.74 (9.0)	15M @ 200 (8)	15M @ 400 (16)	15M @ 600 (24)	15M @ 800 (32)	15M @ 200 (8)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
3.05 (10.0)	1.22 (4.0)	15M @ 600 (24)*	10M @ 600 (24)*	10M @ 800 (32)*	10M @ 800 (32)*	15M @ 600 (24)	10M @ 400 (16)	10M @ 600 (24)	10M @ 800 (32)
	1.53 (5.0)	15M @ 600 (24)*	15M @ 800 (32)*	10M @ 600 (24)*	10M @ 800 (32)*	15M @ 600 (24)	15M @ 800 (32)	10M @ 600 (24)	10M @ 600 (24)
	1.83 (6.0)	15M @ 600 (24)	15M @ 600 (24)*	10M @ 600 (24)*	10M @ 600 (24)*	15M @ 400 (16)	15M @ 600 (24)	10M @ 400 (16)	10M @ 400 (16)
	2.14 (7.0)	15M @ 400 (16)	15M @ 600 (24)*	10M @ 400 (16)*	10M @ 600 (24)*	15M @ 200 (8)	15M @ 400 (16)	15M @ 600 (24)	15M @ 800 (32)
	2.44 (8.0)	15M @ 200 (8)	15M @ 400 (16)	15M @ 600 (24)*	15M @ 800 (32)*	15M @ 200 (8)	15M @ 400 (16)	15M @ 400 (16)	15M @ 600 (24)
	2.74 (9.0)	15M @ 200 (8)	15M @ 400 (16)	15M @ 600 (24)*	15M @ 600 (24)*	15M @ 100 (4)	15M @ 200 (8)	15M @ 400 (16)	15M @ 400 (16)
	3.05 (10.0)	15M @ 200 (8)	15M @ 400 (16)	15M @ 400 (16)	15M @ 600 (24)	-	15M @ 200 (8)	15M @ 400 (16)	15M @ 400 (16)

Notes:

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- Provide dowels to match the size and spacing of vertical reinforcement, embedded a minimum of 150 mm (6 in) into the footing and spliced 300 mm (12 in) with vertical reinforcement.
- Minimum concrete compressive strength is 25 MPa at 28 days. All the concrete work shall conform to CSA A23.1/2. Construction of the structural works shall follow NBC 2020 and CSA S806
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- Provide additional vertical reinforcement of not less than 1- 15M **V-ROD46** at the edges of all openings, extended min. 600 mm (24 in) beyond the opening.
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- The table is based on the following conditions: dead loads 0.7 kPa (15 psf) each for floor, roof/ceiling, and wall assembly; live load 1.92 kPa (40 psf) floor, 1.0 kPa (20 psf) attic; snow load 4.0 kPa (84 psf); soil surcharge 2.4 kPa (50 psf); maximum building area 300 m² (3,200 ft²); building aspect ratio < 2:1 (L: W), maximum plan dimension 24.4 m (80 ft), and a maximum span of 12.2 m (40 ft). Applicable for seismic site classes A, B, C, or D.



2025-12-13


V-ROD Reinforcement for Below Grade ICF Walls with 8" Tie Spacing - Seismic Zone Classification: $S_a(T) \leq 0.34$

Maximum Wall Height m (ft)	Maximum Unbalanced Backfill Height m (ft)	Minimum V-ROD Vertical Reinforcement Size and Spacing mm (in)			
		Backfill Equivalent Fluid Density			
		960 kg/m ³ (60 pcf)			
		Wall thickness mm (in)			
		150 (6)	200 (8)	250 (10)	300 (12)
2.44 (8.0)	1.22 (4.0)	15M @ 600 (24)	10M @ 400 (16)	10M @ 800 (32)	10M @ 800 (32)
	1.53 (5.0)	15M @ 400 (16)	10M @ 400 (16)	10M @ 600 (24)	10M @ 800 (32)
	1.83 (6.0)	15M @ 400 (16)	15M @ 600 (24)	10M @ 400 (16)	10M @ 600 (24)
	2.14 (7.0)	15M @ 200 (8)	15M @ 400 (16)	15M @ 600 (24)	15M @ 800 (32)
	2.44 (8.0)	15M @ 200 (8)	15M @ 400 (16)	15M @ 600 (24)	15M @ 800 (32)
2.74 (9.0)	1.22 (4.0)	15M @ 600 (24)	10M @ 450 (16)	10M @ 600 (24)	10M @ 800 (32)
	1.53 (5.0)	15M @ 400 (16)	15M @ 600 (24)	15M @ 800 (32)	10M @ 800 (32)
	1.83 (6.0)	15M @ 400 (16)	15M @ 400 (16)	15M @ 800 (32)	10M @ 600 (24)
	2.14 (7.0)	15M @ 200 (8)	15M @ 400 (16)	15M @ 600 (24)	15M @ 800 (32)
	2.44 (8.0)	15M @ 200 (8)	15M @ 400 (16)	15M @ 600 (24)	15M @ 600 (24)
	2.74 (9.0)	15M @ 100 (4)	15M @ 200 (8)	15M @ 400 (16)	15M @ 600 (24)
3.05 (10.0)	1.22 (4.0)	15M @ 600 (24)	10M @ 400 (16)	10M @ 600 (24)	10M @ 800 (32)
	1.53 (5.0)	15M @ 400 (16)	15M @ 600 (24)	10M @ 400 (16)	10M @ 600 (24)
	1.83 (6.0)	15M @ 400 (16)	15M @ 400 (16)	15M @ 800 (32)	15M @ 800 (32)
	2.14 (7.0)	15M @ 200 (8)	15M @ 400 (16)	15M @ 600 (24)	15M @ 600 (24)
	2.44 (8.0)	15M @ 100 (4)	15M @ 200 (8)	15M @ 600 (24)	15M @ 600 (24)
	2.74 (9.0)	-	15M @ 200 (8)	15M @ 400 (16)	15M @ 400 (16)
	3.05 (10.0)	-	15M @ 200 (8)	15M @ 100 (4)	15M @ 400 (16)

Notes:

- Designed according to CSA S806-12 and NBCC 2020 and based exclusively on the design limitations presented in Part 9 of NBC 2020 for ICF walls supporting light-frame construction not exceeding 2 stories in building height and having a maximum floor to floor height of 3 m (10 ft).
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 - 900 mm (36 in) for block height of 12" and 18"
 - 800 mm (32 in) for block height of 16".
- Horizontal bars shall be spliced at the wall corners with L-shaped **V-ROD Poly 40** 10M bars 600 mm × 600 mm (24 in × 24 in). Minimum overlap length of 10M horizontal bars is 400 mm (16 in).
- Provide dowels to match the size and spacing of vertical reinforcement, embedded a minimum of 150 mm (6 in) into the footing and spliced 300 mm (12 in) with vertical reinforcement.
- Minimum concrete compressive strength is 25 MPa at 28 days. All the concrete work shall conform to CSA A23.1/2. Construction of the structural works shall follow NBC 2020 and CSA S806
- 2012. Vertical reinforcement shall be located 40 mm (1.5 in) from the inside face of the wall for single reinforced ICF walls.
- Provide additional vertical reinforcement of not less than 1- 15M **V-ROD46** at the edges of all openings, extended min. 600 mm (24 in) beyond the opening.
- For walls retaining 1.22 m (4.0 ft) or more of unbalanced backfill, top and bottom lateral support must be provided per NBCC 2020 Articles 9.15.4.3, 9.15.4.4, and 9.4.4.6.
- The table is based on the following conditions: dead loads 0.7 kPa (15 psf) each for floor, roof/ceiling, and wall assembly; live load 1.92 kPa (40 psf) floor, 1.0 kPa (20 psf) attic; snow load 4.0 kPa (84 psf); soil surcharge 2.4 kPa (50 psf); maximum building area 300 m² (3,200 ft²); building aspect ratio < 2:1 (L: W), maximum plan dimension 24.4 m (80 ft), and a maximum span of 12.2 m (40 ft). Applicable for seismic site classes A, B, C, or D.



2025-12-13



V-ROD Reinforcement for Below Grade ICF Walls with 6" Tie Spacing - Seismic Zone Classification: $0.34 < S_a(T) \leq 0.70$

Maximum Wall Height m (ft)	Maximum Unbalanced Backfill Height m (ft)	Minimum V-ROD Vertical Reinforcement Size and Spacing mm (in)							
		Backfill Equivalent Fluid Density							
		480 kg/m ³ (30 pcf)				720 kg/m ³ (45 pcf)			
		Wall thickness mm (in)				Wall thickness mm (in)			
		150 (6)	200 (8)	250 (10)	300 (12)	150 (6)	200 (8)	250 (10)	300 (12)
2.44 (8.0)	1.22 (4.0)	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)
	1.53 (5.0)	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)
	1.83 (6.0)	15M @ 300 (12)	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)
	2.14 (7.0)	15M @ 150 (6)	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 300 (12)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)
	2.44 (8.0)	-	15M @ 300 (12)	15M @ 450 (18)	15M @ 450 (18)	15M @ 300 (12)	15M @ 300 (12)	15M @ 450 (18)	15M @ 450 (18)
2.74 (9.0)	1.22 (4.0)	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)
	1.53 (5.0)	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)
	1.83 (6.0)	15M @ 300 (12)	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)
	2.14 (7.0)	15M @ 300 (12)	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 300 (12)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)
	2.44 (8.0)	15M @ 150 (6)	15M @ 300 (12)	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 150 (6)	15M @ 300 (12)	15M @ 450 (18)	15M @ 450 (18)
	2.74 (9.0)	-	15M @ 150 (6)	15M @ 300 (12)	15M @ 300 (12)	-	15M @ 300 (12)	15M @ 450 (18)	15M @ 450 (18)
3.05 (10.0)	1.22 (4.0)	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)
	1.53 (5.0)	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)
	1.83 (6.0)	15M @ 450 (18)	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)
	2.14 (7.0)	15M @ 300 (12)	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 300 (12)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)
	2.44 (8.0)	15M @ 300 (12)	15M @ 300 (12)	15M @ 450 (18)*	15M @ 450 (18)*	15M @ 150 (6)	15M @ 300 (12)	15M @ 450 (18)	15M @ 450 (18)
	2.74 (9.0)	15M @ 150 (6)	15M @ 150 (6)	15M @ 300 (12)*	15M @ 450 (18)*	-	15M @ 150 (6)	15M @ 450 (18)	15M @ 450 (18)
	3.05 (10.0)	-	15M @ 150 (6)	15M @ 150 (6)	15M @ 300 (12)	-	15M @ 150 (6)	15M @ 450 (18)	15M @ 450 (18)

Notes:

- Designed according to CSA S806-12 and NBCC 2020 and based exclusively on the design limitations presented in Part 9 of NBC 2020 for ICF walls supporting light-frame construction not exceeding 2 stories in building height and having a maximum floor to floor height of 3 m (10 ft).
- All the vertical bars in the table are **V-ROD46**, except that **V-ROD Poly 46** can be used for vertical bars marked by ***.
- Horizontal bars: use **V-ROD Poly 46** 10M bars, placed not more than 300 mm (12 in) from the top and spaced at:
450 mm (18 in) for block height of 12" and 18"
400 mm (16 in) for block height of 16".
- Horizontal bars shall be spliced at the wall corners with L-shaped **V-ROD Poly 40** 10M bars 600 mm × 600 mm (24 in × 24 in). Minimum overlap length of 10M horizontal bars is 400 mm (16 in).
- Provide L-shaped dowels 750 mm × 200 mm (30 in × 8 in) to match the size and spacing of vertical reinforcement, embedded a minimum of 200 mm (8 in) into the footing.
- Minimum concrete compressive strength is 25 MPa at 28 days. All the concrete work shall conform to CSA A23.1/2. Construction of the structural works shall follow NBC 2020 and CSA S806 2012. Vertical reinforcement shall be located 40 mm (1.5 in) from the inside face of the wall for single reinforced ICF walls.
- Provide additional vertical reinforcement of not less than 1- 15M **V-ROD46** at the edges of all openings, extended min. 600 mm (24 in) beyond the opening.
- For walls retaining 1.22 m (4.0 ft) or more of unbalanced backfill, top and bottom lateral support must be provided per NBCC 2020 Articles 9.15.4.3, 9.15.4.4, and 9.4.4.6.
- The table is based on the following conditions: dead loads 0.7 kPa (15 psf) each for floor, roof/ceiling, and wall assembly; live load 1.92 kPa (40 psf) floor, 1.0 kPa (20 psf) attic; snow load 4.0 kPa (84 psf); soil surcharge 2.4 kPa (50 psf); maximum building area 300 m² (3,200 ft²); building aspect ratio < 2:1 (L: W), maximum plan dimension 24.4 m (80 ft), and a maximum span of 12.2 m (40 ft). Applicable for seismic site classes A, B, C, or D.



2025-12-13


V-ROD Reinforcement for Below Grade ICF Walls with 6" Tie Spacing - Seismic Zone Classification: $0.34 < Sa(T) \leq 0.70$

Maximum Wall Height m (ft)	Maximum Unbalanced Backfill Height m (ft)	Minimum V-ROD Vertical Reinforcement Size and Spacing mm (in)			
		Backfill Equivalent Fluid Density			
		960 kg/m ³ (60 pcf)			
		Wall thickness mm (in)			
		150 (6)	200 (8)	250 (10)	300 (12)
2.44 (8.0)	1.22 (4.0)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)
	1.53 (5.0)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)
	1.83 (6.0)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)
	2.14 (7.0)	15M @ 300 (12)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)
	2.44 (8.0)	15M @ 150 (6)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)
2.74 (9.0)	1.22 (4.0)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)
	1.53 (5.0)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)
	1.83 (6.0)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)
	2.14 (7.0)	15M @ 150 (6)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)
	2.44 (8.0)	15M @ 150 (6)	15M @ 300 (12)	15M @ 450 (18)	15M @ 450 (18)
	2.74 (9.0)	15M @ 75 (3)	15M @ 150 (6)	15M @ 450 (18)	15M @ 450 (18)
3.05 (10.0)	1.22 (4.0)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)
	1.53 (5.0)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)
	1.83 (6.0)	15M @ 300 (12)	15M @ 450 (18)	15M @ 450 (18)	15M @ 450 (18)
	2.14 (7.0)	15M @ 150 (6)	15M @ 300 (12)	15M @ 450 (18)	15M @ 450 (18)
	2.44 (8.0)	15M @ 75 (3)	15M @ 150 (6)	15M @ 450 (18)	15M @ 450 (18)
	2.74 (9.0)	-	15M @ 150 (6)	15M @ 300 (12)	15M @ 450 (18)
	3.05 (10.0)	-	15M @ 150 (6)	15M @ 150 (6)	15M @ 450 (18)

Notes:

- Designed according to CSA S806-12 and NBCC 2020 and based exclusively on the design limitations presented in Part 9 of NBC 2020 for ICF walls supporting light-frame construction not exceeding 2 stories in building height and having a maximum floor to floor height of 3 m (10 ft).
- All the vertical bars in the table are V-ROD46, except that V-ROD Poly 46 can be used for vertical bars marked by ***.
- Horizontal bars: use V-ROD Poly 46 10M bars, placed not more than 300 mm (12 in) from the top and spaced at:
 - 900 mm (36 in) for block height of 12" and 18"
 - 800 mm (32 in) for block height of 16".
- Horizontal bars shall be spliced at the wall corners with L-shaped V-ROD Poly 40 10M bars 600 mm × 600 mm (24 in × 24 in). Minimum overlap length of 10M horizontal bars is 400 mm (16 in).
- Provide L-shaped dowels 750 mm × 200 mm (30 in × 8 in) to match the size and spacing of vertical reinforcement, embedded a minimum of 200 mm (8 in) into the footing.
- Minimum concrete compressive strength is 25 MPa at 28 days. All the concrete work shall conform to CSA A23.1/2. Construction of the structural works shall follow NBC 2020 and CSA S806
- 2012. Vertical reinforcement shall be located 40 mm (1.5 in) from the inside face of the wall for single reinforced ICF walls.
- Provide additional vertical reinforcement of not less than 1- 15M V-ROD46 at the edges of all openings, extended min. 600 mm (24 in) beyond the opening.
- For walls retaining 1.22 m (4.0 ft) or more of unbalanced backfill, top and bottom lateral support must be provided per NBCC 2020 Articles 9.15.4.3, 9.15.4.4, and 9.4.4.6.
- The table is based on the following conditions: dead loads 0.7 kPa (15 psf) each for floor, roof/ceiling, and wall assembly; live load 1.92 kPa (40 psf) floor, 1.0 kPa (20 psf) attic; snow load 4.0 kPa (84 psf); soil surcharge 2.4 kPa (50 psf); maximum building area 300 m² (3,200 ft²); building aspect ratio < 2:1 (L: W), maximum plan dimension 24.4 m (80 ft), and a maximum span of 12.2 m (40 ft). Applicable for seismic site classes A, B, C, or D.



2025-12-13


V-ROD Reinforcement for Below Grade ICF Walls with 8" Tie Spacing - Seismic Zone Classification: $0.34 < S_a(T) \leq 0.70$

Maximum Wall Height m (ft)	Maximum Unbalanced Backfill Height m (ft)	Minimum V-ROD Vertical Reinforcement Size and Spacing mm (in)							
		Backfill Equivalent Fluid Density							
		480 kg/m ³ (30 pcf)				720 kg/m ³ (45 pcf)			
		Wall thickness mm (in)				Wall thickness mm (in)			
		150 (6)	200 (8)	250 (10)	300 (12)	150 (6)	200 (8)	250 (10)	300 (12)
2.44 (8.0)	1.22 (4.0)	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
	1.53 (5.0)	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
	1.83 (6.0)	15M @ 200 (8)	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
	2.14 (7.0)	15M @ 200 (8)	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 200 (8)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
	2.44 (8.0)	-	15M @ 200 (8)	15M @ 400 (16)	15M @ 400 (16)	15M @ 200 (8)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
2.74 (9.0)	1.22 (4.0)	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
	1.53 (5.0)	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
	1.83 (6.0)	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
	2.14 (7.0)	15M @ 400 (16)	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 200 (8)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
	2.44 (8.0)	15M @ 200 (8)	15M @ 400 (16)	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 200 (8)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
	2.74 (9.0)	-	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)	-	15M @ 200 (8)	15M @ 400 (16)	15M @ 400 (16)
3.05 (10.0)	1.22 (4.0)	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
	1.53 (5.0)	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
	1.83 (6.0)	15M @ 400 (16)	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
	2.14 (7.0)	15M @ 400 (16)	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 200 (8)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
	2.44 (8.0)	15M @ 200 (8)	15M @ 400 (16)	15M @ 400 (16)*	15M @ 400 (16)*	15M @ 200 (8)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
	2.74 (9.0)	15M @ 200 (8)	15M @ 200 (8)	15M @ 400 (16)*	15M @ 400 (16)*	-	15M @ 200 (8)	15M @ 400 (16)	15M @ 400 (16)
	3.05 (10.0)	-	15M @ 200 (8)	15M @ 400 (16)	15M @ 400 (16)	-	15M @ 200 (8)	15M @ 400 (16)	15M @ 400 (16)

Notes:

- Designed according to CSA S806-12 and NBCC 2020 and based exclusively on the design limitations presented in Part 9 of NBC 2020 for ICF walls supporting light-frame construction not exceeding 2 stories in building height and having a maximum floor to floor height of 3 m (10 ft).
- All the vertical bars in the table are **V-ROD46**, except that **V-ROD Poly 46** can be used for vertical bars marked by ***.
- Horizontal bars: use **V-ROD Poly 46** 10M bars, placed not more than 300 mm (12 in) from the top and spaced at:
450 mm (18 in) for block height of 12" and 18"
400 mm (16 in) for block height of 16".
- Horizontal bars shall be spliced at the wall corners with L-shaped **V-ROD Poly 40** 10M bars 600 mm × 600 mm (24 in × 24 in). Minimum overlap length of 10M horizontal bars is 400 mm (16 in).
- Provide L-shaped dowels 750 mm × 200 mm (30 in × 8 in) to match the size and spacing of vertical reinforcement, embedded a minimum of 200 mm (8 in) into the footing.
- Minimum concrete compressive strength is 25 MPa at 28 days. All the concrete work shall conform to CSA A23.1/2. Construction of the structural works shall follow NBC 2020 and CSA S806 2012. Vertical reinforcement shall be located 40 mm (1.5 in) from the inside face of the wall for single reinforced ICF walls.
- Provide additional vertical reinforcement of not less than 1- 15M **V-ROD46** at the edges of all openings, extended min. 600 mm (24 in) beyond the opening.
- For walls retaining 1.22 m (4.0 ft) or more of unbalanced backfill, top and bottom lateral support must be provided per NBCC 2020 Articles 9.15.4.3, 9.15.4.4, and 9.4.4.6.
- The table is based on the following conditions: dead loads 0.7 kPa (15 psf) each for floor, roof/ceiling, and wall assembly; live load 1.92 kPa (40 psf) floor, 1.0 kPa (20 psf) attic; snow load 4.0 kPa (84 psf); soil surcharge 2.4 kPa (50 psf); maximum building area 300 m² (3,200 ft²); building aspect ratio < 2:1 (L: W), maximum plan dimension 24.4 m (80 ft), and a maximum span of 12.2 m (40 ft). Applicable for seismic site classes A, B, C, or D.



2025-12-13


V-ROD Reinforcement for Below Grade ICF Walls with 8" Tie Spacing - Seismic Zone Classification: $0.34 < S_a(T) \leq 0.70$

Maximum Wall Height m (ft)	Maximum Unbalanced Backfill Height m (ft)	Minimum V-ROD Vertical Reinforcement Size and Spacing mm (in)			
		Backfill Equivalent Fluid Density			
		960 kg/m ³ (60 pcf)			
		Wall thickness mm (in)			
		150 (6)	200 (8)	250 (10)	300 (12)
2.44 (8.0)	1.22 (4.0)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
	1.53 (5.0)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
	1.83 (6.0)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
	2.14 (7.0)	15M @ 200 (8)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
	2.44 (8.0)	15M @ 200 (8)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
2.74 (9.0)	1.22 (4.0)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
	1.53 (5.0)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
	1.83 (6.0)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
	2.14 (7.0)	15M @ 200 (8)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
	2.44 (8.0)	15M @ 200 (8)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
	2.74 (9.0)	15M @ 100 (4)	15M @ 200 (8)	15M @ 400 (16)	15M @ 400 (16)
3.05 (10.0)	1.22 (4.0)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
	1.53 (5.0)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
	1.83 (6.0)	15M @ 200 (8)	15M @ 400 (16)	15M @ 400 (16)	15M @ 400 (16)
	2.14 (7.0)	15M @ 200 (8)	15M @ 200 (8)	15M @ 400 (16)	15M @ 400 (16)
	2.44 (8.0)	15M @ 100 (4)	15M @ 200 (8)	15M @ 400 (16)	15M @ 400 (16)
	2.74 (9.0)	-	15M @ 200 (8)	15M @ 200 (8)	15M @ 400 (16)
	3.05 (10.0)	-	15M @ 200 (8)	15M @ 100 (4)	15M @ 400 (16)

Notes:

- Designed according to CSA S806-12 and NBCC 2020 and based exclusively on the design limitations presented in Part 9 of NBC 2020 for ICF walls supporting light-frame construction not exceeding 2 stories in building height and having a maximum floor to floor height of 3 m (10 ft).
- All the vertical bars in the table are V-ROD46, except that V-ROD Poly 46 can be used for vertical bars marked by ***.
- Horizontal bars: use V-ROD Poly 46 10M bars, placed not more than 300 mm (12 in) from the top and spaced at:
 - 900 mm (36 in) for block height of 12" and 18"
 - 800 mm (32 in) for block height of 16".
- Horizontal bars shall be spliced at the wall corners with L-shaped V-ROD Poly 40 10M bars 600 mm × 600 mm (24 in × 24 in). Minimum overlap length of 10M horizontal bars is 400 mm (16 in).
- Provide L-shaped dowels 750 mm × 200 mm (30 in × 8 in) to match the size and spacing of vertical reinforcement, embedded a minimum of 200 mm (8 in) into the footing.
- Minimum concrete compressive strength is 25 MPa at 28 days. All the concrete work shall conform to CSA A23.1/2. Construction of the structural works shall follow NBC 2020 and CSA S806
- 2012. Vertical reinforcement shall be located 40 mm (1.5 in) from the inside face of the wall for single reinforced ICF walls.
- Provide additional vertical reinforcement of not less than 1- 15M V-ROD46 at the edges of all openings, extended min. 600 mm (24 in) beyond the opening.
- For walls retaining 1.22 m (4.0 ft) or more of unbalanced backfill, top and bottom lateral support must be provided per NBCC 2020 Articles 9.15.4.3, 9.15.4.4, and 9.4.4.6.
- The table is based on the following conditions: dead loads 0.7 kPa (15 psf) each for floor, roof/ceiling, and wall assembly; live load 1.92 kPa (40 psf) floor, 1.0 kPa (20 psf) attic; snow load 4.0 kPa (84 psf); soil surcharge 2.4 kPa (50 psf); maximum building area 300 m² (3,200 ft²); building aspect ratio < 2:1 (L: W), maximum plan dimension 24.4 m (80 ft), and a maximum span of 12.2 m (40 ft). Applicable for seismic site classes A, B, C, or D.



2025-12-13


Minimum Exterior Footing Dimensions (Width × Thickness) (in × in) – Not Supporting Roof Load

Bearing Capacity kPa (psf)	One-story with basement				Two-story with basement			
	Wall thickness mm (in)				Wall thickness mm (in)			
	150 (6)	200 (8)	250 (10)	300 (12)	150 (6)	200 (8)	250 (10)	300 (12)
72 (1500)	16 × 6	16 × 6	16 × 6	18 × 6	18 × 6	20 × 6	22 × 6	24 × 6
96 (2000)	16 × 6	16 × 6	16 × 6	16 × 6	16 × 6	16 × 6	18 × 6	18 × 6
120 (2500)	16 × 6	16 × 6	16 × 6	16 × 6	16 × 6	16 × 6	16 × 6	16 × 6
144 (3000)	16 × 6	16 × 6	16 × 6	16 × 6	16 × 6	16 × 6	16 × 6	16 × 6

Minimum Exterior Footing Dimensions (Width × Thickness) (in × in)

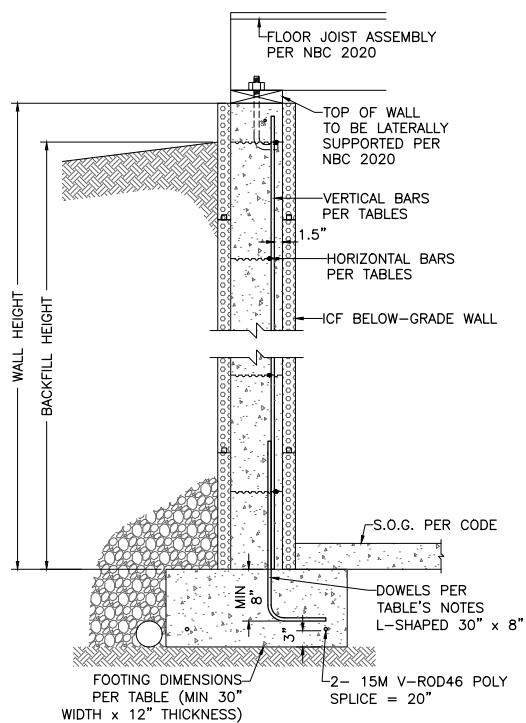
Bearing Capacity kPa (psf)	Maximum Snow load kPa	One-story with basement				Two-story with basement			
		Wall thickness mm (in)				Wall thickness mm (in)			
		150 (6)	200 (8)	250 (10)	300 (12)	150 (6)	200 (8)	250 (10)	300 (12)
72 (1500)	1	18 × 6	20 × 6	22 × 6	24 × 6	24 × 8	26 × 8	28 × 8	30 × 8
	2	22 × 6	24 × 6	26 × 6	28 × 6	28 × 8	30 × 8	32 × 8	34 × 8
	3	24 × 8	26 × 8	28 × 8	30 × 8	30 × 8	32 × 8	34 × 8	36 × 8
	4	28 × 8	30 × 8	32 × 8	34 × 8	34 × 10	36 × 10	38 × 10	40 × 10
96 (2000)	1	16 × 6	16 × 6	16 × 6	18 × 6	18 × 6	20 × 6	22 × 6	22 × 6
	2	16 × 6	18 × 6	20 × 6	20 × 6	20 × 6	22 × 6	24 × 6	26 × 6
	3	18 × 6	20 × 6	22 × 6	22 × 6	22 × 8	24 × 8	26 × 8	28 × 8
	4	20 × 8	22 × 6	24 × 6	26 × 8	26 × 8	26 × 10	28 × 8	30 × 8
120 (2500)	1	16 × 6	16 × 6	16 × 6	16 × 6	16 × 6	16 × 6	18 × 6	18 × 6
	2	16 × 6	16 × 6	16 × 6	16 × 6	16 × 6	18 × 6	20 × 6	20 × 6
	3	16 × 6	16 × 6	18 × 6	18 × 6	18 × 6	20 × 6	20 × 6	22 × 6
	4	16 × 6	18 × 6	20 × 6	20 × 6	20 × 8	22 × 8	22 × 6	24 × 6
144 (3000)	1	16 × 6	16 × 6	16 × 6	16 × 6	16 × 6	16 × 6	16 × 6	18 × 6
	2	16 × 6	16 × 6	16 × 6	16 × 6	16 × 6	16 × 6	18 × 6	18 × 6
	3	16 × 6	16 × 6	16 × 6	16 × 6	16 × 6	16 × 6	18 × 6	18 × 6
	4	16 × 6	16 × 6	16 × 6	18 × 6	18 × 6	18 × 6	20 × 6	20 × 6

Notes:

- Designed according to NBCC 2020 and based exclusively on the design limitations presented in Part 9 of NBC 2020 for ICF walls supporting light-frame construction not exceeding 2 stories in building height and having a maximum floor-to-floor height of 3 m (10 ft).
- Minimum concrete compressive strength is 25 MPa at 28 days. All the concrete work shall conform to CSA A23.1/2. Construction of the structural works shall follow NBC 2020.
- Footings to be reinforced with 2- 15M V-ROD46 continuous bars. Minimum overlap length is 500 mm (20 in).
- To be read in conjunction with the Below Grade ICF Walls Below Grade ICF Walls tables in this document.
- Footing for locations with $S_a(T) \geq 0.19$ shall be the minimum of 30 in width and 12 in thickness, but not less than the size shown in the table.
- Footing sizes in this table do not consider masonry veneer weight.



2025-12-13



Seismic Zone Classification: $S_a(T) > 0.19$



V-ROD REINFORCEMENT FOR BELOW GRADE ICF WALLS

SIZE	A
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Appendix A: Seismic Design Data for Selected Locations in Canada for Part 9 Design

Province and Location	Sa(T) for Seismic Design in 2020 NBC
Alberta	
Athabasca	0.137
Banff	0.434
Barrhead	0.192
Beaverlodge	0.255
Brooks	0.199
Calgary	0.295
Campsie	0.200
Camrose	0.172
Canmore	0.434
Cardston	0.415
Claresholm	0.350
Cold Lake	0.107
Coleman	0.431
Coronation	0.144
Cowley	0.434
Drumheller	0.205
Edmonton	0.183
Edson	0.264
Embarras Portage	0.102
Fairview	0.215
Fort MacLeod	0.353
Fort McMurray	0.106
Fort Saskatchewan	0.162
Fort Vermilion	0.119
Grande Prairie	0.235
Habay	0.145
Hardisty	0.133
High River	0.328
Hinton	0.426
Jasper	0.436
Keg River	0.143
Lac La Biche	0.120
Lacombe	0.213
Lethbridge	0.263
Manning	0.163
Medicine Hat	0.159
Peace River	0.188
Pincher Creek	0.436
Ranfurly	0.131
Red Deer	0.218
Rocky Mountain House	0.282
Slave Lake	0.151
Stettler	0.190
Stony Plain	0.201
Suffield	0.177
Taber	0.219
Turner Valley	0.392
Valleyview	0.218

Province and Location	Sa(T) for Seismic Design in 2020 NBC
Vegreville	0.136
Vermilion	0.120
Wagner	0.153
Wainwright	0.125
Wetaskiwin	0.198
Whitecourt	0.216
Wimborne	0.220
Ontario	
Ailsa Craig	0.212
Ajax	0.351
Alexandria	0.724
Alliston	0.259
Almonte	0.509
Armstrong	0.118
Arnprior	0.531
Atikokan	0.125
Attawapiskat	0.138
Aurora	0.289
Bancroft	0.353
Barrie	0.263
Barriefield	0.372
Beaverton	0.281
Belleville	0.352
Belmont	0.241
Borden (CFB)	0.252
Bracebridge	0.293
Bradford	0.275
Brampton	0.307
Brantford	0.293
Brighton	0.343
Brockville	0.467
Burk's Falls	0.323
Burlington	0.366
Cambridge	0.277
Campbellford	0.330
Cannington	0.286
Carleton Place	0.496
Cavan	0.310
Centralia	0.210
Chapleau	0.154
Chatham	0.226
Chesley	0.206
Clinton	0.199
Coboconk	0.295
Cobourg	0.344
Cochrane	0.322
Colborne	0.274
Collingwood	0.239
Cornwall	0.718



Note: Values are provided only to be used with V-ROD below-grade wall design tables.



Appendix A: Seismic Design Data for Selected Locations in Canada for Part 9 Design

Province and Location	Sa(T) for Seismic Design in 2020 NBC
Corunna	0.192
Deep River	0.532
Deseronto	0.354
Dorchester	0.238
Dorion	0.110
Dresden	0.216
Dryden	0.132
Dundalk	0.236
Dunnville	0.354
Durham	0.218
Dutton	0.237
Earlton	0.343
Edison	0.129
Elliot Lake	0.170
Elmvale	0.254
Embro	0.239
Englehart	0.333
Espanola	0.205
Exeter	0.207
Fenelon Falls	0.295
Fergus	0.250
Forest	0.197
Fort Erie	0.408
Fort Erie (Ridgeway)	0.404
Fort Frances	0.118
Gananoque	0.395
Geraldton	0.109
Glencoe	0.225
Goderich	0.191
Gore Bay	0.172
Graham	0.236
Gravenhurst (Muskoka Airport)	0.285
Grimsby	0.399
Guelph	0.274
Guthrie	0.266
Haileybury	0.377
Haldimand (Caledonia)	0.335
Haldimand (Hagersville)	0.303
Haliburton	0.312
Halton Hills (Georgetown)	0.297
Hamilton	0.373
Hanover	0.210
Hastings	0.343
Hawkesbury	0.657
Hearst	0.148
Honey Harbour	0.260
Hornepayne	0.128
Huntsville	0.305

Province and Location	Sa(T) for Seismic Design in 2020 NBC
Ingersoll	0.244
Iroquois Falls	0.310
Jellicoe	0.109
Kapuskasing	0.206
Kemptville	0.568
Kenora	0.116
Killaloe	0.458
Kincardine	0.188
Kingston	0.369
Kinmount	0.304
Kirkland Lake	0.309
Kitchener	0.259
Kitchenuhmaykoosib / Big Trout Lake	0.103
Lakefield	0.310
Lansdowne House	0.107
Leamington	0.228
Lindsay	0.295
Lion's Head	0.203
Listowel	0.220
London	0.232
Lucan	0.216
Maitland	0.488
Markdale	0.223
Markham	0.325
Martin	0.140
Matheson	0.291
Mattawa	0.557
Midland	0.256
Milton	0.323
Milverton	0.225
Minden	0.313
Mississauga	0.345
Mississauga (Lester B. Pearson Int'l Airport)	0.328
Mississauga (Port Credit)	0.365
Mitchell	0.215
Moosonee	0.160
Morrisburg	0.679
Mount Forest	0.224
Nakina	0.110
Nanticoke (Jarvis)	0.288
Nanticoke (Port Dover)	0.277
Napanee	0.356
Newcastle	0.342
Newcastle (Bowmanville)	0.342
New Liskeard	0.367
Newmarket	0.284
Niagara Falls	0.414



Note: Values are provided only to be used with V-ROD below-grade wall design tables.



Appendix A: Seismic Design Data for Selected Locations in Canada for Part 9 Design

Province and Location	Sa(T) for Seismic Design in 2020 NBC	Province and Location	Sa(T) for Seismic Design in 2020 NBC
North Bay	0.405	Sioux Lookout	0.135
Norwood	0.321	Smiths Falls	0.464
Oakville	0.367	Smithville	0.397
Orangeville	0.257	Smooth Rock Falls	0.296
Orillia	0.272	Southampton	0.196
Oshawa	0.344	South River	0.345
Ottawa (Metropolitan)	0.595	St. Catharines	0.414
Ottawa (Barrhaven)	0.579	St. Marys	0.224
Ottawa (City Hall)	0.597	St. Thomas	0.241
Ottawa (Kanata)	0.562	Stirling	0.109
Ottawa (M-C Int'l Airport)	0.604	Stratford	0.228
Ottawa (Orléans)	0.624	Strathroy	0.218
Owen Sound	0.212	Sturgeon Falls	0.346
Pagwa River	0.119	Sudbury	0.256
Paris	0.276	Sundridge	0.338
Parkhill	0.206	Tavistock	0.236
Parry Sound	0.270	Temagami	0.393
Pelham (Fonthill)	0.408	Thamesford	0.238
Pembroke	0.527	Thedford	0.200
Penetanguishene	0.256	Thunder Bay	0.111
Perth	0.439	Tillsonburg	0.254
Petawawa	0.526	Timmins	0.245
Peterborough	0.310	Timmins (Porcupine)	0.261
Petrolia	0.202	Toronto Metropolitan Region (Etobicoke)	0.342
Pickering (Dunbarton)	0.352	Toronto Metropolitan Region (North York)	0.338
Picton	0.349	Toronto Metropolitan Region (Scarborough)	0.351
Plattsville	0.252	Toronto Metropolitan Region (Toronto City Hall)	0.345
Point Alexander	0.533	Trenton	0.349
Port Burwell	0.259	Trout Creek	0.361
Port Colborne	0.401	Uxbridge	0.291
Port Elgin	0.195	Vaughan (Woodbridge)	0.310
Port Hope	0.332	Vittoria	0.271
Port Perry	0.304	Walkerton	0.205
Port Stanley	0.246	Wallaceburg	0.209
Prescott	0.528	Waterloo	0.250
Princeton	0.262	Watford	0.209
Raith	0.122	Wawa	0.127
Rayside-Balfour (Chelmsford)	0.241	Welland	0.406
Red Lake	0.126	West Lorne	0.236
Renfrew	0.511	Whitby	0.334
Richmond Hill	0.309	Whitby (Brooklin)	0.328
Rockland	0.662	White River	0.121
Sarnia	0.192	Warton	0.205
Sault Ste. Marie	0.131	Windsor	0.206
Schreiber	0.107	Wingham	0.202
Seaforth	0.206		
Shelburne	0.246		
Simcoe	0.273		



Note: Values are provided only to be used with V-ROD below-grade wall design tables.



Appendix A: Seismic Design Data for Selected Locations in Canada for Part 9 Design

Province and Location	Sa(T) for Seismic Design in 2020 NBC
Woodstock	0.248
Wyoming	0.197
Quebec	
Acton Vale	0.490
Alma	0.905
Amos	0.265
Asbestos	0.459
Aylmer	0.455
Baie-Comeau	0.554
Baie-Saint-Paul	1.674
Beauport	0.706
Bedford	0.555
Beloeil	0.660
Brome	0.475
Brossard	0.717
Buckingham	0.629
Campbell's Bay	0.542
Chambly	0.687
Coaticook	0.441
Contrecoeur	0.627
Cowansville	0.500
Deux-Montagnes	0.725
Dolbeau	0.638
Drummondville	0.509
Farnham	0.561
Fort-Coulonge	0.541
Gagnon	0.592
Gaspé	0.311
Gatineau	0.601
Gracefield	0.578
Granby	0.501
Harrington Harbour	0.170
Havre-Saint-Pierre	0.359
Hemmingford	0.699
Hull	0.578
Iberville	0.662
Inukjuak	0.128
Joliette	0.616
Kuujuaq	0.162
Kuujuarapik	0.106
Lachute	0.663
Lac-Mégantic	0.444
La Malbaie	1.811
La Pocatière	1.564
La Tuque	0.468

Province and Location	Sa(T) for Seismic Design in 2020 NBC
Lennoxville	0.441
Léry	0.735
Loretteville	0.693
Louiseville	0.554
Magog	0.448
Malartic	0.309
Maniwaki	0.580
Masson	0.642
Matane	0.576
Mont-Joli	0.601
Mont-Laurier	0.570
Montmagny	0.821
Montréal (Beaconsfield)	0.734
Montréal (Dorval)	0.731
Montréal (Laval (City Hall))	0.726
Montréal (Montréal)	0.724
Montréal (Montréal-Est)	0.711
Montréal (Montréal-Nord)	0.722
Montréal (Outremont)	0.726
Montréal (Pierrefonds)	0.731
Montréal (Sainte-Anne-de-Bellevue)	0.734
Montréal (Saint-Lambert)	0.720
Montréal (Saint-Laurent)	0.728
Montréal (Verdun)	0.725
Nicolet (Gentilly)	0.563
Nitchequon	0.132
Noranda	0.293
Percé	0.292
Pincourt	0.735
Plessisville	0.507
Port-Cartier	0.462
Puvirnituq	0.192
Québec City Region (Ancienne-Lorette)	0.685
Québec City Region (Lévis)	0.688
Québec City Region (Québec)	0.692
Québec City Region (Sainte-Foy)	0.679
Québec City Region (Sillery)	0.683
Richmond	0.393
Rimouski	0.611
Rivière-du-Loup	1.208
Roberval	0.797



Note: Values are provided only to be used with V-ROD below-grade wall design tables.



Appendix A: Seismic Design Data for Selected Locations in Canada for Part 9 Design

Province and Location	Sa(T) for Seismic Design in 2020 NBC
Rock Island	0.445
Rosemère	0.719
Rouyn	0.293
Saguenay	0.925
Saguenay (Bagotville)	0.951
Saguenay (Jonquière)	0.934
Saguenay (Kénogami)	0.932
Sainte-Agathe-des-Monts	0.596
Saint-Eustache	0.724
Saint-Félicien	0.656
Saint-Georges-de-Cacouna	1.003
Saint-Hubert	0.712
Saint-Hubert-de-Rivière-du-Loup	0.685
Saint-Hyacinthe	0.552
Saint-Jean-sur-Richelieu	0.669
Saint-Jérôme	0.677
Saint-Jovite	0.592
Saint-Lazare / Hudson	0.731
Saint-Nicolas	0.659
Salaberry-de-Valleyfield	0.735
Schefferville	0.115
Senneterre	0.285
Sept-Îles	0.430
Shawinigan	0.531
Shawville	0.540
Sherbrooke	0.442
Sorel	0.580
Sutton	0.479
Tadoussac	0.875
Témiscaming	0.866
Terrebonne	0.714
Thetford Mines	0.476
Thurso	0.640
Trois-Rivières	0.560
Val-d'Or	0.314
Varenes	0.703
Verchères	0.675
Victoriaville	0.490
Ville-Marie	0.413
Wakefield	0.571
Waterloo	0.472
Windsor	0.450

Province and Location	Sa(T) for Seismic Design in 2020 NBC
British Columbia	
100 MileHouse	0.252
Abbotsford	0.976
Agassiz	0.721
Alberni	1.371
Ashcroft	0.348
Bamfield	1.912
Beatton River	0.243
Bella Bella	0.315
Bella Coola	0.315
Burns Lake	0.184
Cache Creek	0.339
Campbell River	0.908
Carmi	0.260
Castlegar	0.229
Chetwynd	0.305
Chilliwack	0.810
Comox	1.030
Courtenay	1.034
Cranbrook	0.283
Crescent Valley	0.229
Crofton	1.596
Dawson Creek	0.255
Dease Lake	0.241
Dog Creek	0.191
Duncan	1.682
Elko	0.343
Fernie	0.372
Fort Nelson	0.247
Fort St. John	0.250
Glacier	0.335
Golden	0.410
Gold River	1.391
Grand Forks	0.242
Greenwood	0.250
Hope	0.301
Jordan River	0.249
Kamloops	0.266
Kaslo	0.243
Kelowna	0.264
Kimberley	0.277
Kitimat Plant	0.343
Kitimat Townsite	0.332
Ladysmith	1.526
Langford	1.968



Note: Values are provided only to be used with V-ROD below-grade wall design tables.



Appendix A: Seismic Design Data for Selected Locations in Canada for Part 9 Design

Province and Location	Sa(T) for Seismic Design in 2020 NBC
Lillooet	0.462
Lytton	0.487
Mackenzie	0.284
Masset	1.332
McBride	0.384
McLeod Lake	0.274
Merritt	0.374
Mission City	0.929
Montrose	0.228
Nakusp	0.234
Nanaimo	1.393
Nelson	0.247
Ocean Falls	0.361
Osoyoos	0.313
Parksville	1.257
Penticton	0.292
Port Alberni	1.371
Port Alice	1.711
Port Hardy	1.036
Port McNeill	1.039
Port Renfrew	2.002
Powell River	0.905
Prince George	0.200
Prince Rupert	0.485
Princeton	0.450
Qualicum Beach	1.232
Queen Charlotte City	2.347
Quesnel	0.191
Revelstoke	0.250
Salmon Arm	0.237
Sandspit	1.973
Sechelt	1.136
Sidney	1.725
Smithers	0.198
Smith River	0.854
Sooke	1.932
Squamish	0.880
Stewart	0.302
Tahsis	1.871
Taylor	0.476
Terrace	0.297
Tofino	1.871
Trail	0.229
Ucluelet	1.924

Province and Location	Sa(T) for Seismic Design in 2020 NBC
Vancouver Region (Burnaby (Simon Fraser Univ.))	1.062
Vancouver Region (Cloverdale)	1.092
Vancouver Region (Haney)	0.985
Vancouver Region (Ladner0)	1.238
Vancouver Region (Langley)	1.069
Vancouver Region (New Westminster)	1.102
Vancouver Region (North Vancouver)	1.082
Vancouver Region (Richmond)	1.225
Vancouver Region (Surrey (88 Ave & 156 St.))	1.072
Vancouver Region (Vancouver (City Hall))	1.135
Vancouver Region (Vancouver (Granville St. & 41st Ave))	1.165
Vancouver Region (West Vancouver)	1.105
Vernon	0.244
Victoria Region (Victoria)	1.922
Victoria Region (Victoria (Gonzales Hts))	1.909
Victoria Region (Victoria (Mt Tolmie))	1.872
Whistler	0.676
White Rock	1.175
Williams Lake	0.244
Youbou	1.672

Saskatchewan

Assiniboia	0.248
Battrum	0.137
Biggar	0.117
Broadview	0.159
Dafoe	0.128
Dundurn	0.124
Estevan	0.233
Hudson Bay	0.107
Humboldt	0.118
Island Falls	0.099
Kamsack	0.119
Kindersley	0.123



Note: Values are provided only to be used with V-ROD below-grade wall design tables.



Appendix A: Seismic Design Data for Selected Locations in Canada for Part 9 Design

Province and Location	Sa(T) for Seismic Design in 2020 NBC
Lloydminster	0.113
Maple Creek	0.140
Meadow Lake	0.105
Melfort	0.110
Melville	0.143
Moose Jaw	0.193
Nipawin	0.105
North Battleford	0.112
Prince Albert	0.107
Qu'Appelle	0.165
Regina	0.199
Rosetown	0.123
Saskatoon	0.118
Scott	0.115
Strasbourg	0.153
Swift Current	0.148
Uranium City	0.098
Weyburn	0.294
Yorkton	0.131
Manitoba	
Beausejour	0.102
Boissevain	0.118
Brandon	0.116
Churchill	0.099
Dauphin	0.111
Flin Flon	0.100
Gimli	0.102
Island Lake	0.102
Lac du Bonnet	0.105
Lynn Lake	0.099
Morden	0.101
Neepawa	0.110
Pine Falls	0.104
Portage la Prairie	0.103
Rivers	0.118
Sandilands	0.101
Selkirk	0.101
Split Lake	0.099
Steinbach	0.100
Swan River	0.110
The Pas	0.101
Thompson	0.099
Virden	0.131
Winnipeg	0.100
New Brunswick	

Province and Location	Sa(T) for Seismic Design in 2020 NBC
Alma	0.328
Bathurst	0.407
Campbellton	0.434
Edmundston	0.506
Fredericton	0.417
Gagetown	0.394
Grand Falls	0.485
Miramichi	0.399
Moncton	0.338
Oromocto	0.410
Sackville	0.313
Saint Andrews	0.928
Saint John	0.385
Shippagan	0.331
St. George	0.675
St. Stephen	0.831
Woodstock	0.435
Nova Scotia	
Amherst	0.298
Antigonish	0.249
Bridgewater	0.278
Canso	0.279
Debert	0.264
Digby	0.343
Greenwood (CFB)	0.304
Halifax Region (Dartmouth)	0.263
Halifax Region (Halifax)	0.264
Kentville	0.289
Liverpool	0.279
Lockeport	0.282
Louisbourg	0.299
Lunenburg	0.275
New Glasgow	0.249
North Sydney	0.273
Pictou	0.249
Port Hawkesbury	0.260
Springhill	0.284
Stewiacke	0.261
Sydney	0.280
Tatamagouche	0.259
Truro	0.259
Wolfville	0.285
Yarmouth	0.311
Prince Edward Island	



Note: Values are provided only to be used with V-ROD below-grade wall design tables.



Appendix A: Seismic Design Data for Selected Locations in Canada for Part 9 Design

Province and Location	Sa(T) for Seismic Design in 2020 NBC
Charlottetown	0.256
Souris	0.238
Summerside	0.296
Tignish	0.303
Newfoundland and Labrador	
Argentia	0.268
Bonavista	0.213
Buchans	0.197
Cape Harrison	0.306
Cape Race	0.291
Channel-Port aux Basques	0.234
Corner Brook	0.189
Gander	0.200
Grand Bank	0.306
Grand Falls	0.197
Happy Valley-Goose Bay	0.153
Labrador City	0.148
St. Anthony	0.173
Stephenville	0.198
St. John's	0.242
Twin Falls	0.136
Wabana	0.240
Wabush	0.150
Yukon	
Aishihik	0.738
Dawson	0.682
Destruction Bay	2.612
Faro	0.456
Haines Junction	1.270
Snag	0.902
Teslin	0.482
Watson Lake	0.483
Whitehorse	0.569
Northwest Territories	
Aklavik	0.665
Behchokq̃ / Rae-Edzo	0.103
Echo Bay / Port Radium	0.113
Fort Good Hope	0.475
Fort McPherson	0.665
Fort Providence	0.113
Fort Resolution	0.101
Fort Simpson	0.257
Fort Smith	0.099
Hay River	0.106
Inuvik	0.500

Province and Location	Sa(T) for Seismic Design in 2020 NBC
Mould Bay	0.415
Norman Wells	0.873
Tungsten	0.501
Ulukhaktok / Holman	0.116
Wrigley	0.839
Yellowknife	0.100
Nunavut	
Alert	0.268
Arctic Bay	0.283
Arviat	0.107
Baker Lake	0.154
Eureka	0.366
Igluligaarjuk / Chesterfield Inlet	0.368
Iqaluit	0.209
Iqaluktuuttiaq / Cambridge Bay	0.124
Isachsen	0.591
Kangiqiniq / Rankin Inlet	0.144
Kanngiqitugaapik / Clyde River	0.564
Kugluktuk / Coppermine	0.110
Nottingham Island	0.200
Resolute	0.353
Resolution Island	0.401
Salliq / Coral Harbour	0.148



Note: Values are provided only to be used with V-ROD below-grade wall design tables.


Appendix B: Roof Snow loads, kPa, 1/50, No Snow Accumulation ($C_s \leq 1.0$)

Province and Location	Snow Load, kPa, 1/50, 2020 NBC
Alberta	
Athabasca	1.3
Banff	2.74
Barrhead	1.46
Beaverlodge	2.02
Brooks	1.06
Calgary	0.98
Campsie	1.46
Camrose	1.7
Canmore	2.66
Cardston	1.3
Claresholm	1.14
Cold Lake	1.46
Coleman	2.46
Coronation	1.62
Cowley	1.38
Drumheller	1.06
Edmonton	1.46
Edson	1.78
Embarras Portage	1.86
Fairview	2.02
Fort MacLeod	1.06
Fort McMurray	1.3
Fort Saskatchewan	1.38
Fort Vermilion	1.78
Grande Prairie	1.86
Habay	2.02
Hardisty	1.46
High River	1.14
Hinton	2.18
Jasper	2.5
Keg River	2.02
Lac La Biche	1.38
Lacombe	1.62
Lethbridge	1.06
Manning	1.94
Medicine Hat	0.98
Peace River	1.86
Pincher Creek	1.3
Ranfurly	1.62
Red Deer	1.54
Rocky Mountain House	1.62
Slave Lake	1.62
Stettler	1.62
Stony Plain	1.46

Province and Location	Snow Load, kPa, 1/50, 2020 NBC
Suffield	1.14
Taber	1.06
Turner Valley	1.22
Valleyview	1.94
Vegreville	1.62
Vermilion	1.46
Wagner	1.62
Wainwright	1.7
Wetaskiwin	1.7
Whitecourt	1.62
Wimborne	1.38
Ontario	
Ailsa Craig	2.16
Ajax	1.2
Alexandria	2.32
Alliston	2
Almonte	2.4
Armstrong	2.56
Arnprior	2.4
Atikokan	2.22
Attawapiskat	2.54
Aurora	2
Bancroft	2.88
Barrie	2.4
Barriefield	2.08
Beaverton	2.16
Belleville	1.76
Belmont	1.76
Borden (CFB)	1.52
Bracebridge	2.88
Bradford	2.08
Brampton	1.44
Brantford	1.44
Brighton	1.68
Brockville	2.16
Burk's Falls	2.56
Burlington	1.28
Cambridge	1.68
Campbellford	1.76
Cannington	2.16
Carleton Place	2.4
Cavan	2
Centralia	2.24
CFB Borden	2.16
Chapleau	3.28



Note: Values are provided only to be used with V-ROD below-grade wall design tables.


Appendix B: Roof Snow loads, kPa, 1/50, No Snow Accumulation ($C_s \leq 1.0$)

Province and Location	Snow Load, kPa, 1/50, 2020 NBC
Chatham	1.2
Chesley	2.64
Clinton	2.48
Coboconk	2.4
Cobourg	1.36
Cochrane	2.54
Colborne	1.68
Collingwood	2.56
Cornwall	2.16
Corunna	1.2
Deep River	2.4
Deseronto	1.92
Dorchester	1.92
Dorion	2.64
Dresden	1.2
Dryden	2.22
Dundalk	2.96
Dunnville	2
Durham	2.64
Dutton	1.44
Earlton	2.88
Edison	2.22
Elliot Lake	2.72
Elmvale	2.48
Embro	2
Englehart	2.64
Espanola	2.24
Exeter	2.32
Fenelon Falls	2.24
Fergus	2.16
Forest	2
Fort Erie	2.24
Fort Erie (Ridgeway)	2.24
Fort Frances	2.14
Gananoque	2.08
Geraldton	2.72
Glencoe	1.6
Goderich	2.32
Gore Bay	2.48
Graham	2.38
Gravenhurst (Muskoka Airport)	2.56
Grimsby	1.12
Guelph	1.92
Guthrie	2.4

Province and Location	Snow Load, kPa, 1/50, 2020 NBC
Haileybury	2.32
Haldimand (Caledonia)	1.36
Haldimand (Hagersville)	1.44
Haliburton	2.72
Halton Hills (Georgetown)	1.52
Hamilton	1.28
Hanover	2.48
Hastings	2
Hawkesbury	2.24
Hearst	2.54
Honey Harbour	2.56
Hornepayne	3.04
Huntsville	2.72
Ingersoll	1.76
Iroquois Falls	2.62
Jellicoe	2.56
Kapuskasing	2.7
Kemptville	2.24
Kenora	2.3
Killaloe	2.56
Kincardine	2.48
Kingston	2.08
Kinmount	2.56
Kirkland Lake	2.62
Kitchener	2
Kitchenuhmaykoosib / Big Trout Lake	2.76
Lakefield	2.16
Lansdowne House	2.6
Leamington	1.04
Lindsay	2.24
Lion's Head	2.56
Listowel	2.48
London	1.92
Lucan	2.24
Maitland	2.16
Markdale	2.96
Markham	1.44
Martin	2.38
Matheson	2.54
Mattawa	2.08
Midland	2.56
Milton	1.44
Milverton	2.32
Minden	2.56



Note: Values are provided only to be used with V-ROD below-grade wall design tables.


Appendix B: Roof Snow loads, kPa, 1/50, No Snow Accumulation ($C_s \leq 1.0$)

Province and Location	Snow Load, kPa, 1/50, 2020 NBC
Mississauga	1.28
Mississauga (Lester B. Pearson Int'l Airport)	1.28
Mississauga (Port Credit)	1.12
Mitchell	2.32
Moosonee	2.46
Morrisburg	2.24
Mount Forest	2.56
Nakina	2.64
Nanticoke (Jarvis)	1.52
Nanticoke (Port Dover)	1.36
Napanee	1.92
Newcastle	1.6
New Liskeard	2.48
Newmarket	2
Niagara Falls	1.84
North Bay	2.16
Norwood	2.08
Oakville	1.28
Orangeville	2.24
Orillia	2.32
Oshawa	1.52
Ottawa (Barrhaven)	2.32
Ottawa (City Hall)	2.32
Ottawa (Kanata)	2.4
Ottawa (M-C Int'l Airport)	2.32
Ottawa (Orléans)	2.32
Owen Sound	2.64
Pagwa River	2.56
Paris	1.52
Parkhill	2.08
Parry Sound	2.64
Pelham (Fonthill)	2.08
Pembroke	2.4
Penetanguishene	2.64
Perth	2.24
Petawawa	2.48
Peterborough	2
Petrolia	1.44
Pickering (Dunbarton)	1.2
Picton	2
Plattsville	1.92
Point Alexander	2.4
Port Burwell	1.36
Port Colborne	2.08

Province and Location	Snow Load, kPa, 1/50, 2020 NBC
Port Elgin	2.64
Port Hope	1.36
Port Perry	2.32
Port Stanley	1.36
Prescott	2.16
Princeton	1.6
Raith	2.56
Rayside-Balfour (Chelmsford)	2.4
Red Lake	2.38
Renfrew	2.4
Richmond Hill	1.6
Rockland	2.32
Sarnia	1.28
Sault Ste. Marie	2.88
Schreiber	3.04
Seaforth	2.4
Shelburne	2.88
Simcoe	1.44
Sioux Lookout	2.38
Smiths Falls	2.24
Smithville	1.6
Smooth Rock Falls	2.46
Southampton	2.56
South River	2.64
St. Catharines	1.2
St. Marys	2.16
St. Thomas	1.52
Stirling	1.76
Stratford	2.24
Strathroy	1.92
Sturgeon Falls	2.32
Sudbury	2.4
Sundridge	2.64
Tavistock	2.08
Temagami	2.48
Thamesford	1.92
Thedford	2.08
Thunder Bay	2.72
Tillsonburg	1.44
Timmins	2.78
Timmins (Porcupine)	2.62
Toronto Metropolitan Region (Etobicoke)	1.28



Note: Values are provided only to be used with V-ROD below-grade wall design tables.


Appendix B: Roof Snow loads, kPa, 1/50, No Snow Accumulation ($C_s \leq 1.0$)

Province and Location	Snow Load, kPa, 1/50, 2020 NBC
Toronto Metropolitan Region (North York)	1.36
Toronto Metropolitan Region (Scarborough)	1.36
Toronto Metropolitan Region (Toronto City Hall)	1.12
Trenton	1.68
Trout Creek	2.56
Uxbridge	2.32
Vaughan (Woodbridge)	1.28
Vittoria	1.44
Walkerton	2.56
Wallaceburg	1.12
Waterloo	2
Watford	1.92
Wawa	3.12
Welland	2
West Lorne	1.44
Whitby	1.36
Whitby (Brooklin)	1.92
White River	3.28
Warton	2.56
Windsor	1.04
Wingham	2.48
Woodstock	1.92
Wyoming	1.68
Quebec	
Acton-Vale	2.24
Alma	3.04
Amos	2.86
Asbestos	2.84
Aylmer	2.4
Baie-Comeau	3.84
Baie-Saint-Paul	3.32
Beauport	3.32
Bedford	2.08
Beloeil	2.32
Brome	2.4
Brossard	2.32
Buckingham	2.48
Campbell's Bay	2.48
Chambly	2.24
Coaticook	2.44
Contrecoeur	2.64
Cowansville	2.24

Province and Location	Snow Load, kPa, 1/50, 2020 NBC
Deux-Montagnes	2.32
Dolbeau	3.1
Drummondville	2.4
Farnham	2.4
Fort-Coulonge	2.4
Gagnon	4.08
Gaspé	4.04
Gatineau	2.4
Gracefield	2.48
Granby	2.24
Harrington-Harbour	4.52
Havre-St-Pierre	3.88
Hemmingford	2.32
Hull	2.32
Iberville	2.16
Inukjuak	3.48
Joliette	2.88
Kuujuuaq	4.04
Kuujuarapik	3.66
La Pocatière	3.16
Lachute	2.32
Lac-Mégantic	3.16
La-Malbaie	3.08
La-Tuque	3.12
Lennoxville	2.28
Léry	2.24
Loretteville	3.56
Louiseville	2.72
Magog	2.24
Malartic	2.94
Maniwaki	2.32
Masson	2.32
Matane	3.36
Mont-Joli	3.68
Mont-Laurier	2.48
Montmagny	2.92
Montréal (Beaconsfield)	2.24
Montréal (Dorval)	2.32
Montréal (Laval (City Hall))	2.48
Montréal (Montréal)	2.48
Montréal (Montréal-Est)	2.56
Montréal (Montréal-Nord)	2.48
Montréal (Outremont)	2.64
Montréal (Pierrefonds)	2.32
Montréal (Saint-Lambert)	2.4



Note: Values are provided only to be used with V-ROD below-grade wall design tables.


Appendix B: Roof Snow loads, kPa, 1/50, No Snow Accumulation ($C_s \leq 1.0$)

Province and Location	Snow Load, kPa, 1/50, 2020 NBC
Montréal (Saint-Laurent)	2.4
Montréal (Sainte-Anne-de-Bellevue)	2.24
Montréal (Verdun)	2.4
Nicolet (Gentilly)	2.64
Nitchequon	3.1
Noranda	2.86
Percé	3.64
Pincourt	2.24
Plessisville	2.84
Port-Cartier	3.68
Puvionrituq	3.8
Québec City Region (Ancienne-Lorette)	3.32
Québec City Region (Lévis)	3.24
Québec City Region (Québec)	3.48
Québec City Region (Sillery)	3.08
Québec City Region (Sainte-Foy)	3.56
Richmond	2.52
Rimouski	3.44
Rivière-du-Loup	3.4
Roberval	3.1
Rock-Island	2
Rosemère	2.48
Rouyn	2.78
Saguenay	2.56
Saguenay (Bagotville)	2.56
Saguenay (Jonquière)	2.88
Saguenay (Kénogami)	2.88
Saint-Eustache	2.32
Saint-Jean-sur-Richelieu	2.16
Salaberry-de-Valleyfield	2.24
Schefferville	3.9
Senneterre	2.94
Sept-Îles	3.68
Shawinigan	2.88
Shawville	2.64
Sherbrooke	2.36
Sorel	2.64
Ste-Agathe-des-Monts	3.12
St-Félicien	3.1
St-Georges-de-Cacouna	3.16
St-Hubert	2.4

Province and Location	Snow Load, kPa, 1/50, 2020 NBC
St-Hubert-de-Rivière-du-Loup	4.12
St-Hyacinthe	2.24
St-Jérôme	2.56
St-Jovite	2.64
St-Lazare-Hudson	2.24
St-Nicolas	3.4
Sutton	2.32
Tadoussac	3.36
Témiscaming	2.4
Terrebonne	2.48
Thetford Mines	3.4
Thurso	2.32
Trois-Rivières	2.64
Val-d'Or	3.02
Varennes	2.48
Verchères	2.56
Victoriaville	2.68
Ville-Marie	2.24
Wakefield	2.32
Waterloo	2.4
Windsor	2.24

British Columbia

100 MileHouse	2.38
Abbotsford	1.9
Agassiz	2.62
Alberni	2.48
Ashcroft	1.46
Bamfield	1.2
Beatton River	2.74
Bella Bella	2.88
Bella Coola	4.4
Burns Lake	2.92
Cache Creek	1.56
Campbell River	2.64
Carmi	3.08
Castlegar	3.46
Chetwynd	2.12
Chilliwack	2.06
Comox	2.32
Courtenay	2.32
Cranbrook	2.6
Crescent Valley	3.46
Crofton	1.64



Note: Values are provided only to be used with V-ROD below-grade wall design tables.


Appendix B: Roof Snow loads, kPa, 1/50, No Snow Accumulation ($C_s \leq 1.0$)

Province and Location	Snow Load, kPa, 1/50, 2020 NBC
Dawson Creek	2.2
Dease Lake	2.34
Dog Creek	1.64
Duncan	1.84
Elko	3.08
Fernie	3.8
Fort Nelson	2.02
Fort St. John	2.34
Glacier	7.72
Golden	2.84
Gold River	3.16
Grand Forks	2.34
Greenwood	2.98
Hope	2.94
Jordan River	1.36
Kamloops	1.64
Kaslo	2.34
Kelowna	1.46
Kimberley	2.6
Kitimat Plant	5.2
Kitimat Townsite	6
Ladysmith	2.32
Langford	1.74
Lillooet	1.78
Lytton	2.54
Mackenzie	4.28
Masset	1.84
McBride	3.64
McLeod Lake	3.48
Merritt	1.74
Mission City	2.22
Montrose	3.38
Nakusp	3.62
Nanaimo	2.08
Nelson	3.46
Ocean Falls	3.92
Osoyoos	0.98
Parksville	2
Penticton	1.14
Port Alberni	2.48
Port Alice	1.28
Port Hardy	1.12
Port McNeill	1.28
Port Renfrew	1.28
Powell River	1.76

Province and Location	Snow Load, kPa, 1/50, 2020 NBC
Prince George	2.92
Prince Rupert	1.92
Princeton	2.92
Qualicum Beach	2
Queen Charlotte City	1.84
Quesnel	2.5
Revelstoke	5.86
Salmon Arm	2.9
Sandspit	1.84
Sechelt	1.84
Sidney	1.08
Smithers	2.34
Smith River	3
Sooke	1.34
Squamish	2.94
Stewart	7.12
Tahsis	1.28
Taylor	1.94
Terrace	4.92
Tofino	1.28
Trail	3.38
Ucluelet	1.2
Vancouver Region (Burnaby (Simon Fraser Univ.))	3.02
Vancouver Region (Cloverdale)	2.2
Vancouver Region (Haney)	2.12
Vancouver Region (Ladner0)	1.24
Vancouver Region (Langley)	2.12
Vancouver Region (New Westminster)	2.04
Vancouver Region (North Vancouver)	2.7
Vancouver Region (Richmond)	1.4
Vancouver Region (Surrey (88 Ave & 156 St.))	2.22
Vancouver Region (Vancouver (City Hall))	1.64
Vancouver Region (Vancouver (Granville St. & 41st Ave))	1.82
Vancouver Region (West Vancouver)	2.12



Note: Values are provided only to be used with V-ROD below-grade wall design tables.


Appendix B: Roof Snow loads, kPa, 1/50, No Snow Accumulation ($C_s \leq 1.0$)

Province and Location	Snow Load, kPa, 1/50, 2020 NBC
Vernon	1.86
Victoria Region (Victoria)	1.08
Victoria Region (Victoria (Gonzales Hts))	1.5
Victoria Region (Victoria (Mt Tolmie))	1.98
Whistler	8.5
White Rock	1.8
Williams Lake	2.12
Youbou	3.5
Saskatchewan	
Assiniboia	1.38
Battrum	1.06
Biggar	1.78
Broadview	1.46
Dafoe	1.46
Dundurn	1.3
Estevan	1.38
Hudson Bay	1.7
Humboldt	1.78
Island Falls	1.78
Kamsack	1.88
Kindersley	1.22
Lloydminster	1.7
Maple Creek	1.06
Meadow Lake	1.46
Melfort	1.78
Melville	1.46
Moose Jaw	1.22
Nipawin	1.7
North Battleford	1.46
Prince Albert	1.62
Qu'Appelle	1.46
Regina	1.22
Rosetown	1.46
Saskatoon	1.46
Scott	1.62
Strasbourg	1.3
Swift Current	1.22
Uranium City	1.7
Weyburn	1.54
Yorkton	1.62
Manitoba	
Beausejour	1.8
Boissevain	1.96

Province and Location	Snow Load, kPa, 1/50, 2020 NBC
Brandon	1.88
Churchill	2.6
Dauphin	1.72
Flin Flon	1.96
Gimli	1.72
Island Lake	2.28
Lac du Bonnet	1.72
Lynn Lake	2.12
Morden	1.96
Neepawa	1.96
Pine Falls	1.72
Portage la Prairie	1.88
Rivers	1.88
Sandilands	1.96
Selkirk	1.72
Split Lake	2.2
Steinbach	1.8
Swan River	1.8
The Pas	1.96
Thompson	2.12
Virden	1.8
Winnipeg	1.72
New Brunswick	
Alma	2.68
Bathurst	3.88
Boiestown	3.48
Campbellton	3.84
Edmundston	3.32
Fredericton	3.08
Gagetown	2.84
Grand Falls	3.48
Miramichi	3.32
Moncton	3
Oromocto	3
Sackville	2.6
Saint Andrews	2.84
Saint John	2.84
Shippagan	2.44
St. George	3.32
St. Stephen	2.92
Woodstock	3.08
Nova Scotia	
Amherst	2.52
Antigonish	2.44
Bridgewater	2.12



Note: Values are provided only to be used with V-ROD below-grade wall design tables.


Appendix B: Roof Snow loads, kPa, 1/50, No Snow Accumulation ($C_s \leq 1.0$)

Province and Location	Snow Load, kPa, 1/50, 2020 NBC
Canso	1.96
Debert	1.88
Digby	2.28
Greenwood (CFB)	2.36
Halifax Region (Dartmouth)	2.76
Halifax Region (Halifax)	2.12
Kentville	2.68
Liverpool	1.96
Lockeport	1.72
Louisbourg	2.38
Lunenburg	2.12
New Glasgow	2.36
North Sydney	2.52
Pictou	2.36
Port Hawkesbury	2.28
Springhill	3.08
Stewiacke	2.04
Sydney	2.44
Tatamagouche	2.36
Truro	2.2
Wolfville	2.68
Yarmouth	2.04
Prince Edward Island	
Charlottetown	2.76
Souris	2.76
Summerside	3.08
Tignish	3.16
Newfoundland and Labrador	
Argentia	2.62
Bonavista	3.08
Buchans	4.36
Cape Harrison	5.44
Cape Race	2.54
Channel-Port aux Basques	3.58
Corner Brook	3.56
Gander	3.56
Grand Bank	2.62
Grand Falls	3.32
Happy Valley-Goose Bay	4.64
Labrador City	4.14
St. Anthony	5.48
Stephenville	3.02
St. John's	3.88
Twin Falls	4.24

Province and Location	Snow Load, kPa, 1/50, 2020 NBC
Wabana	3.1
Wabush	4.14
Yukon	
Aishihik	1.62
Dawson	2.42
Destruction Bay	1.62
Faro	1.94
Haines Junction	1.86
Snag	1.86
Teslin	2.5
Watson Lake	2.66
Whitehorse	1.7
Northwest Territories	
Aklavik	2.34
Behchokq̃ / Rae-Edzo	2.5
Echo Bay / Port Radium	2.42
Fort Good Hope	2.66
Fort McPherson	2.02
Fort Providence	1.94
Fort Resolution	1.94
Fort Simpson	2.04
Fort Smith	2.02
Hay River	2.58
Inuvik	1.3
Mould Bay	2.5
Norman Wells	1.94
Tungsten	3.54
Ulukhaktok / Holman	1.78
Wrigley	2.34
Yellowknife	1.86
Nunavut	
Alert	2.18
Arctic Bay	2.02
Arviat	2.6
Baker Lake	2.92
Eureka	1.38
Igluligaarjuk / Chesterfield Inlet	3.08
Iqaluit	2.52
Iqaluktuuttiaq / Cambridge Bay	1.62
Isachsen	1.62
Kangiqiniq / Rankin Inlet	2.6
Kanngiqitugaapik / Clyde River	3.56



Note: Values are provided only to be used with V-ROD below-grade wall design tables.


Appendix B: Roof Snow loads, kPa, 1/50, No Snow Accumulation ($C_s \leq 1.0$)

Province and Location	Snow Load, kPa, 1/50, 2020 NBC
Kugluktuk / Coppermine	2.82
Nottingham Island	3.96
Resolute	1.7
Resolution Island	4.6
Salliq / Coral Harbour	3.24



Note: Values are provided only to be used with V-ROD below-grade wall design tables.



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