

Appendix B – Wall Engineering

B1.0 – Canada

Currently we have two main engineering resources for walls to be constructed with Amvic ICF.

1. **CCMC report no. 13043-R** which can be used as a reference for all Canadian provinces.
2. **National Building Code of Canada 2005 (NBC 2005)** upon which the individual provincial building codes of Canada's provinces are based.

Reinforced or plain concrete walls to be constructed using Amvic ICF and which are outside the applicability limits of **CCMC 13043-R** and **NBC 2005** shall be designed and approved by a local licensed/registered engineer.

B1.1 – CCMC 13043-R

This report can be used and is recognized by most building departments of local cities, throughout Canada. Since at the time of printing this manual the provincial building code models have not had time to adopt or adapt to the new NBC 2005, this report will remain an essential engineering resource that can readily be used.

The report is available upon request and can be either downloaded from the Amvic website or from **Canadian Construction Material Centre** website as given below:

www.irc.nrc-cnrc.gc.ca/ccmc/regprodeval_e.shtml

B1.2 – National Building Code of Canada 2005

The following articles and/or tables are reproduced from NBC 2005 and will have the specific NBC 2005 reference from which they were obtained.

B1.2.1 – Application

All information given under section **B1.2** is applicable to structures which fall under **Part 9 Housing and Small Buildings of NBC 2005**.



B1.2.2 – Materials

1. Concrete

- a) [NBC 2005 - 9.3.1.1 (4)] For flat insulating concrete form walls not exceeding 2 storeys and having a maximum floor to floor height of 3m, in buildings of light frame construction containing only a single dwelling unit, the concrete and reinforcing shall comply with Part 4 or :

CAN/CSA-A23.1 “Concrete Materials and Methods of Concrete Construction” and maximum aggregate size of 19mm

- b) [NBC 2005 – 9.3.1.6 (1)] Compressive strength of un-reinforced concrete after 28 days shall be not less than **15 MPa** for walls, columns, fireplaces and chimneys, footings, foundation walls, grade beams and piers

2. Reinforcing Steel

[NBC 2005 – 9.3.1.1 (4)] Reinforcing shall:

- a) Conform to **CAN/CSA-G30.18-M** “Billet-Steel Bars for Concrete Reinforcement”
- b) Have a minimum Specified yield strength of **400 MPa**, and
- c) Be lapped a minimum of 450 mm for 10M bars and 650 mm for 15M bars

B1.2.3 – Footings and Foundations

B1.2.3.1 – Application

The articles and/or tables given in section B1.2.3 applies to:

[NBC 2005 – 9.15.1.1 (C)] Flat insulating concrete form foundation walls and concrete footings not subject to surcharge and:

- i) on stable soils with an allowable bearing pressure of 100 KPa (2000 lbs/sq.ft) or greater
- ii) for buildings of light frame or flat insulating concrete form construction that are not more than 2 storeys in building height, with a maximum floor to floor height of 3m, and containing only a single dwelling unit.



[NBC 2005 – 9.15.3.3] Minimum footing width shall apply to footings where

- a) the footings support
 - i) foundation walls of masonry, concrete or flat insulating concrete form walls
 - ii) above-ground walls of masonry, flat insulating concrete form walls or light wood frame construction and
 - iii) floors and roofs of light wood frame construction
- b) The span of supported joists does not exceed 4.9m, and
- c) The specified live load on any floor supported by the footing does not exceed 2.4 KPa.

B1.2.3.2 – Minimum Footing Sizes

Footing Width

NBC 2005 - Table 9.15.3.4
Minimum Footing Sizes

No. of Floors Supported	Minimum Width of Strip Footings, mm		Minimum Footing Area for Columns Spaced 3m o.c.
	Supporting Exterior Walls (*1)	Supporting Interior Walls (*2)	
1	250	200	0.4
2	350	350	0.75
3	450	500	1.0

(*1) Adjustments to Footing Widths for Exterior Walls

[NBC 2005 – 9.15.3.5] The strip footing for exterior walls shown in table 9.15.3.4 shall be increased by

- a) 65 mm for each storey of masonry veneer over wood-frame construction supported by the foundation wall,
- b) 130 mm for each storey of masonry construction supported by the foundation wall, and
- c) 150 mm for each storey of flat insulating concrete form wall construction supported by the foundation wall

(*2) Adjustments to Footing Widths for Interior Walls

[NBC 2005 – 9.15.3.6 (1)] The minimum strip footing widths for interior load-bearing masonry walls shown in Table 9.15.3.4 shall be increased by 100 mm for each storey of masonry construction supported by the footing.



[NBC 2005 – 9.15.3.6 (2)] Footings for interior non-loadbearing masonry walls shall be not less than 200 mm wide for walls up to 5.5 m high and the widths shall be increased by 100 mm for each additional 2.7 m of height.

Footing Thickness

[NBC 2005 – 9.15.3.8] Footing thickness shall be not less than the greater of

- a) 100 mm, or
- b) the width of the projection of the footing beyond the supported element

B1.2.4 – Foundation Walls

B1.2.4.1 – Application

Application of the articles and/or tables given in section B1.2.4 is subject to the following conditions:

1. [NBC 2005 – 9.15.4.1 (1)] Insulating concrete form units shall be manufactured of polystyrene conforming to the performance requirements of CAN/ULC-S701 “Thermal Insulation Polystyrene, Boards and Pipe Covering” for type 2, 3 or 4 polystyrene.
2. [NBC 2005 – 9.15.4.2 (2)] The thickness of concrete in flat insulating concrete form foundation walls shall be not less than the greater of
 - a) 140 mm, or
 - b) the thickness of the concrete in the wall above
3. [NBC 2005 – 9.15.4.2 (3)] Foundation walls made of flat insulating concrete form units shall be laterally supported at the top and at the bottom. Please refer to articles 9.15.4.3 and 9.15.4.4 for determining bottom and top lateral support of walls.



B1.2.4.2 – Reinforcement for Flat Insulating Concrete Form Foundation Walls

Horizontal Reinforcement

[NBC 2005 – 9.15.4.5 (1)] Horizontal reinforcement in flat insulating concrete form foundation walls shall

- a) consist of
 - ii) one 10M bar placed not more than 300 mm from the top of the wall, and
 - ii) 10M bars at 600 mm o.c. and
- b) be located
 - i) in the inside half of the wall section and
 - ii) with a minimum cover of 30 mm from the inside face of the concrete

Vertical Reinforcement

[NBC 2005 – 9.15.4.5 (2)] Vertical reinforcement in flat insulating concrete form foundation walls shall be

- a) provided in accordance with
 - i) **Table 9.15.4.5.A for 140 mm walls [use for 6 inch (152 mm) Amvic forms]**
 - ii) **Table 9.15.4.5.B for 190 mm walls [use for 8 inch (203 mm) Amvic forms]**
 - iii) **Table 9.15.4.5.C for 240 mm walls [use for 10 inch (254 mm) Amvic forms]**
- b) located in the inside half of the wall section with a minimum cover of 30 mm from the inside face of the concrete wall, and
- c) where interrupted by wall openings, placed not more than 600 mm from each side of the openings



Table 9.15.4.5.A
Vertical Reinforcement for 140 mm Flat Insulating Concrete Foundation Walls
[Amvic 6 inch (152 mm) Forms]

Max. Height of Finished Ground Above Finished Basement Floor, M	Minimum Vertical Reinforcement		
	Maximum Unsupported Basement Wall Height		
	2.44 m	2.75 m	3.0 m
1.35	10M at 400 mm o.c.	10M at 400 mm o.c.	10M at 400 mm o.c.
1.6	10M at 400 mm o.c.	10M at 380 mm o.c.	10M at 380 mm o.c.
2	10M at 380 mm o.c.	10M at 380 mm o.c.	10M at 380 mm o.c.
2.2	10M at 250 mm o.c.	10M at 250 mm o.c.	10M at 250 mm o.c.
2.35	n/a	10M at 250 mm o.c.	10M at 250 mm o.c.
2.6	n/a	10M at 250 mm o.c.	10M at 250 mm o.c.
3	n/a	n/a	10M at 250 mm o.c.

NBC 2005 - Table 9.15.4.5.B
Vertical Reinforcement for 190 mm Flat Insulating Concrete Foundation Walls
[Amvic 8 inch (203 mm) Forms]

Max. Height of Finished Ground Above Finished Basement Floor, m	Minimum Vertical Reinforcement		
	Maximum Unsupported Basement Wall Height		
	2.44 m	2.75 m	3.0 m
2.2	Not required	10M at 400 mm o.c.	10M at 400 mm o.c.
2.35	n/a	10M at 300 mm o.c.	10M at 300 mm o.c.
2.6	n/a	10M at 300 mm o.c.	10M at 400 mm o.c.
3	n/a	n/a	10M at 400 mm o.c.

NBC 2005 - Table 9.15.4.5.C
Vertical Reinforcement for 240 mm Flat Insulating Concrete Foundation Walls
[Amvic 10 inch (254 mm) Forms]

Max. Height of Finished Ground Above Finished Basement Floor, m	Minimum Vertical Reinforcement		
	Maximum Unsupported Basement Wall Height		
	2.44 m	2.75 m	3.0 m
2.2	Not required	10M at 400 mm o.c.	10M at 400 mm o.c.
2.35	n/a	10M at 300 mm o.c.	10M at 300 mm o.c.
2.6	n/a	10M at 300 mm o.c.	10M at 400 mm o.c.
3	n/a	n/a	10M at 400 mm o.c.

[NBC 2005 -9.15.4.5 (3)] Cold joints in flat insulating concrete form foundation walls shall be reinforced with no less than one 15M bar spaced at not more than 600 mm o.c. and embedded 300 mm on both sides of the joint.



B1.2.5 – Above Grade Walls

B1.2.5.1 – Application

The articles and/or tables given in section B1.2.5 applies to:

[NBC 2005 – 9.20.1.1 (1) (B)] Flat insulating concrete form walls not in contact with the ground that;

- i) have a maximum floor to floor height of 3m,
- ii) are erected in buildings not more than 2 storeys in building height and containing only a single dwelling unit, and
- iii) are erected in locations where the seismic spectral response accelerations, $S_a(0.2)$, is not greater than 0.4

B1.2.5.2 – Thickness for Flat Insulating Concrete Form Walls

[NBC 2005 - 9.20.17.1 (1)] The thickness of the concrete in flat insulating concrete form walls not in contact with the ground shall be

- a) not less than 140 mm, and
- b) constant for the entire height of the wall

B1.2.5.3 – Reinforcement for Flat Insulating Concrete Form Walls

Horizontal Reinforcement

[NBC 2005 – 9.20.17.2 (1)] Horizontal reinforcement in above-grade flat insulating concrete form walls shall

- a) consist of
 - i) one 10M bar placed not more than 300 mm from the top of the wall, and
 - ii) 10M bars at 600 mm o.c. and
- b) be placed in the middle third of the wall section



Vertical Reinforcement

[NBC 2005 – 9.20.17.2 (2)] Vertical reinforcement in above-grade flat insulating concrete form walls shall

- a) consist of 10M bars at 400 mm o.c. and
- b) be placed in the middle third of the wall section

[NBC 2005 – 9.20.17.2 (3)] Vertical reinforcement required by above sentence and interrupted by wall openings shall be placed not more than 600 mm from each side of the opening.

B1.2.5.4 – Openings in Non-Loadbearing Flat ICF walls

[NBC 2005 – 9.20.17.3]

1. No openings shall occur within 1200 mm of interior and exterior corners of exterior non-load-bearing flat ICF walls
2. Portions of walls above openings in non-load-bearing flat ICF walls shall have a minimum depth of concrete of no less than 200 mm across the width of the opening.
3. Openings that are more than 600 mm but not more than 3000 mm in width in non-load-bearing flat ICF walls shall be reinforced at the top and bottom with one 10M bar.
4. Openings more than 3000 mm in width in non-load-bearing flat ICF walls shall be reinforced on all four sides with two 10M bars.
5. Reinforcing bars described in sentences (3) and (4) shall extend 600 mm beyond the edges of the opening.
6. The cumulative width of openings in non-load-bearing flat ICF walls shall not make up more than 70% of the length of any wall.

B1.2.5.5 – Lintels over Openings in Load-bearing Flat ICF walls

[NBC 2005 – 9.20.17.4]

1. In load-bearing flat ICF walls, lintels shall be provided over all openings wider than 900 mm.
2. Lintels described in above sentence over openings wider than 1200 mm shall be reinforced for shear with 10M stirrups at a maximum spacing of half the distance from the bottom reinforcing bar to the top of the lintel.



B1.2.5.6 – Framing Supported on Flat ICF walls

[NBC 2005 – 9.20.71.5]

1. Floor joists supported on the side of flat insulating concrete from walls shall be supported with joist hangers secured to wood ledger boards.
2. The ledger boards referred to in above sentence shall be not less than
 - a) 38 mm thick, and
 - b) the depth of the floor joists
3. Anchor bolts shall be used to secure ledger boards to flat ICF walls and shall be
 - a) embedded in the wall to a depth not less than 100 mm, and
 - b) spaced in accordance with table 9.20.17.5 (below)

NBC 2005 - Table 9.20.17.5
Maximum Anchor Bolt Spacing for the Connection of Floor Ledgers to Flat ICF walls

Maximum Clear Floor Span, m	Maximum Anchor Bolt Spacing, mm	
	Staggerred 12.7 mm Diameter Anchor Bolts	Staggerred 16 mm Diameter Anchor Bolts
2.44	450	500
3.0	400	450
4.0	300	400
5.0	275	325

B1.2.5.7 – Anchoring of Roof Framing to Top Of Flat ICF walls

[NBC 2005 – 9.20.17.6]

1. Roof framing supported on the top of flat ICF walls shall be fixed to the top plates, which shall be anchored to the wall with anchor bolts
 - a) not less than 12.7 mm in diameter, and
 - b) spaced at not more than 1200 mm o.c
2. The anchor bolts described in above sentence shall be placed in the centre of the flat ICF wall and shall be embedded no less than 100 mm into the concrete.



B2.0 – USA

There are two main resources for the engineering of flat ICF walls in the United States:

1. **Prescriptive Method for Insulating Concrete Forms in Residential Construction** prepared by NAHB (National Association of Home Builders) and PCA (Portland Cement Association). This document is widely recognized across most of the states, and is stated in the Amvic ICC (International Code Council) legacy report ESR-1269 as an approved engineering source.
2. **ACI 318 “Building Code Requirements for Structural Concrete”** is used for walls which are outside the scope and applicability limits of the Prescriptive Method. A local licensed/registered engineer is required to approve the design using this resource.

B2.1 – Prescriptive Method

The prescriptive method book can be downloaded online from the following link:

www.huduser.org/publications/destech/icf_2ed.html

The articles and/or tables contained herein are reproduced from the prescriptive method and each will have the specific reference from which they were obtained.

B2.1.1 – Scope

[Prescriptive Method 1.3]

1. The provisions of the *Prescriptive Method* apply to the construction of detached one- and two-family homes, townhouses, and other attached single-family dwellings in compliance with the general limitations of Table 1.1 (below).



Prescriptive Method - TABLE 1.1
APPLICABILITY LIMITS

ATTRIBUTE	MAXIMUM LIMITATION
General	
Number of Stories	2 stories above grade plus a basement
Design Wind Speed	150 mph (241 km/hr) 3-second gust (130 mph (209 km/hr) fastest-mile)
Ground Snow Load	70 psf (3.4 kPa)
Seismic Design Category	A, B, C, D1, and D2 (Seismic Zones 0, 1, 2, 3, and 4)
Foundations	
Unbalanced Backfill Height	9 feet (2.7 m)
Equivalent Fluid Density of Soil	60 pcf (960 kg/m ³)
Presumptive Soil Bearing Value	2,000 psf (96 kPa)
Walls	
Unit Weight of Concrete	150 pcf (23.6 kN/m ³)
Wall Height (unsupported)	10 feet (3 m)
Floors	
Floor Dead Load	15 psf (0.72 kPa)
First-Floor Live Load	40 psf (1.9 kPa)
Second-Floor Live Load (sleeping rooms)	30 psf (1.4 kPa)
Floor Clear Span (unsupported)	32 feet (9.8 m)
Roofs	
Maximum Roof Slope	12:12
Roof and Ceiling Dead Load	15 psf (0.72 kPa)
Roof Live Load (ground snow load)	70 psf (3.4 kPa)
Attic Live Load	20 psf (0.96 kPa)
Roof Clear Span (unsupported)	40 feet (12 m)

For SI: 1 foot = 0.3048 m; 1 psf = 47.8804 Pa; 1 pcf = 157.0877 N/m³ = 16.0179 kg/m³; 1 mph = 1.6093 km/hr

- An engineered design shall be required for houses built along the immediate, hurricane-prone coastline subjected to storm surge (i.e., beach front property) or in near-fault seismic hazard conditions (i.e., Seismic Design Category E).
- The provisions of the *Prescriptive Method* shall not apply to irregular structures or portions of structures in Seismic Design Categories C, D1, and D2.



B2.1.2 – Material Specifications

ICF Size

[Prescriptive Method 2.1.1]

1. Flat ICF wall systems shall have a minimum concrete thickness of 5.5 inches (140 mm) for basement walls and 3.5 inches (89 mm) for above-grade walls.

Concrete Slump

[Prescriptive Method 2.2.1]

Ready-mixed concrete for ICF walls shall meet the requirements of ASTM C 94 [13]. Maximum slump shall not be greater than 6 inches (152 mm) as determined in accordance with ASTM C 143 [11]. Maximum aggregate size shall not be larger than 3/4 inch (19 mm).

Exception: Maximum slump requirements may be exceeded for approved concrete mixtures resistant to segregation, meeting the concrete compressive strength requirements, and in accordance with the ICF manufacturer's recommendations.

Concrete Compressive Strength

[Prescriptive Method 2.2.2]

1. The minimum specified compressive strength of concrete, f_c' , shall be 2,500 psi (17.2 MPa) at 28 days as determined in accordance with ASTM C 31 [8] and ASTM C 39 [9].
2. For Seismic Design Categories D₁ and D₂, the minimum compressive strength of concrete, f_c' , shall be 3,000 psi.

Reinforcing Steel

[Prescriptive Method 2.2.3]

1. Reinforcing steel used in ICFs shall meet the requirements of ASTM A 615 [14], ASTM A 996 [15], or ASTM A 706 [16].
2. In Seismic Design Categories D₁ and D₂, reinforcing steel shall meet the requirements of ASTM A706 [16] for low-alloy steel.



3. The minimum yield strength of the reinforcing steel shall be 40,000 psi, Grade 40 (300 MPa) except in Seismic Design Categories D1 and D2 where reinforcing steel shall have a minimum yield strength of 60,000 psi (Grade 60) (414 MPa).
4. Steel reinforcement shall have a minimum 3/4-inch (19mm) concrete cover.

EPS Materials

[Prescriptive Method 2.3]

1. Insulating concrete forms shall be constructed of rigid foam plastic meeting the requirements of ASTM C 578 [17].
2. Flame-spread rating of ICF forms that remain in place shall be less than 75 and smoke-development rating of such forms shall be less than 450, tested in accordance with ASTM E 84.



B2.1.3 – Footings

[Prescriptive Method 3.1]

1. Minimum sizes for concrete footings shall be as set forth in Table 3.1 (below)

**Prescriptive Method - TABLE 3.1
APPLICABILITY LIMITS
FOOTINGS FOR ICF WALLS^{1,2,3} (Inches)**

Maximum Number of Storeys ⁴	MINIMUM LOAD BEARING VALUE OF SOIL (psf)				
	2,000	2,500	3,000	3,500	4,000
5.5 Inch Flat, 6-Inch Waffle Grid, or 6 Inch Screen Grid ICF Wall Thickness⁵					
One Storey ⁶	15	12	10	9	8
Two Storey ⁶	20	16	13	12	10
7.5-Inch Flat or 8-Inch Waffle-Grid, or 8-Inch Screen-Grid ICF Wall Thickness⁵					
One Storey ⁷	18	14	12	10	8
Two Storey ⁷	24	19	16	14	12
9.5-Inch Flat ICF Wall Thickness⁵					
One Storey	20	16	13	11	10
Two Storey	27	22	18	15	14

For SI: 1 foot = 0.3048 m; 1 inch = 25.4 mm; 1 psf = 47.8804 Pa

1-Minimum footing thickness shall be the greater of one-third of the footing width, 6 inches (152 mm), or 11 inches (279 mm) when a dowel is required in accordance with Section 6.0.

2-Footings shall have a width that allows for a nominal 2-inch (51-mm) projection from either face of the concrete in the wall to the edge of the footing.

3-Table values are based on 32 ft (9.8 m) building width (floor and roof clear span).

4-Basement walls shall not be considered as a story in determining footing widths.

5-Actual thickness is shown for flat walls while nominal thickness is given for waffle- and screen-grid walls. Refer to Section 2.0 for actual waffle- and screen-grid thickness and dimensions.

6-Applicable also for 7.5-inch (191-mm) thick or 9.5-inch (241-mm) thick flat ICF foundation wall supporting 3.5-inch (88.9-mm) thick flat ICF stories.

7-Applicable also for 9.5-inch (241-mm) thick flat ICF foundation wall story supporting 5.5-inch (140-mm) thick flat ICF stories.

2. Foundations erected on soils with a bearing value of less than 2,000 psf (96 KPa) shall be designed in accordance with accepted engineering practice.



B2.1.3.1 – ICF Foundation Wall-to-Footing Connection

[Prescriptive Method – 6.1]

1. No vertical reinforcement (i.e. dowels) across the joint between the foundation wall and the footing is required when one of the following exists:
 - The unbalanced backfill height does not exceed 4 feet (1.2 m)
 - The interior floor slab is installed in accordance with Figure 3.3 before backfilling.
 - Temporary bracing at the bottom of the foundation wall is erected before backfilling and remains in place during construction until an interior floor slab is installed in accordance with Figure 3.3 or the wall is backfilled on both sides (i.e. stem wall).
2. For foundation walls that do not meet one of the above requirements, vertical reinforcement (i.e. dowel) shall be installed across the joint between the foundation wall and the footing at 48 inches (1.2 m) on center in accordance with Figure 6.1.
3. Vertical reinforcement (i.e. dowels) shall be provided for all foundation walls for buildings located in regions with 3 second gust design wind speeds greater than 130 mph (209 km/hr) or located in Seismic Design Categories D1 and D2 at 18 inches (457 mm) on center.

Exception: The foundation wall's vertical wall reinforcement at intervals of 4 feet (1.2 m) on center shall extend 8 inches (203 mm) into the footing in lieu of using a dowel as shown in Figure 6.1.

B2.1.4 – Foundation Wall Requirements

Crawlspace Walls

[Prescriptive Method – 3.2.2]

Applicable to walls 5 feet (1.5m) or less in height with a maximum unbalanced backfill height of 4 feet (1.2m) for a one-storey construction with floor bearing on top of crawlspace wall.

1. ICF crawlspace walls shall be laterally supported at the top and bottom of the wall in accordance with Section 6.0.
2. A minimum of one horizontal no. 4 bar shall be placed within 12 inches (305mm) of the top of the crawlspace wall.



3. Vertical reinforcement shall be as per table 3.2 (below). For crawlspace walls carrying ICF wall on top, vertical reinforcement shall be the greater of that required in table 3.2 or table 4.2 in the following section

**Prescriptive Method - TABLE 3.2
MINIMUM VERTICAL WALL REINFORCEMENT FOR
ICF CRAWLSPACE WALLS^{1,2,3,4,5,6}**

SHAPE OF CONCRETE WALLS	WALL THICKNESS ⁷ (inches)	MINIMUM VERTICAL REINFORCEMENT		
		MAXIMUM EQUIVALENT FLUID DENSITY 30 pcf	MAXIMUM EQUIVALENT FLUID DENSITY 45 pcf	MAXIMUM EQUIVALENT FLUID DENSITY 60 pcf
Flat	3.5 ⁸	#3 @ 16"; #4 @ 32"	#3 @ 18"; #4 @ 28"; #5 @ 38"	#3 @ 12"; #4 @ 22"; #5 @ 28"
	5.5	#3 @ 24"; #4 @ 48"	#3 @ 24"; #4 @ 48"	#3 @ 24"; #4 @ 48"
	7.5	N/R	N/R	N/R

For SI: 1 foot = 0.3048 m; 1 inch = 25.4 mm; 1 pcf = 16.0179 kg/m³

- 1 - Table values are based on reinforcing bars with a minimum yield strength of 40,000 psi (276 MPa) and concrete with a minimum specified compressive strength of 2,500 psi (17.2 MPa).
- 2 - N/R indicates no vertical wall reinforcement is required.
- 3 - Spacing of rebar shall be permitted to be multiplied by 1.5 when reinforcing steel with a minimum yield strength of 60,000 psi (414 MPa) is used. Reinforcement, when required, shall not be less than one #4 bar at 48 inches (1.2 m) on center.
- 4 - Applicable only to crawlspace walls 5 feet (1.5 m) or less in height with a maximum unbalanced backfill height of 4 feet (1.2 m).
- 5 - Interpolation shall not be permitted.
- 6 - Walls shall be laterally supported at the top before backfilling.
- 7 - Actual thickness is shown for flat walls while nominal thickness is given for waffle-and screen-grid walls. Refer to Section 2.0 for actual waffle- and screen-grid thickness and dimensions.
- 8 - Applicable only to one-story construction with floor bearing on top of crawlspace wall.



Basement Walls

[Prescriptive Method – 3.2.3]

1. Basement walls shall be laterally supported at the top and bottom of the wall in accordance with section 6.0.
2. Minimum horizontal reinforcement shall be as per table 3.3 (below)

**Prescriptive Method - TABLE 3.3
MINIMUM HORIZONTAL WALL REINFORCEMENT FOR
ICF BASEMENT WALLS**

MAXIMUM HEIGHT OF BASEMENT WALL FEET (METERS)	LOCATION OF HORIZONTAL REINFORCEMENT
8 (2.4)	One No.4 bar within 12 inches (305 mm) of the top of the wall storey and one No.4 bar near mid-height of the wall storey
9 (2.7)	One No.4 bar within 12 inches (305 mm) of the top of the wall storey and one No.4 bar near third points in the wall storey
10 (3.0)	One No.4 bar within 12 inches (305 mm) of the top of the wall storey and one No.4 bar near third points in the wall storey

For SI: 1 foot = 0.3048 m; 1 inch = 25.4 mm; 1 pcf = 16.0179 kg/m³

Horizontal reinforcement requirements are for reinforcing bars with a minimum yield strength from 40,000 psi (276 MPa) and concrete with a minimum concrete compressive strength of 2,500 psi (17.2 Mpa)

3. Vertical wall reinforcement shall be as per the following tables:
 - a) Prescriptive Method Table 3.4 – For use with Amvic 6 inch (152 mm) basement walls.
 - b) Prescriptive Method Table 3.5 – For use with Amvic 8 inch (203 mm) basement walls.
 - c) Prescriptive Method Table 3.6 – For use with Amvic 10 inch (254 mm) basement walls.



**Prescriptive Method - TABLE 3.4
MINIMUM VERTICAL WALL REINFORCEMENT FOR
5.5 inch (140 mm) THICK FLAT ICF BASEMENT WALLS ^{1,2,3,4,5}**

MAX WALL HEIGHT (feet)	MAXIMUM UNBALANCED BACKFILL HEIGHT ⁶ (feet)	MINIMUM VERTICAL REINFORCEMENT		
		MAXIMUM EQUIVALENT FLUID DENSITY 30 pcf	MAXIMUM EQUIVALENT FLUID DENSITY 45 pcf	MAXIMUM EQUIVALENT FLUID DENSITY 60 pcf
8	4	#4@48"	#4@48"	#4@48"
	5	#4@48"	#3@12"; #4@22"; #5@32"; #6@40"	#3@8"; #4@14"; #5@20"; #6@26"
	6	#3@12"; #4@22"; #5@30"; #6@40"	#3@8"; #4@14"; #5@20"; #6@24"	#3@6"; #4@10"; #5@14"; #6@20"
	7	#3@8"; #4@14"; #5@22"; #6@26"	#3@5"; #4@10"; #5@14"; #6@18"	#3@4"; #4@6"; #5@10"; #6@14"
9	4	#4@48"	#4@48"	#4@48"
	5	#4@48"	#3@12"; #4@20"; #5@28"; #6@36"	#3@8"; #4@14"; #5@20"; #6@22"
	6	#3@10"; #4@20"; #5@28"; #6@34"	#3@6"; #4@12"; #5@18"; #6@20"	#4@8"; #5@14"; #6@16"
	7	#3@8"; #4@14"; #5@20"; #6@22"	#4@8"; #5@12"; #6@16"	#4@6"; #5@10"; #6@12"
	8	#3@6"; #4@10"; #5@14"; #6@16"	#4@6"; #5@10"; #6@12"	#4@4"; #5@6"; #6@8"
10	4	#4@48"	#4@48"	#4@48"
	5	#4@48"	#3@10"; #4@18"; #5@26"; #6@30"	#3@6"; #4@14"; #5@18"; #6@20"
	6	#3@10"; #4@18"; #5@24"; #6@30"	#3@6"; #4@12"; #5@16"; #6@18"	#3@4"; #4@8"; #5@12"; #6@14"
	7	#3@6"; #4@12"; #5@16"; #6@18"	#3@4"; #4@8"; #5@12"	#4@6"; #5@8"; #6@10"
	8	#3@4"; #4@8"; #5@12"; #6@14"	#4@6"; #5@8"; #6@12"	#4@4"; #5@6"; #6@8"
	9	#3@4"; #4@6"; #5@10"; #6@12"	#4@4"; #5@6"; #6@8"	#5@4"; #6@6"

For SI: 1 foot = 0.3048 m; 1 inch = 25.4 mm; 1 pcf = 16.0179 kg/m³

- 1 - Table values are based on reinforcing bars with a minimum yield strength of 40,000 psi (276 MPa) and concrete with a minimum specified compressive strength of 2,500 psi (17.2 MPa).
- 2 - Spacing of rebar shall be permitted to be multiplied by 1.5 when reinforcing steel with a minimum yield strength of 60,000 psi (414 MPa) is used. Reinforcement shall not be less than one #4 bar at 48 inches (1.2 m) on center.
- 3 - Deflection criterion is L/240, where L is the height of the basement wall in inches.
- 4 - Interpolation shall not be permitted.
- 5 - Walls shall be laterally supported at the top before backfilling.
- 6 - Refer to Section 1.0 for the definition of unbalanced backfill height.



**Prescriptive Method - TABLE 3.5
MINIMUM VERTICAL WALL REINFORCEMENT FOR
7.5 inch (191 mm) THICK FLAT ICF BASEMENT WALLS ^{1,2,3,4,5,6}**

MAX WALL HEIGHT (feet)	MAXIMUM UNBALANCED BACKFILL HEIGHT ⁷ (feet)	MINIMUM VERTICAL REINFORCEMENT		
		MAXIMUM EQUIVALENT FLUID DENSITY 30 pcf	MAXIMUM EQUIVALENT FLUID DENSITY 45 pcf	MAXIMUM EQUIVALENT FLUID DENSITY 60 pcf
8	4	N/R	N/R	N/R
	5	N/R	N/R	N/R
	6	N/R	N/R	N/R
	7	N/R	#4@14"; #5@20"; #6@28"	#4@10"; #5@16"; #6@20"
9	4	N/R	N/R	N/R
	5	N/R	N/R	N/R
	6	N/R	N/R	#4@14"; #5@20"; #6@28"
	7	N/R	#4@12"; #5@18"; #6@26"	#4@8"; #5@14"; #6@18"
	8	#4@14"; #5@22"; #6@28"	#4@8"; #5@14"; #6@18"	#4@6"; #5@10"; #6@14"
10	4	N/R	N/R	N/R
	5	N/R	N/R	N/R
	6	N/R	N/R	#4@12"; #5@18"; #6@26"
	7	N/R	#4@12"; #5@18"; #6@24"	#4@8"; #5@12"; #6@18"
	8	#4@12"; #5@20"; #6@26"	#4@8"; #5@12"; #6@16"	#4@6"; #5@8"; #6@12"
	9	#4@10"; #5@14"; #6@20"	#4@6"; #5@10"; #6@12"	#4@4"; #5@6"; #6@10"

For SI: 1 foot = 0.3048 m; 1 inch = 25.4 mm; 1 pcf = 16.0179 kg/m³

- 1 - Table values are based on reinforcing bars with a minimum yield strength of 40,000 psi (276 MPa) and concrete with a minimum specified compressive strength of 2,500 psi (17.2 MPa).
- 2 - Spacing of rebar shall be permitted to be multiplied by 1.5 when reinforcing steel with a minimum yield strength of 60,000 psi (414 MPa) is used. Reinforcement, when required, shall not be less than one #4 bar at 48 inches (1.2 m) on center.
- 3 - N/R indicates no reinforcement is required.
- 4 - Deflection criterion is L/240, where L is the height of the basement wall in inches.
- 5 - Interpolation shall not be permitted.
- 6 - Walls shall be laterally supported at the top before backfilling.
- 7 - Refer to Section 1.0 for the definition of unbalanced backfill height.



**Prescriptive Method - TABLE 3.6
MINIMUM VERTICAL WALL REINFORCEMENT FOR
9.5 inch (241 mm) THICK FLAT ICF BASEMENT WALLS ^{1,2,3,4,5,6}**

MAX WALL HEIGHT (feet)	MAXIMUM UNBALANCED BACKFILL HEIGHT ⁷ (feet)	MINIMUM VERTICAL REINFORCEMENT		
		MAXIMUM EQUIVALENT FLUID DENSITY 30 pcf	MAXIMUM EQUIVALENT FLUID DENSITY 45 pcf	MAXIMUM EQUIVALENT FLUID DENSITY 60 pcf
8	4	N/R	N/R	N/R
	5	N/R	N/R	N/R
	6	N/R	N/R	N/R
	7	N/R	N/R	N/R
9	4	N/R	N/R	N/R
	5	N/R	N/R	N/R
	6	N/R	N/R	N/R
	7	N/R	N/R	#4@12"; #5@18"; #6@26"
10	4	N/R	N/R	N/R
	5	N/R	N/R	N/R
	6	N/R	N/R	#4@18"; #5@26"; #6@36"
	7	N/R	N/R	#4@10"; #5@18"; #6@24"
	8	N/R	#4@12"; #5@16"; #6@24"	#4@8"; #5@12"; #6@16"
	9	N/R	#4@8"; #5@12"; #6@18"	#4@6"; #5@10"; #6@12"

For SI: 1 foot = 0.3048 m; 1 inch = 25.4 mm; 1 pcf = 16.0179 kg/m³

- 1 - Table values are based on reinforcing bars with a minimum yield strength of 40,000 psi (276 MPa) and concrete with a minimum specified compressive strength of 2,500 psi (17.2 MPa).
- 2 - Spacing of rebar shall be permitted to be multiplied by 1.5 when reinforcing steel with a minimum yield strength of 60,000 psi (414 MPa) is used. Reinforcement, when required, shall not be less than one #4 bar at 48 inches (1.2 m) on center.
- 3 - N/R indicates no reinforcement is required.
- 4 - Deflection criterion is L/240, where L is the height of the basement wall in inches.
- 5 - Interpolation shall not be permitted.
- 6 - Walls shall be laterally supported at the top before backfilling.
- 7 - Refer to Section 1.0 for the definition of unbalanced backfill height.



Seismic Requirements for Basement Walls

[Prescriptive Method – 3.2.4]

1. Concrete foundation walls supporting above-grade ICF walls in Seismic Design Category C shall be reinforced with minimum No. 5 rebar at 24 inches (610 mm) on center (both ways) or a lesser spacing if required by Tables 3.2 through 3.6
2. Concrete foundation walls supporting above grade ICF walls in Seismic Design Categories D1 and D2 shall be reinforced with minimum No. 5 rebar at a maximum spacing of 18 inches (457 mm) on center (both ways) or a lesser spacing if required by Tables 3.2 through 3.6 and the minimum concrete compressive strength shall be 3,000 psi (20.5 MPa). Vertical reinforcement shall be continuous with ICF above grade wall vertical reinforcement. Alternatively, the reinforcement shall extend a minimum of 40db into the ICF above grade wall, creating a lap-splice with the above-grade wall reinforcement or extend 24 inches (610 mm) terminating with a minimum 90° bend of 6 inches in length.



B2.1.5 – Above Grade Walls

Wind Pressures

[Prescriptive Method – 4.1]

1. Design Wind pressures of table 4.1 (below) shall be used to determine the vertical wall reinforcement requirements.

**Prescriptive Method - TABLE 4.1
DESIGN WIND PRESSURE FOR USE WITH MINIMUM VERTICAL WALL REINFORCEMENT
TABLES FOR ABOVE GRADE WALLS¹**

WIND SPEED (mph)	DESIGN WIND PRESSURE (psf)					
	ENCLOSED ²			PARTIALLY ENCLOSED		
	Exposure ³			Exposure ³		
	B	C	D	B	C	D
85	18	24	29	23	31	37
90	20	27	32	25	35	41
100	24	34	39	31	43	51
110	29	41	48	38	52	61
120	35	48	57	45	62	73
130	41	56	66	53	73	85 ⁴
140	47	65	77	61	84 ⁴	99 ⁴
150	54	75	88 ⁴	70	96 ⁴	114 ⁴

For SI: 1 psf = 0.0479 kN/m²; 1 mph = 1.6093 km/hr

- 1 - This table is based on ASCE 7-98 components and cladding wind pressures using a mean roof height of 35 ft (10.7 m) and a tributary area of 10 ft² (0.9 m²).
- 2 - Enclosure Classifications are as defined in Section 1.5.
- 3 - Exposure Categories are as defined in Section 1.5.
- 4 - For wind pressures greater than 80 psf (3.8 kN/m²), design is required in accordance with accepted practice and approved manufacturer guidelines.

2. If relying on fastest mile speed maps or design provisions based on fastest wind speeds, the designer should convert wind speeds to 3 second gust wind in accordance with Table C1.1 for use with the given tables in this section.

**Prescriptive Method - TABLE C1.1
WIND SPEED CONVERSIONS**

Fastest Mile (mph)	70	75	80	90	100	110	120	130
3-second Gust (mph)	85	90	100	110	120	130	140	150



**Prescriptive Method - TABLE 4.2
MINIMUM VERTICAL WALL REINFORCEMENT
FOR FLAT ICF ABOVE-GRADE WALLS^{1,2,3}**

DESIGN WIND PRESSURE (TABLE 4.1) (psf)	MAXIMUM WALL HEIGHT PER STORY (feet)	MINIMUM VERTICAL REINFORCEMENT ^{4,5}					
		SUPPORTING ROOF OR NON-LOAD-BEARING WALL		SUPPORTING LIGHT FRAME SECOND STORY AND ROOF		SUPPORTING ICF SECOND STORY AND LIGHT FRAME ROOF	
		MINIMUM WALL THICKNESS (inches)					
		3.5	5.5	3.5	5.5	3.5	5.5
20	8	#4 @ 48"	#4 @ 48"	#4 @ 48"	#4 @ 48"	#4 @ 48"	#4 @ 48"
	9	#4 @ 48"	#4 @ 48"	#4 @ 48"	#4 @ 48"	#4 @ 48"	#4 @ 48"
	10	#4 @ 38"	#4 @ 48"	#4 @ 40"	#4 @ 48"	#4 @ 42"	#4 @ 48"
30	8	#4 @ 42"	#4 @ 48"	#4 @ 46"	#4 @ 48"	#4 @ 48"	#4 @ 48"
	9	#4 @ 32"; #5 @ 48"	#4 @ 48"	#4 @ 34"; #5 @ 48"	#4 @ 48"	#4 @ 34"; #5 @ 48"	#4 @ 48"
	10	Design Required	#4 @ 48"	Design Required	#4 @ 48"	Design Required	#4 @ 48"
40	8	#4 @ 30"; #5 @ 48"	#4 @ 48"	#4 @ 30"; #5 @ 48"	#4 @ 48"	#4 @ 32"; #5 @ 48"	#4 @ 48"
	9	Design Required	#4 @ 42"	Design Required	#4 @ 46"	Design Required	#4 @ 48"
	10	Design Required	#4 @ 32"; #5 @ 48"	Design Required	#4 @ 34"; #5 @ 48"	Design Required	#4 @ 38"
50	8	#4 @ 20"; #5 @ 30"	#4 @ 42"	#4 @ 22"; #5 @ 34"	#4 @ 46"	#4 @ 24"; #5 @ 36"	#4 @ 48"
	9	Design Required	#4 @ 34"; #5 @ 48"	Design Required	#4 @ 34"; #5 @ 48"	Design Required	#4 @ 38"
	10	Design Required	#4 @ 26"; #5 @ 38"	Design Required	#4 @ 26"; #5 @ 38"	Design Required	#4 @ 28"; #5 @ 46"
60	8	Design Required	#4 @ 34"; #5 @ 48"	Design Required	#4 @ 36"	Design Required	#4 @ 40"
	9	Design Required	#4 @ 26"; #5 @ 38"	Design Required	#4 @ 28"; #5 @ 46"	Design Required	#4 @ 34"; #5 @ 48"
	10	Design Required	#4 @ 22"; #5 @ 34"	Design Required	#4 @ 22"; #5 @ 34"	Design Required	#4 @ 26"; #5 @ 38"
70	8	Design Required	#4 @ 28"; #5 @ 46"	Design Required	#4 @ 30"; #5 @ 48"	Design Required	#4 @ 34"; #5 @ 48"
	9	Design Required	#4 @ 22"; #5 @ 34"	Design Required	#4 @ 22"; #5 @ 34"	Design Required	#4 @ 24"; #5 @ 36"
	10	Design Required	#4 @ 16"; #5 @ 26"	Design Required	#4 @ 18"; #5 @ 28"	Design Required	#4 @ 20"; #5 @ 30"
80	8	Design Required	#4 @ 26"; #5 @ 38"	Design Required	#4 @ 26"; #5 @ 38"	Design Required	#4 @ 28"; #5 @ 46"
	9	Design Required	#4 @ 20"; #5 @ 30"	Design Required	#4 @ 20"; #5 @ 30"	Design Required	#4 @ 21"; #5 @ 34"
	10	Design Required	#4 @ 14"; #5 @ 24"	Design Required	#4 @ 14"; #5 @ 24"	Design Required	#4 @ 16"; #5 @ 26"

For SI: 1 foot = 0.3048 m; 1 inch = 25.4 mm; 1 mph = 1.6093 km/hr

1 - This table is based on reinforcing bars with a minimum yield strength of 40,000 psi (276 Mpa) and concrete with a minimum specified compression strength of 2,500 psi (17.2 Mpa)

2 - Deflection criterion is L/240 where L is the height of the wall storey in inches.

3 - Interpolation shall not be permitted.

4 - Reinforcement spacing for 3.5 inch (88.9 mm) walls shall be permitted to be multiplied by 1.6 when reinforcing steel with a minimum yield strength of 60,000 psi (414 Mpa) is used. Reinforcement shall not be less than one #4 bar at 48 inches (1.2m) on center.

5 - Reinforcement spacing for 5.5 inch (139.7 mm) walls shall be permitted to be multiplied by 1.5 when reinforcing steel with a minimum yield strength of 60,000 psi (414 Mpa) is used. Reinforcement shall not be less than one #4 bar at 48 inches (1.2m) on center.

6 - A 3.5 inch wall shall not be permitted if wood ledgers are used to support floor or roof loads.



Above Grade Wall Reinforcement

[Prescriptive Method – 4.1]

1. Horizontal wall reinforcement shall be required in the form of one No. 4 rebar within 12 inches (305 mm) from the top of the wall, one No. 4 rebar within 12 inches (305 mm) from the finish floor, and one No. 4 rebar near one-third points throughout the remainder of the wall.
2. The vertical wall reinforcement shall be as per the Prescriptive Method table 4.2 (below). This table can be used for Amvic 4 inch (100 mm) and 6 inch (152 mm) above grade ICF walls.

Seismic & Wind Requirements

[Prescriptive Method – 4.1]

1. In Seismic Design Category C, the minimum vertical and horizontal reinforcement shall be one No. 5 rebar at 24 inches (610 mm) on center or lesser spacing if required by table 4.2.
2. In Seismic Design Categories D1 and D2, the minimum vertical and horizontal reinforcement shall be one No. 5 rebar at a maximum spacing of 18 inches (457 mm) on center or lesser spacing if required by table 4.2 and the minimum concrete compressive strength shall be 3,000 psi (20.5 MPa).
3. For design wind pressure greater than 40 psf (1.9 kPa) or Seismic Design Category C or greater, all vertical wall reinforcement in the top-most ICF story shall be terminated with a 90 degree bend. The bend shall result in a minimum length of 6 inches (152 mm) parallel to the horizontal wall reinforcement and lie within 4 inches (102 mm) of the top surface of the ICF wall. In addition, horizontal wall reinforcement at exterior building corners shall be terminated with a 90 degree bend resulting in a minimum lap splice length of 40db with the horizontal reinforcement in the intersecting wall. The radius of bends shall not be less than 4 inches (102 mm).



Seismic & Wind Wall Opening Requirements

[Prescriptive Method – 5.1]

1. For minimum amount of solid wall length for different wind pressures, please refer to prescriptive tables 5.1, 5.2A, 5.2B and 5.2C (below).

**Prescriptive Method - TABLE 5.1
WIND VELOCITY PRESSURE FOR DETERMINATION OF MINIMUM
SOLID WALL LENGTH¹**

WIND SPEED (mph)	VELOCITY PRESSURE (psf)		
	Exposure ²		
	B	C	D
85	14	19	23
90	16	21	25
100	19	26	31
110	23	32	37
120	27	38	44
130	32	44	52
140	37	51	60
150	43	59	69 ³

For SI: 1 psf = 0.0479 kN/m²; 1 mph = 1.6093 km/hr

1 - Table values are based on ASCE 7-98 Figure 6-4 wind velocity pressures for low-rise buildings using a mean roof height of 35 ft (10.7 m).

2 - Exposure Categories are as defined in Section 1.5.

3 - Design is required in accordance with acceptable practice and approved manufacturer guidelines.



**Prescriptive Method - TABLE 5.2A
MINIMUM SOLID END WALL
REQUIREMENTS FOR FLAT ICF WALLS
(WIND PERPENDICULAR TO RIDGE)^{1,2,3,4,5}**

DESIGN VELOCITY PRESSURE (psf)			20	25	30	35	40	45	50	60	
WALL CATEGORY	BUILDING SIDE WALL LENGTH, L (feet)	ROOF SLOPE	MINIMUM SOLID WALL LENGTH ON BUILDING END WALL (feet)								
			One-storey or Top Storey of Two-Storey	16	≤ 1:12	4.00	4.00	4.00	4.00	4.00	4.00
5:12	4.00	4.00			4.00	4.00	4.00	4.00	4.00	4.25	4.50
7:12 ⁴	4.00	4.25			4.25	4.50	4.75	4.75	4.75	5.00	5.50
12:12 ⁴	4.25	4.50			4.75	5.00	5.25	5.50	5.50	5.75	6.25
24	≤ 1:12	4.00		4.00	4.00	4.00	4.00	4.00	4.00	4.25	4.50
	5:12	4.00		4.00	4.00	4.25	4.25	4.50	4.50	4.50	4.75
	7:12 ⁴	4.25		4.50	4.75	5.00	5.25	5.50	5.50	5.75	6.25
	12:12 ⁴	4.75		5.00	5.25	5.75	6.00	6.50	6.50	6.75	7.50
32	≤ 1:12	4.00		4.00	4.00	4.00	4.25	4.25	4.50	4.50	4.75
	5:12	4.00		4.00	4.25	4.50	4.50	4.75	4.75	5.00	5.25
	7:12 ⁴	4.50		5.00	5.25	5.50	6.00	6.25	6.25	6.50	7.25
	12:12 ⁴	5.00		5.50	6.00	6.50	7.00	7.25	7.25	7.75	8.75
40	≤ 1:12	4.00		4.00	4.25	4.25	4.50	4.50	4.50	4.75	5.00
	5:12	4.00		4.25	4.50	4.75	4.75	5.00	5.00	5.25	5.50
	7:12 ⁴	4.75		5.25	5.75	6.00	6.50	7.00	7.00	7.25	8.00
	12:12 ⁴	5.50		6.00	6.50	7.25	7.75	8.25	8.25	8.75	10.00
50	≤ 1:12	4.00		4.25	4.25	4.50	4.75	4.75	4.75	5.00	5.50
	5:12	4.25		4.50	4.75	5.00	5.25	5.50	5.50	5.75	6.00
	7:12 ⁴	5.25		5.75	6.25	6.75	7.25	7.75	7.75	8.25	9.25
	12:12 ⁴	6.00		6.75	7.50	8.00	8.75	9.50	9.50	10.25	11.50
60	≤ 1:12	4.00		4.25	4.50	4.75	5.00	5.25	5.25	5.25	5.75
	5:12	4.50		4.75	5.00	5.25	5.50	5.75	5.75	6.00	6.75
	7:12 ⁴	5.50		6.25	6.75	7.50	8.00	8.50	8.50	9.25	10.25
	12:12 ⁴	6.50		7.25	8.25	9.00	9.75	10.50	10.50	11.50	13.00

For SI: 1 foot = 0.3048 m; 1 inch = 25.4 mm; 1 psf = 0.0479 kN/m²

- 1 - Table values are based on reinforcing bars with a minimum yield strength of 40,000 psi (276 MPa) and concrete with a minimum specified compressive strength of 2,500 psi (17.2 MPa).
- 2 - Table values are based on a 3.5 in (88.9 mm) thick flat wall. For a 5.5 in (139.7 mm) thick flat wall, multiply the table values by 0.9. The adjusted values shall not result in solid wall lengths less than 4 ft.
- 3 - Table values are based on a maximum unsupported wall height of 10 ft (3.0 m).
- 4 - Values are based on a 30 foot (9.1 m) building end wall width. For a 45 ft (13.7 m) building end wall and roof pitches greater than 7:12, multiply the table values by 1.2. For a 60 ft (18.3 m) building end wall and roof pitches greater than 7:12, multiply the table values by 1.4.
- 5 - Linear interpolation shall be permitted.



**Prescriptive Method - TABLE 5.2B
MINIMUM SOLID END WALL
REQUIREMENTS FOR FLAT ICF WALLS
(WIND PERPENDICULAR TO RIDGE)^{1,2,3,4,5}**

DESIGN VELOCITY PRESSURE (psf)			20	25	30	35	40	45	50	60
WALL CATEGORY	BUILDING SIDE WALL LENGTH, L (feet)	ROOF SLOPE	MINIMUM SOLID WALL LENGTH ON BUILDING END WALL (feet)							
			First Storey of Two-Storey	16	≤ 1:12	4.00	4.25	4.50	4.75	5.00
5:12	4.50	4.75			5.00	5.25	5.50	5.75	6.00	6.75
7:12 ⁴	4.50	5.00			5.25	5.75	6.00	6.25	6.75	7.25
12:12 ⁴	5.00	5.25			5.75	6.25	6.50	7.00	7.25	8.25
24	≤ 1:12	4.50		4.75	5.00	5.25	5.50	5.75	6.00	6.75
	5:12	4.75		5.25	5.50	6.00	6.25	6.75	7.00	7.75
	7:12 ⁴	5.25		5.75	6.25	6.75	7.00	7.50	8.00	9.00
	12:12 ⁴	5.50		6.25	6.75	7.25	8.00	8.50	9.00	10.25
32	≤ 1:12	4.75		5.00	5.50	5.75	6.25	6.50	6.75	7.50
	5:12	5.25		5.75	6.25	6.75	7.25	7.50	8.00	9.00
	7:12 ⁴	5.75		6.50	7.00	7.75	8.25	9.00	9.50	10.75
	12:12 ⁴	6.25		7.00	7.75	8.50	9.25	10.00	10.75	12.25
40	≤ 1:12	5.00		5.50	5.75	6.25	6.75	7.25	7.50	8.50
	5:12	5.50		6.25	6.75	7.25	8.00	8.50	9.00	10.25
	7:12 ⁴	6.25		7.00	7.75	8.75	9.50	10.25	11.00	12.50
	12:12 ⁴	7.00		8.00	8.75	9.75	10.75	11.50	12.50	14.25
50	≤ 1:12	5.50		6.00	6.50	7.00	7.50	8.00	8.50	9.50
	5:12	6.00		6.75	7.50	8.25	9.00	9.75	10.50	11.75
	7:12 ⁴	7.00		8.00	9.00	10.00	10.75	11.75	12.75	14.50
	12:12 ⁴	7.75		9.00	10.00	11.25	12.25	13.50	14.75	17.00
60	≤ 1:12	5.75		6.50	7.00	7.50	8.25	8.75	9.50	10.75
	5:12	6.75		7.50	8.25	9.25	10.00	10.75	11.75	13.25
	7:12 ⁴	7.75		9.00	10.00	11.00	12.25	13.25	14.50	16.75
	12:12 ⁴	8.75		10.00	11.50	12.75	14.00	15.50	16.75	19.50

For SI: 1 foot = 0.3048 m; 1 inch = 25.4 mm; 1 psf = 0.0479 kN/m²

- 1 - Table values are based on reinforcing bars with a minimum yield strength of 40,000 psi (276 MPa) and concrete with a minimum specified compressive strength of 2,500 psi (17.2 MPa).
- 2 - Table values are based on a 3.5 in (88.9 mm) thick flat wall. For a 5.5 in (139.7 mm) thick flat wall, multiply the table values by 0.9. The adjusted values shall not result in solid wall lengths less than 4 ft.
- 3 - Table values are based on a maximum unsupported wall height of 10 ft (3.0 m).
- 4 - Values are based on a 30 foot (9.1 m) building end wall width. For a 45 ft (13.7 m) building end wall and roof pitches greater than 7:12, multiply the table values by 1.2. For a 60 ft (18.3 m) building end wall and roof pitches greater than 7:12, multiply the table values by 1.4.
- 5 - Linear interpolation shall be permitted.



**Prescriptive Method - TABLE 5.2C
MINIMUM SOLID WALL LENGTH
REQUIREMENTS FOR FLAT ICF WALLS
(WIND PARALLEL TO RIDGE)^{1,2,3,4,5}**

DESIGN VELOCITY PRESSURE (psf)		20	25	30	35	40	45	50	60
WALL CATEGORY	BUILDING END WALL WIDTH, W (feet)	MINIMUM SOLID WALL LENGTH ON BUILDING SIDE WALL (feet)							
	One Storey of Top Storey of Two-Storey	16	4	4	4	4	4.25	4.25	4.5
24		4	4.25	4.5	4.75	4.75	5	5.25	5.5
32		4.5	4.75	5	5.25	5.5	6	6.25	6.75
40		5	5.5	5.75	6.25	6.75	7	7.5	8.25
50		5.75	6.25	7	7.5	8.25	8.75	9.5	10.75
60		6.5	7.5	8.25	9.25	10	10.75	11.75	13.25
First Storey of Two-Storey	16	4.25	4.5	4.75	5	5.25	5.5	5.75	6.5
	24	4.75	5.25	5.5	6	6.25	6.75	7	8
	32	5.5	6	6.5	7	7.5	8	8.75	9.75
	40	6.25	7	7.5	8.25	9	9.75	10.5	12
	50	7.25	8.25	9.25	10.25	11.25	12.25	13.25	15.25
	60	8.5	9.75	11	12.25	13.5	15	16.25	18.75

For SI: 1 foot = 0.3048 m; 1 inch = 25.4 mm; 1 psf = 0.0479 kN/m²

- 1 - Table values are based on reinforcing bars with a minimum yield strength of 40,000 psi (276 MPa) and concrete with a minimum specified compressive strength of 2,500 psi (17.2 MPa).
- 2 - Table values are based on a 3.5 in (88.9 mm) thick flat wall. For a 5.5 in (139.7 mm) thick flat wall, multiply the table values by 0.9. The adjusted values may not result in solid wall lengths less than 4 ft.
- 3 - Table values are based on a maximum unsupported wall height of 10 ft (3.0 m).
- 4 - Table values are based on a maximum 12:12 roof pitch.
- 5 - Linear interpolation shall be permitted.

2. Minimum amount of solid wall length for Seismic Design Categories C, D1 and D2 shall be as per table 5.5 (below).



**Prescriptive Method - TABLE 5.5
MINIMUM PERCENTAGE OF SOLID WALL LENGTH
ALONG EXTERIOR WALL LINES FOR SEISMIC DESIGN CATEGORY C AND D^{1,2}**

ICF WALL TYPE AND MINIMUM WALL THICKNESS (inches)	MINIMUM SOLID WALL LENGTH (percent)		
	ONE-STORY OR TOP STORY OF TWO-STORY	WALL SUPPORTING LIGHT FRAME SECOND STORY AND ROOF	WALL SUPPORTING ICF SECOND STORY AND ROOF
Seismic Design Category C ³	20 percent	25 percent	35 percent
Seismic Design Category D1 ⁴	25 percent	30 percent	40 percent
Seismic Design Category D2 ⁴	30 percent	35 percent	45 percent

For SI: 1 inch = 25.4 mm; 1 mph = 1.6093 km/hr

- 1 - Base percentages are applicable for maximum unsupported wall height of 10-feet (3.0-m), light-frame gable construction, all ICF wall types in Seismic Design Category C, and all ICF wall types with a nominal thickness greater than 5.5 inches (140 mm) for Seismic Design Category D1 and D2. These percentages assume that the maximum weight of the interior and exterior wall finishes applied to ICF walls do not exceed 8 psf (0.38 KN/m³)
- 2 - For all walls, the minimum required length of solid walls shall be based on the table percent value multiplied by the minimum dimensions of a rectangle inscribing the overall building plan.
- 3 - Walls shall be reinforced with minimum No.5 rebar (grade 40 or 60) spaced a maximum of 24 inches (609.6 mm) on center each way or No.4 rebar (Grade 40 or 60) spaced at a maximum of 16 inches (406.4 mm) on center each way.
- 4 - Walls shall be constructed with a minimum concrete compressive strength of 3,000 psi (20.7 Mpa) and reinforced with minimum #5 rebar (Grade 60, ASTM A706) spaced a maximum of 18 inches (457.2 mm) on center each way or No. 4 rebar (Grade 60, ASTM A706) spaced at a maximum of 12 inches (304.8 mm) on center each way.

3. The larger amount of solid wall length as required by tables 5.2A, 5.2B, 5.2C and 5.5 shall be used.



B2.1.6 – Floor Joist Connections

[Prescriptive Method – 6.2.2]

1. Wood ledger board shall be anchored to flat ICF walls in accordance with table 6.1 (below).

**Prescriptive Method - TABLE 6.1
FLOOR LEDGER-ICF WALL CONNECTION (SIDE-BEARING CONNECTION)
REQUIREMENTS^{1,2,3}**

MAXIMUM FLOOR CLEAR SPAN ⁴ (feet)	MAXIMUM ANCHOR BOLT SPACING ⁵ (inches)			
	STAGGERED 1/2 INCH DIAMETER ANCHOR BOLTS	STAGGERED 5/8 INCH DIAMETER ANCHOR BOLTS	TWO 1/2 INCH DIAMETER ANCHOR BOLTS ⁶	TWO 5/8 INCH DIAMETER ANCHOR BOLTS ⁶
8	18	20	36	40
10	16	18	32	36
12	14	18	28	36
14	12	16	24	32
16	10	14	20	28
18	9	13	18	26
20	8	11	16	22
22	7	10	14	20
24	7	9	14	18
26	6	9	12	18
28	6	8	12	16
30	5	8	10	16
32	5	7	10	14

For SI: 1 foot = 0.3048 m; 1 inch = 25.4 mm

- 1 - Minimum ledger board nominal depth shall be 8 inches (203 mm). The actual thickness of the ledger board shall be a minimum of 1.5 inches (38 mm). Ledger board shall be minimum No. 2 Grade.
- 2 - Minimum edge distance shall be 2 inches (51 mm) for 1/2-inch-(13-mm-) diameter anchor bolts and 2.5 inches (64 mm) for 5/8-inch-(16-mm) diameter anchor bolts.
- 3 - Interpolation is permitted between floor spans.
- 4 - Floor span corresponds to the clear span of the floor structure (i.e., joists or trusses) spanning between load-bearing walls or beams.
- 5 - Anchor bolts shall extend through the ledger to the center of the flat ICF wall thickness or the center of the horizontal or vertical core thickness of the waffle-grid or screen-grid ICF wall system.
- 6 - Minimum vertical clear distance between bolts shall be 1.5 inches (38 mm) for 1/2-inch-(13-mm-) diameter anchor bolts and 2 inches (51 mm) for 5/8-inch-(16 mm) diameter anchor bolt

2. Please refer to Prescriptive Method Section 6 for additional requirements on floor, roof, and minimum wall thickness requirements for high wind pressures and seismic design categories C, D1 and D2.

