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The Advantage ICF System® Technical Manual

The Advantage ICF System®

Recommendation: Review the Advantage ICF System Installation Videos.

When building with the Advantage ICF System please review your local building code requirements with your local building officials before your permitting stage.

Notes:

ADVANTAGE
ICF SYSTEM®

INTRODUCTION

This manual is designed to inform general contractors, installers, engineers and architects of the reinforcement required in structures that are built with the patented Advantage ICF System®. Data is provided for both the 150 mm (6") wall system and the 200 mm (8") wall system.

The Advantage ICF System is an insulating concrete forming system consisting of two panels of expanded polystyrene (EPS) insulation connected with web connectors moulded into the EPS panel. The EPS panels have a preformed interlocking mechanism along their top and bottom edges to ensure web connectors align vertically for attachment of interior and exterior finish materials.

When reinforcement and concrete are placed in the Advantage ICF system, an insulated, monolithic concrete wall of uniform thickness is formed. The result is a strong, energy efficient wall that will provide long-term energy cost savings and add resale value to the building.

Concrete Reinforcement Design
Engineering analysis within this manual was prepared based upon requirements within Parts 4 and 9 of the National Building Code of Canada 2005 and requirements within the publication PCA 100-2007, *Prescriptive Design of Exterior Concrete Walls for One- and Two-family Dwellings (Pub. No. EB560)* published by the Portland Cement Association. The tables in this manual provide steel reinforcement in a number of different wall and lintel applications based upon the structural loads as detailed and design assumptions as indicated below each table.

Those who feel comfortable reading the tables and interpreting the technical drawings contained in this manual may not need to consult a structural engineer. **Note however, that site-specific design and engineering is always the sole responsibility of the contractor or installer.**

When the Advantage ICF System is used in structural applications outside the scope of the design analysis provided in this manual or the applicable building code, a registered professional engineer skilled in concrete design must certify the design analysis and the design drawings for such application to provide a level of performance equivalent to requirements as noted above.

It is recommended that this manual is used in combination with the Advantage ICF System Installation Manual, which describes how to assemble the product. This manual contains the following information:

1. A list of design assumptions applied to the reinforcement design tables and drawings that follow. If your building deviates from any of these assumptions, you should consult a structural design engineer.
2. Tables containing data that specify steel reinforcement requirements.
3. Wall section and detail drawings that illustrate a variety of common construction details.

ADVANTAGE ICF SYSTEM®

TABLE OF CONTENTS

INTRODUCTION **1**

TABLE OF CONTENTS **3**

ADVANTAGE ICF SYSTEM DESCRIPTION **5**

Figure 1 - Advantage ICF System Blocks 5

ADVANTAGE ICF SYSTEM PRODUCT SPECIFICATIONS **6**

Design Assumptions 7
Table 1 - Load Combinations 8

DESIGN TABLES **10**

Table 2 – Ledger Size and Bolt Spacing for Floors and Decks 10
Table 3 – Soil Classifications 11

REINFORCING STEEL TABLES FOR 150-MM (6") ADVANTAGE ICF SYSTEM **12**

Table 4 – Recommended US Rebar Size Substitution for Designated SI Rebar Sizes 12
Table 5 – 150 mm (6") Below Grade Laterally Restrained Walls in All Seismic Zones 13
Table 6 – 150 mm (6") Above Grade Walls (with Brick Veneer), S_a (0.2) ≤ 1.2 14
Figure 2 –Typical Lintel Reinforcement Layout 15
Table 7a – 210 mm (8 ¼") Deep Lintels – Reinforcement in All Seismic Zones 16
Table 7b – 419 mm (16 ½") Deep Lintels – Reinforcement in All Seismic Zones 17
Table 7c – 629 mm (24 ¾") Deep Lintels – Reinforcement in All Seismic Zones 18

REINFORCING STEEL TABLES FOR 200-MM (8") ADVANTAGE ICF SYSTEM **19**

Table 8 - Recommended US Rebar Size Substitution for Designated SI Rebar Sizes 19
Table 9 – 200 mm (8") Below Grade Laterally Restrained Walls in All Seismic Zones 20
Table 10 – 200 mm (8") Above Grade Walls (with Brick Veneer), Sa (0.2) ≤ 1.2 21
Figure 3 – Typical Lintel Reinforcement Layout 22
Table 11a – 210 mm (8 ¼") Deep Lintels – Reinforcement in All Seismic Zones 23
Table 11b – 419 mm (16 ½") Deep Lintels – Reinforcement in All Seismic Zones 24
Table 11c – 629 mm (24 ¾") Deep Lintels – Reinforcement in All Seismic Zones 25

MINIMUM SOLID WALL LENGTH FOR ADVANTAGE ICF SYSTEM **26**

Table 12a – Minimum Solid Wall Length (m) for Wind Pressure q(1/50) = 0.4 kPa 26
Table 12b – Minimum Solid Wall Length (m) for Wind Pressure q(1/50) = 0.6 kPa 26
Table 12c – Minimum Solid Wall Length (m) for Wind Pressure q(1/50) = 0.8 kPa 27
Table 12d – Minimum Solid Wall Length (m) for Wind Pressure q(1/50) = 1.0 kPa 27
Table 12e – Minimum Solid Wall Length (m) for Wind Pressure q(1/50) = 1.2 kPa 28
Table 13a – Minimum Solid Wall Length (m) for Spectral Acceleration S_a(0.2) = 0.4 29
Table 13b – Minimum Solid Wall Length (m) for Spectral Acceleration S_a(0.2) = 0.6 29
Table 13c – Minimum Solid Wall Length (m) for Spectral Acceleration S_a(0.2) = 0.8 30
Table 13d – Minimum Solid Wall Length (m) for Spectral Acceleration S_a(0.2) = 1.0 30
Table 13e – Minimum Solid Wall Length (m) for Spectral Acceleration S_a(0.2) = 1.2 31

ADVANTAGE ICF SYSTEM DESCRIPTION

The Advantage ICF System® is designed as a monolithic flat insulating concrete form (ICF) system (Figure 1). One block comprises two corresponding panels made from expanded polystyrene (EPS). The panels function as the form and are held together with high-density plastic webs (or ties) spaced 200 mm (8”) on centre for the 150 mm (6”) concrete wall form or 150 mm (6”) on centre for the 200 mm (8”) concrete wall form. Once a series of blocks have been assembled to form a wall with the appropriate steel reinforcement, concrete is poured inside the blocks to create a uniform structural wall system. With the application of appropriate interior and exterior wall finishes, the resulting structural concrete wall has exceptional fire, sound, and insulating characteristics.

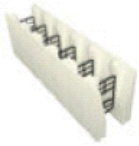
The outside dimensions of an Advantage ICF System 150 mm (6”) standard block are 419 mm (16 ½”) high, 286 mm (11 ¼”) wide and 1219 mm (48”) long. The outside dimensions of an Advantage ICF System 200 mm (8”) standard block are 419 mm (16 ½”) high, 336 mm (13 ¼”) wide and 1219 mm (48”) long.

Typical dimensions for Advantage ICF System blocks are provided on next page. If you are reading this document at the planning stage of your project, you should factor block dimensions into your plans if you want to save time on construction.

Figure 1 - Advantage ICF System Blocks

ADVANTAGE ICF SYSTEM®

ADVANTAGE ICF SYSTEM PRODUCT SPECIFICATIONS

Product	Feature	150 mm Metric	6" Imperial	200 mm Metric	8" Imperial
Standard Block 	Height: Width: Length:	419 286 1219	16-1/2" 11-1/4" 48"	419 337 1219	16-1/2" 13-1/4" 48"
Corner Block 	Height: Width: Length:	419 286 813 x 406	16-1/2" 11-1/4" 32" x 16"	419 337 737 x 432	16-1/2" 13-1/4" 29" x 17"
7-1/2" Height Adjuster 	Height: Width: Length:	191 286 1219	7-1/2" 11-1/4" 48"	191 337 1219	7-1/2" 13-1/4" 48"
Taper Top Block 	Height: Width: Length: Bearing at Top:	419 286 1219 249	16-1/2" 11-1/4" 48" 9-3/4"	419 337 1219 292	16-1/2" 13-1/4" 48" 11-1/2"
45° Corner Block 	Height: Width: Length:	419 286 645 x 241	16-1/2" 11-1/4" 25-3/8" x 9-1/2"	419 337 540 x 236	16-1/2" 13-1/4" 21-1/4" x 9-1/4"
Brick Ledge 	Height: Width at Top Width at Bottom: Length:	419 400 286 1219	16-1/2" 15-3/4" 11-1/4" 48"	419 451 337 1219	16-1/2" 17-3/4" 13-1/4" 48"

ENGINEERING ANALYSIS

This engineering analysis has been prepared for above and below grade reinforced concrete walls formed using the Advantage ICF System.

Design Assumptions

The following design assumptions define the parameters used to determine the reinforcement stated in the tables and drawings in this manual.

Below Grade Wall Heights

- 2440 mm (8 ft)
- 3048 mm (10 ft)
- 3660 mm (12 ft)

Backfill Height Below Grade

The height of backfill used to cover below grade laterally restrained walls is assumed to be as follows:

- 2440 mm (8 ft) wall: 1220 mm (4 ft) to 2130 mm (7 ft)
- 3048 mm (10ft) wall: 1220 mm (4 ft) to 2740 mm (9 ft)
- 3660 mm (12 ft) wall: 1220 mm (4 ft) to 3350 mm (11ft)

Above Grade Wall Height

Reinforcement requirements for three above grade wall heights are provided in this manual:

- 2440 mm (8 ft)
- 3048 mm (10 ft)
- 3660 mm (12 ft)

Clear Spans

Walls are designed for the following maximum clear spans:

- Floor: 6.1 m (20 ft)
- Roof: 12.2 m (40 ft)

Wall Thickness

Thickness of the concrete inside the Advantage ICF System is assumed to be either 150 mm (6”) or 200 mm (8”).

Maximum Building Dimensions

- Maximum building length: 24.4 m (80 ft)
- Maximum building width: 12.2 m (40 ft)

Restraint Conditions

The following restraint conditions are assumed:

- Walls are laterally restrained at the top unless otherwise noted.
- Laterally restrained walls are considered pinned top and bottom.
- Lateral restraint is provided at each floor by diaphragm action.

Eccentricity

- Floor load on above grade walls has an eccentricity of 140 mm (5 5/8”) for the 150 mm (6”) wall system and of 170 mm (6 5/8”) for the 200 mm (8”) wall system.

- Below grade walls are assumed to support a brick veneer of maximum 7320 mm (24 ft) high with an eccentricity of 220 mm (8 5/8") for the 150 mm (6") wall system and of 245 mm (9 5/8") for the 200 mm (8") wall system. The eccentricity of floor load is not considered for below grade walls as it is counteracting the earth pressure of backfill.

Design Loads
The following floor, roof, wall, wind and seismic loads have been used:

- Floor dead load: 0.72 kPa (15 psf)
- Floor live load: 1.92 kPa (40 psf)
- Roof dead load: 0.72 kPa (15 psf)
- Roof snow load: 4.44 kPa (90 psf)
- Passenger vehicle surcharge: 2.4 kPa (50 psf)
- Wall dead load:
  4.12 kPa (85 psf) for the 150 mm (6") wall system including interior and exterior finish
  5.29 kPa (110 psf) for the 200 mm (8") wall system including interior and exterior finish
  0.72 kPa (15 psf) for wood frame wall
  1.87 kPa (39 psf) for brick veneer
- Maximum wind pressure: q (1/50) = 1.2 kPa (25 psf)
- Seismic load for above grade walls: $S_a(0.2) \leq 1.2$

Table 1 - Load Combinations

Case	Load Combination	
	Principal Loads	Companion Loads
1	1.4D	
2	(1.25D or 0.9D) + 1.5L	0.5S or 0.4W
3	(1.25D or 0.9D) + 1.5S	0.5L or 0.4W
4	(1.25D or 0.9D) + 1.4W	0.5L or 0.5S
5	1.0D + 1.0E	0.5L + 0.25S

Deflection Limits
Deflection limits are as follows:

- Length of span divided by 360 for live load
- Length of span divided by 240 for total load

Soils, Footings and Foundation Pressures
Design lateral soil loads are per m (ft) of backfill height for moist soil conditions without hydrostatic pressure. Wall reinforcement requirements in Tables 4 and 7 are grouped into the following three categories:
1. Walls with soil backfill having a maximum design lateral soil load of 480 kg/m^3 (30 pcf);
2. Walls with soil backfill having a maximum design lateral soil load of 720 kg/m^3 (45 pcf); and
3. Walls with soil backfill having a maximum design lateral soil load of 960 kg/m^3 (60 pcf).

It is also assumed that the sub-floor or adequate bracing has been installed prior to backfilling in order to allow walls to resist the lateral pressure from the backfill.

For seismic design, the footing soil is assumed to be a dense soil or soft rock. Note that a site inspection should be performed at all building locations to confirm that the soil has adequate bearing capacity.

Material Properties

Concrete

The following conditions with regard to concrete usage are assumed:

- Concrete compressive strength 20 MPa (3,000 psi) at 28 days, Type 10 with 20 mm (0.75”) aggregate
- Concrete slump: 100 to 150 mm (4” to 6”)
- Concrete wall thickness: 150 mm (6”) or 200 mm (8”)
- Concrete Air entrainment: minimum 4 to 7 percent where exposed to freeze/thaw cycles
- Concrete pour rate: 1220 mm (4 ft) /hr
- Internal vibration with a 25 mm (1”) mechanical vibrator

Reinforcing Steel

The following conditions with regard to reinforcing steel (rebar) are assumed:

- Design as per CAN/CSA-A23.3-04
- Reinforcement steel as per CAN/CSA-A23.1-04 and CAN/CSA-G30.18
- Rebar strength (10M, 15M and 20M): 400 MPa (60,000 psi)
- Vertical reinforcing bars are secured in position a minimum of 38 mm (1.5”) from the tension face of concrete for below grade walls or in the middle third of wall section for above grade walls.
- Horizontal reinforcing bars are secured in position a minimum of 28 mm (1.125”) from the tension face of concrete for below grade walls or in the middle third of wall section for above grade walls.
- Distance from the edge of the wall to the primary reinforcement for exterior walls is 50 mm (2”) for reinforcement steel 20M or greater, and 40 mm (1 ½”) for reinforcement steel 15M or smaller.
- Corner bars are provided for all wall intersections.
- All horizontal and vertical rebar lap lengths are as per NBC 2005, Clause 9.3.1.1.(4)(b)(iii), lapped a minimum of 450mm (18”) for 10M bars and 650mm (26”) for 15M bars.

Other Construction Materials

The following specifications apply to other materials used in addition to those described above:

- All dimensional lumber is SPF No. 2 or better.
- A structural engineer is to design any steel beams.
- A structural engineer is to review shop drawings for engineered wood product floors, roofs and pre-engineered truss systems.
- All anchor bolts are 200 mm (8”) long “L” shaped ½” diameter ASTM A36 or A307 unless noted otherwise.

Openings

- For below grade walls when considered to be laterally supported at top, it is assumed that
  - Openings are less than 1220 mm (4’) in width and the total openings in the wall are less than 25% of the wall area.
  - When the length of solid wall between windows is less than the average length of the windows, the wall is considered unsupported and additional engineering is required.
- For above grade walls
  - For exterior non-load bearing walls, no openings shall occur within 1200 mm of interior and exterior corners. The cumulative width of openings in non-load bearing walls shall

not make up more than 70% of the wall length. Openings shall be reinforced on all four sides with two 10M bars, extending 600 mm beyond the edges of the openings.

- For load-bearing walls, lintels shall be provided over all openings wider than 900 mm. See lintel reinforcement tables for additional information.

Angle Iron Brick ledges

- It is assumed to be 89 mm (3 ½") by 89 mm (3 ½") by 6 mm (¼") angle iron anchored with 12 mm (½") diameter anchor bolts at 610 mm (24") on centre for a brick veneer of maximum 7320 mm (24 ft) high.
- Anchor bolt minimum length needs to extend to centre line of wall.
- Minimum anchor bolt cut-outs to be 100 mm (4") wide and 200 mm (8") high.

Advantage Brick Ledge Blocks

- Advantage brick ledge requires 10M stirrups at 203 mm (8") on centre.
- Maximum 7320 mm (24 ft) continuous height of brick veneer.
- A local engineer should be retained when loads or spans exceed what is used in the manual.

Lintels

The following with regard to lintels is assumed:

- 15M and larger bottom reinforcement steel and 10M stirrups have yield strength of 400 MPa (60,000 psi).
- Concrete compressive strength 20 MPa (3,000 psi).
- Support a uniformly distributed load including live and dead loads.
- An engineer is to review point loads from beams, girder trusses or other sources.
- Lintels are laterally supported at top.

DESIGN TABLES

The purpose of the design tables contained in this document is to enable users to determine rebar reinforcement requirements based on the design loads stated. Please note that all dimensions in the tables have been rounded for practical purposes.

Table 2 – Ledger Size and Bolt Spacing for Floors and Decks

Material	Clear Span		Bolt Spacing
2 x 12 (SPF No.2 or better)	4.57m	15'	12.7 mm x 152 mm @ 300 mm o/c (½" x 6" @ 12" o/c)
2 x 12 (SPF No.2 or better)	6.10m	20'	12.7 mm x 152 mm @ 200 mm o/c (½" x 6" @ 8" o/c)
Timber Strand 1.5E 45 mm x 242 mm (1 3/4" x 9 ¼")	4.57m	15'	12.7 mm x 152 mm @ 330 mm o/c (½" x 6" @ 13" o/c)
Timber Strand 1.5E 45 mm x 242 mm (1 3/4" x 9 ¼")	6.10m	20'	12.7 mm x 152 mm @ 250 mm o/c (½" x 6" @ 10" o/c)

Note: All anchor bolts are ASTM A36 or A307.

Table 3 – Soil Classifications

Types of Soils and Engineering Characteristics						
Soil Group	**Unified Soil Classification Symbol**	**Soil Description**	**Drainage Characteristics**	**Frost Heave Susceptibility**	**Bearing Capacity kPa (psf)**	**Design Lateral Soil Load kg/m^3(pcf)**
Group I	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	Good	Low	150 (3000)	480 (30)
	GP	Poorly graded gravels, gravel-sand mixtures, little or no fines	Good	Low	150 (3000)	480 (30)
	SW	Well-graded sands, gravelly sands, little or no fines	Good	Low	100 (2000)	480 (30)
	SP	Poorly graded sands, gravelly sands, little or no fines	Good	Low	100 (2000)	480 (30)
	GM	Silty gravels, gravel-sand-silt mixtures	Good	Medium	100 (2000)	720 (45)
	SM	Silty sand, sand-silt mixtures	Good	Medium	100 (2000)	720 (45)
Group II	GC	Clayey gravels, gravel-sand-clay mixtures	Medium	Medium	100 (2000)	720 (45)
	SC	Clayey sand, sand-clay mixtures	Medium	Medium	100 (2000)	960 (60)
	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	Medium	High	75 (1500)	960 (60)
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	Medium	Medium	75 (1500)	960 (60)

Note: Refer to NBC 2005 Table 9.4.4.1 and 2006 IRC Tables R401.4.1, R404.4 and R405.1 for additional information.

Reinforcing steel Tables for 150-mm (6”) Advantage ICF System

Assumptions used for development of reinforcing tables for above and below grade walls are as follows:

1. Maximum floor span: 6.1 m (20 ft); maximum roof span: 12.2 m (40 ft).
2. Specified compressive strength of concrete, f'_c at 28 days is 20 MPa (3,000psi).
3. Specified yield strength of reinforcement, f_y is 400 MPa (60,000 psi).
4. All above grade situations are assumed to be on top of ICF foundation walls.
5. Add one vertical rebar 15M at each corner.
6. Table 4 below provides recommended US rebar substitutions for SI rebar sizes designated in tables 5 to 7.

Table 4 – Recommended US Rebar Size Substitution for Designated SI Rebar Sizes

Reinforcing Steel Bars (SI Units) Per Advantage Reinforcing Tables			Reinforcing Steel Bars (US Units) Recommended Substitution		
Metric Bar Size Designation	Rebar Properties		US Bar Size Designation	Rebar Properties	
	Diameter mm	Nom. Mass kg/m		Diameter mm	Nom. Mass kg/m
10M	11.3	0.785	#4	12.7	0.994
15M	16.0	1.570	#5	15.9	1.552
20M	19.5	2.355	#6	19.1	2.235

Table 5 – 150 mm (6") Below Grade Laterally Restrained Walls in All Seismic Zones

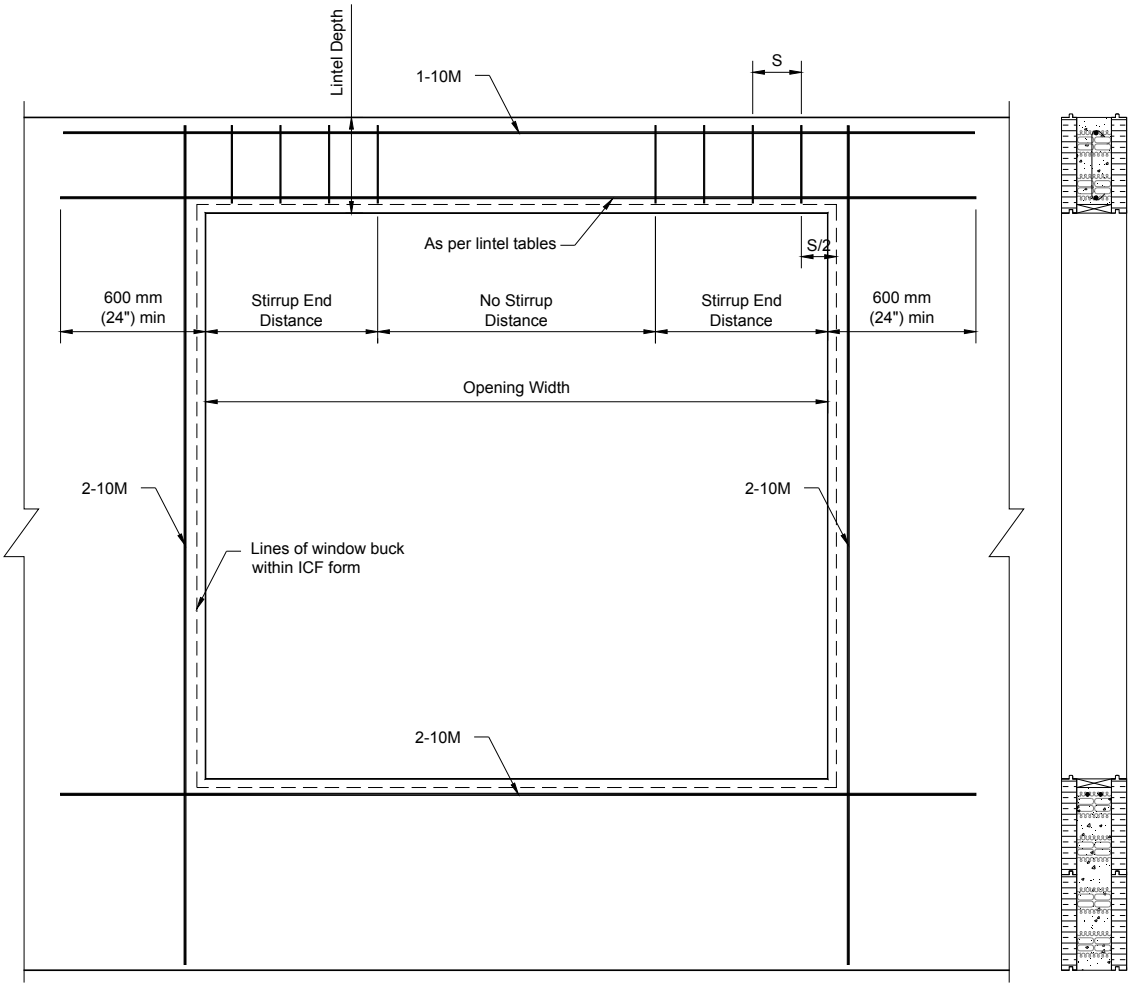
Wall Height m (ft)	Backfill Height m (ft)	Vertical Reinforcement Spacing, mm (in)			Horizontal Reinforcement Spacing, mm (in)
		Design Lateral Soil Load Per m (ft) of Backfill Height			All Soil Types
		480 kg/m^3 (30 pcf)	720 kg/m^3 (45 pcf)	960 kg/m^3 (60 pcf)	
2.44 (8.00)	1.22 (4.00)	10M @ 406 (16)	10M @ 406 (16)	10M @ 406 (16)	10M @ 419 (16 ½)
	1.52 (5.00)	10M @ 406 (16)	10M @ 406 (16)	10M @ 406 (16)	10M @ 419 (16 ½)
	1.83 (6.00)	10M @ 406 (16)	10M @ 406 (16)	10M @ 406 (16)	10M @ 419 (16 ½)
	2.13 (7.00)	10M @ 406 (16)	10M @ 406 (16)	10M @ 305 (12)	10M @ 419 (16 ½)
3.05 (10.00)	1.22 (4.00)	10M @ 406 (16)	10M @ 406 (16)	10M @ 406 (16)	10M @ 419 (16 ½)
	1.52 (5.00)	10M @ 406 (16)	10M @ 406 (16)	10M @ 406 (16)	10M @ 419 (16 ½)
	1.83 (6.00)	10M @ 406 (16)	10M @ 406 (16)	10M @ 305 (12)	10M @ 419 (16 ½)
	2.13 (7.00)	10M @ 406 (16)	10M @ 305 (12)	10M @ 203 (8)	10M @ 419 (16 ½)
	2.44 (8.00)	10M @ 305 (12)	10M @ 203 (8)	15M @ 305 (12)	10M @ 419 (16 ½)
	2.74 (9.00)	10M @ 203 (8)	15M @ 305 (12)	15M @ 203 (8)	10M @ 419 (16 ½)
3.66 (12.00)	1.22 (4.00)	10M @ 406 (16)	10M @ 406 (16)	10M @ 406 (16)	10M @ 419 (16 ½)
	1.52 (5.00)	10M @ 406 (16)	10M @ 406 (16)	10M @ 406 (16)	10M @ 419 (16 ½)
	1.83 (6.00)	10M @ 406 (16)	10M @ 406 (16)	10M @ 305 (12)	10M @ 419 (16 ½)
	2.13 (7.00)	10M @ 406 (16)	10M @ 305 (12)	10M @ 203 (8)	10M @ 419 (16 ½)
	2.44 (8.00)	10M @ 305 (12)	10M @ 203 (8)	15M @ 305 (12)	10M @ 419 (16 ½)
	2.74 (9.00)	10M @ 203 (8)	15M @ 305 (12)	15M @ 203 (8)	10M @ 419 (16 ½)
	3.05 (10.00)	10M @ 203 (8)	15M @ 203 (8)		10M @ 419 (16 ½)
	3.35 (10.00)	15M @ 305 (12)			10M @ 419 (16 ½)

tes engineering input is required.

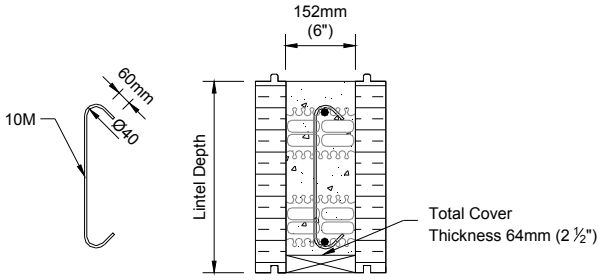
Table 6 – 150 mm (6") Above Grade Walls (with Brick Veneer), S_a (0.2) ≤ 1.2

Wall Height m (ft)	Vertical Reinforcement Spacing, mm (in)		Horizontal Reinforcement Spacing, mm (in)	
	Sa (0.2) ≤ 0.4	Sa (0.2) > 0.4 ≤1.2	Sa (0.2) ≤ 0.4	Sa (0.2) > 0.4 ≤1.2
Single storey concrete construction supporting a wood-frame roof structure				
2.44 (8.00)	10M @ 406 (16)	10M @ 406 (16)	10M @ 419 (16 1/2)	10M @ 419 (16 1/2)
3.05 (10.00)	10M @ 406 (16)	10M @ 406 (16)	10M @ 419 (16 1/2)	10M @ 419 (16 1/2)
3.66 (12.00)	10M @ 203 (8)	10M @ 203 (8)	10M @ 419 (16 1/2)	10M @ 419 (16 1/2)
Ground floor concrete construction supporting a second storey wood-frame and wood-frame roof structure				
2.44 (8.00)	10M @ 406 (16)	10M @ 406 (16)	10M @ 419 (16 1/2)	10M @ 419 (16 1/2)
3.05 (10.00)	10M @ 406 (16)	10M @ 406 (16)	10M @ 419 (16 1/2)	10M @ 419 (16 1/2)
3.66 (12.00)	10M @ 203 (8)	10M @ 203 (8)	10M @ 419 (16 1/2)	10M @ 419 (16 1/2)
Ground floor concrete construction supporting a second storey concrete construction and wood-frame roof structure				
2.44 (8.00)	10M @ 406 (16)	10M @ 406 (16)	10M @ 419 (16 1/2)	10M @ 419 (16 1/2)
3.05 (10.00)	10M @ 406 (16)	10M @ 406 (16)	10M @ 419 (16 1/2)	10M @ 419 (16 1/2)
3.66 (12.00)	10M @ 203 (8)	10M @ 203 (8)	10M @ 419 (16 1/2)	10M @ 419 (16 1/2)

Figure 2 –Typical Lintel Reinforcement Layout



Lintel Elevation



Lintel Section

ADVANTAGE ICF SYSTEM®

Table 7a – 210 mm (8 ¼") Deep Lintels – Reinforcement in All Seismic Zones

Opening Width mm (ft)	Factored Uniformly Distributed Load - kN/m (lb/ft)													
	2 (137)		5 (342)		10 (685)		15 (1027)		20 (1370)		25 (1712)		30 (2055)	
	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)
900 (3 ft)	1-15M	-	1-15M	-	1-15M	-	1-15M	-	1-15M	-	1-15M	-	1-15M	-
1500 (5 ft)	1-15M	-	1-15M	-	1-15M	300 (12)	1-15M	300 (12)	1-15M	300 (12)	1-15M	300 (12)	1-20M	300 (12)
2100 (7 ft)	1-15M	-	1-15M	-	1-15M	300 (12)	1-20M	300 (12)						
2700 (9 ft)	1-15M	-	1-15M	-	1-20M	300 (12)								
3300 (11 ft)	1-15M	-	1-20M	-										
3900 (13 ft)	1-15M	-												
4500 (15 ft)	1-15M	-												
5100 (17 ft)														

Indicates engineering input is required.

1. Tables 7a, 7b and 7c are based on the following assumptions:

Stirrups are fabricated from 10M bars spaced at 100 mm (4") o.c. for Table 7a, 200 mm (8") o.c. for Tables 7b and 300 mm (12") o.c. for Table 7c.
The factored uniformly distributed load includes live and dead loads, not including lintel self weight.
The minimum height of lintel is 210 mm (8 ¼") for Table 7a, 419 mm (16 ½") for table 7b and 629 mm (24 ¾") for Table 7c.
Lintel reinforcing is located in bottom of lintel and projects 600 mm (24") into lintel support on each side.

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Table 7b – 419 mm (16 ½") Deep Lintels – Reinforcement in All Seismic Zones

Opening Width mm (ft)	Factored Uniformly Distributed Load - kN/m (lb/ft)													
	2 (137)		5 (342)		10 (685)		15 (1027)		20 (1370)		25 (1712)		30 (2055)	
	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)
900 (3 ft)	1-15M	-	1-15M	-	1-15M	-	1-15M	-	1-15M	-	1-15M	-	1-15M	-
1500 (5 ft)	1-15M	-	1-15M	-	1-15M	500 (20)	1-15M	500 (20)	1-15M	500 (20)	1-15M	500 (20)	1-15M	500 (20)
2100 (7 ft)	1-15M	-	1-15M	-	1-15M	500 (20)	1-15M	500 (20)	1-15M	500 (20)	1-15M	500 (20)	1-15M	500 (20)
2700 (9 ft)	1-15M	-	1-15M	-	1-15M	500 (20)	1-15M	500 (20)	1-15M	500 (20)	1-20M	500 (20)	1-20M	500 (20)
3300 (11 ft)	1-15M	-	1-15M	-	1-15M	500 (20)	1-20M	500 (20)	1-20M	500 (20)				
3900 (13 ft)	1-15M	-	1-15M	-	1-20M	500 (20)								
4500 (15 ft)	1-15M	-	1-15M	-	1-20M	500 (20)								
5100 (17 ft)	1-15M	-	1-20M	-										

Indicates engineering input is required.

Note: If lintels are less than 419 mm (16 ½") deep, see Table 7a.

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Table 7c – 629 mm (24 ¾") Deep Lintels – Reinforcement in All Seismic Zones

Opening Width mm (ft)	Factored Uniformly Distributed Load - kN/m (lb/ft)													
	2 (137)		5 (342)		10 (685)		15 (1027)		20 (1370)		25 (1712)		30 (2055)	
	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)
900 (3 ft)	1-20M	-	1-20M	-	1-20M	-	1-20M	-	1-20M	-	1-20M	-	1-20M	-
1500 (5 ft)	1-20M	-	1-20M	-	1-20M	700 (28)	1-20M	700 (28)	1-20M	700 (28)	1-20M	700 (28)	1-20M	700 (28)
2100 (7 ft)	1-20M	-	1-20M	-	1-20M	700 (28)	1-20M	700 (28)	1-20M	700 (28)	1-20M	700 (28)	1-20M	700 (28)
2700 (9 ft)	1-20M	-	1-20M	-	1-20M	700 (28)	1-20M	700 (28)	1-20M	700 (28)	1-20M	700 (28)	1-20M	700 (28)
3300 (11 ft)	1-20M	-	1-20M	-	1-20M	700 (28)	1-20M	700 (28)	1-20M	700 (28)	1-20M	700 (28)	1-20M	700 (28)
3900 (13 ft)	1-20M	-	1-20M	-	1-20M	700 (28)	1-20M	700 (28)	1-20M	700 (28)				
4500 (15 ft)	1-20M	-	1-20M	-	1-20M	700 (28)	1-20M	700 (28)						
5100 (17 ft)	1-20M	-	1-20M	-	1-20M	700 (28)								

Indicates engineering input is required.

Note: If lintels are less than 629mm (24 ¾") deep, see Table 7b.

Reinforcing steel Tables for 200-mm (8”) Advantage ICF System

Assumptions used for development of reinforcing tables for above and below grade walls are as follows:

1. Maximum floor span: 6.1 m (20 ft); maximum roof span: 12.2 m (40 ft).
2. Specified compressive strength of concrete, f’c at 28 days is 20 MPa (3,000psi).
3. Specified yield strength of reinforcement, fy is 400 MPa (60,000 psi).
4. All above grade situations are assumed to be on top of ICF foundation walls.
5. Add one vertical rebar 15M at each corner.
6. Table 8 below provides recommended US rebar substitutions for SI rebar sizes designated in tables 9 to 11.

Table 8 - Recommended US Rebar Size Substitution for Designated SI Rebar Sizes

Reinforcing Steel Bars (SI Units) Per Advantage Reinforcing Tables			Reinforcing Steel Bars (US Units) Recommended Substitution		
Metric Bar Size Designation	Rebar Properties		US Bar Size Designation	Rebar Properties	
	Diameter mm	Nom. Mass kg/m		Diameter mm	Nom. Mass kg/m
10M	11.3	0.785	#4	12.7	0.994
15M	16.0	1.570	#5	15.9	1.552
20M	19.5	2.355	#6	19.1	2.235

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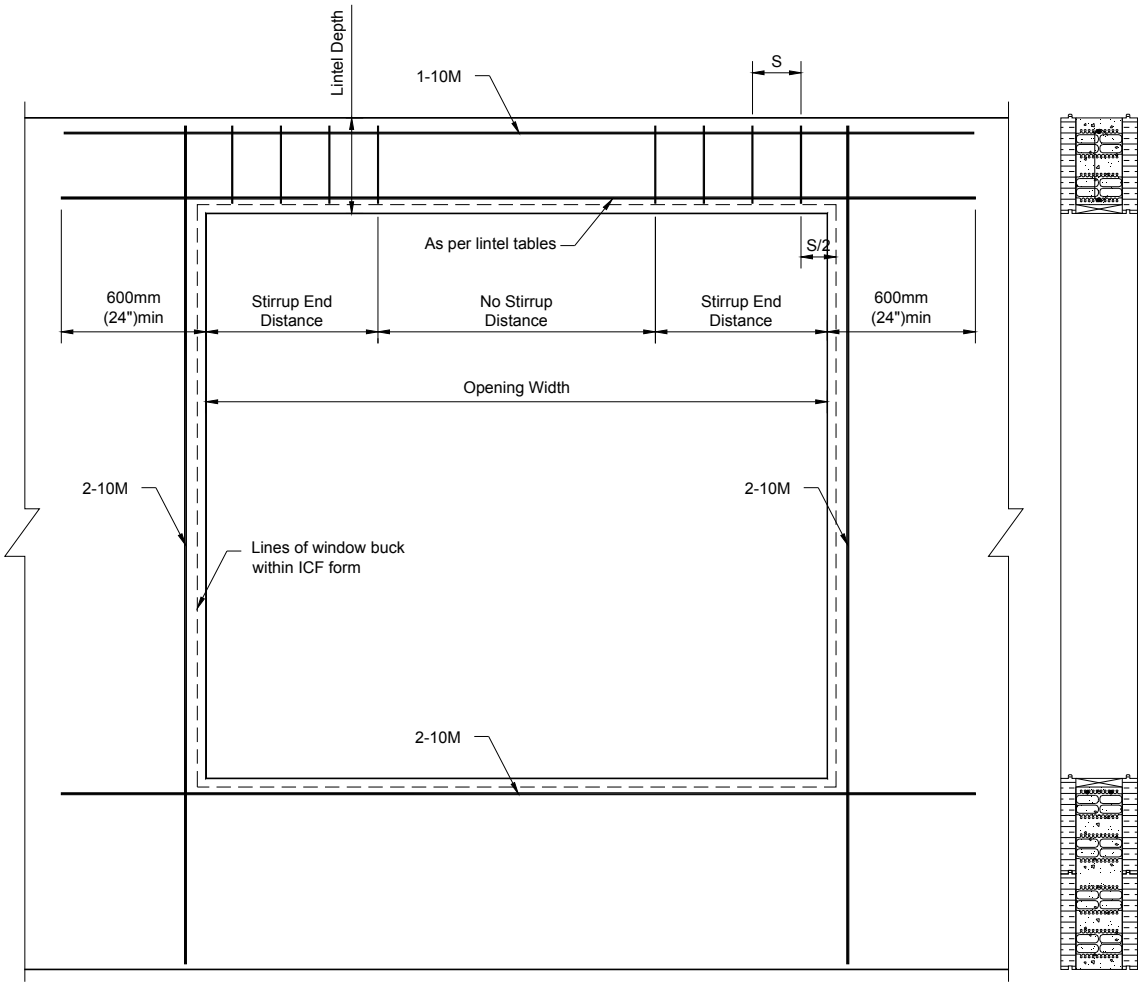
Table 9 – 200 mm (8") Below Grade Laterally Restrained Walls in All Seismic Zones

Wall Height m (ft)	Backfill Height m (ft)	Vertical Reinforcement Spacing, mm (in)			Horizontal Reinforcement Spacing, mm (in)
		Design Lateral Soil Load Per m (ft) of Backfill Height			All Soil Types
		480 kg/m^3 (30 pcf)	720 kg/m^3 (45 pcf)	960 kg/m^3 (60 pcf)	
2.44 (8.00)	1.22 (4.00)	15M @ 610 (24)	15M @ 610 (24)	15M @ 610 (24)	15M @ 419 (16 ½)
	1.52 (5.00)	15M @ 610 (24)	15M @ 610 (24)	15M @ 610 (24)	15M @ 419 (16 ½)
	1.83 (6.00)	15M @ 610 (24)	15M @ 610 (24)	15M @ 610 (24)	15M @ 419 (16 ½)
	2.13 (7.00)	15M @ 610 (24)	15M @ 610 (24)	15M @ 610 (24)	15M @ 419 (16 ½)
3.05 (10.00)	1.22 (4.00)	15M @ 610 (24)	15M @ 610 (24)	15M @ 610 (24)	15M @ 419 (16 ½)
	1.52 (5.00)	15M @ 610 (24)	15M @ 610 (24)	15M @ 610 (24)	15M @ 419 (16 ½)
	1.83 (6.00)	15M @ 610 (24)	15M @ 610 (24)	15M @ 610 (24)	15M @ 419 (16 ½)
	2.13 (7.00)	15M @ 610 (24)	15M @ 610 (24)	15M @ 610 (24)	15M @ 419 (16 ½)
	2.44 (8.00)	15M @ 610 (24)	15M @ 610 (24)	15M @ 457 (18)	15M @ 419 (16 ½)
	2.74 (9.00)	15M @ 610 (24)	15M @ 457 (18)	15M @ 305 (12)	15M @ 419 (16 ½)
3.66 (12.00)	1.22 (4.00)	15M @ 610 (24)	15M @ 610 (24)	15M @ 610 (24)	15M @ 419 (16 ½)
	1.52 (5.00)	15M @ 610 (24)	15M @ 610 (24)	15M @ 610 (24)	15M @ 419 (16 ½)
	1.83 (6.00)	15M @ 610 (24)	15M @ 610 (24)	15M @ 610 (24)	15M @ 419 (16 ½)
	2.13 (7.00)	15M @ 610 (24)	15M @ 610 (24)	15M @ 610 (24)	15M @ 419 (16 ½)
	2.44 (8.00)	15M @ 610 (24)	15M @ 610 (24)	15M @ 457 (18)	15M @ 419 (16 ½)
	2.74 (9.00)	15M @ 610 (24)	15M @ 457 (18)	15M @ 305 (12)	15M @ 419 (16 ½)
	3.05 (10.00)	15M @ 610 (24)	15M @ 305 (12)	15M @ 203 (8)	15M @ 419 (16 ½)
	3.35 (10.00)	15M @ 457 (18)	15M @ 305 (12)	15M @ 203 (8)	15M @ 419 (16 ½)

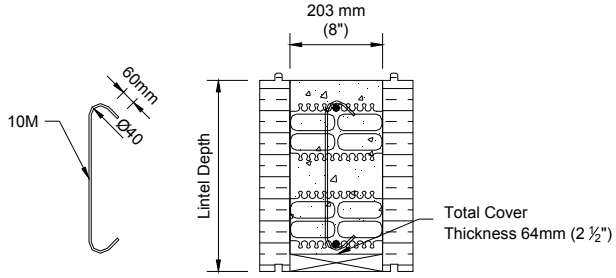
Table 10 – 200 mm (8") Above Grade Walls (with Brick Veneer), Sa (0.2) ≤ 1.2

Wall Height m (ft)	Vertical Reinforcement Spacing, mm (in)		Horizontal Reinforcement Spacing, mm (in)	
	Sa (0.2) ≤ 0.4	Sa (0.2) > 0.4 ≤1.2	Sa (0.2) ≤ 0.4	Sa (0.2) > 0.4 ≤1.2
Single storey concrete construction supporting a wood-frame roof structure				
2.44 (8.00)	15M @ 610 (24)	15M @ 610 (24)	15M @ 419 (16 1/2)	15M @ 419 (16 1/2)
3.05 (10.00)	15M @ 610 (24)	15M @ 610 (24)	15M @ 419 (16 1/2)	15M @ 419 (16 1/2)
3.66 (12.00)	15M @ 610 (24)	15M @ 610 (24)	15M @ 419 (16 1/2)	15M @ 419 (16 1/2)
Ground floor concrete construction supporting a second storey wood-frame and wood-frame roof structure				
2.44 (8.00)	15M @ 610 (24)	15M @ 610 (24)	15M @ 419 (16 1/2)	15M @ 419 (16 1/2)
3.05 (10.00)	15M @ 610 (24)	15M @ 610 (24)	15M @ 419 (16 1/2)	15M @ 419 (16 1/2)
3.66 (12.00)	15M @ 610 (24)	15M @ 610 (24)	15M @ 419 (16 1/2)	15M @ 419 (16 1/2)
Ground floor concrete construction supporting a second storey concrete construction and wood-frame roof structure				
2.44 (8.00)	15M @ 610 (24)	15M @ 610 (24)	15M @ 419 (16 1/2)	15M @ 419 (16 1/2)
3.05 (10.00)	15M @ 610 (24)	15M @ 610 (24)	15M @ 419 (16 1/2)	15M @ 419 (16 1/2)
3.66 (12.00)	15M @ 610 (24)	15M @ 610 (24)	15M @ 419 (16 1/2)	15M @ 419 (16 1/2)

Figure 3 – Typical Lintel Reinforcement Layout



Lintel Elevation



Lintel Section

ADVANTAGE ICF SYSTEM®

Table 11a – 210 mm (8 ¼") Deep Lintels – Reinforcement in All Seismic Zones

Opening Width mm (ft)	Factored Uniformly Distributed Load - kN/m (lb/ft)													
	2 (137)		5 (342)		10 (685)		15 (1027)		20 (1370)		25 (1712)		30 (2055)	
	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)
900 (3 ft)	1-15M	-	1-15M	-	1-15M	-	1-15M	-	1-15M	-	1-15M	-	1-15M	-
1500 (5 ft)	1-15M	-	1-15M	-	1-15M	300 (12)	1-15M	300 (12)	1-15M	300 (12)	1-15M	300 (12)	1-20M	300 (12)
2100 (7 ft)	1-15M	-	1-15M	-	1-15M	300 (12)	1-20M	300 (12)						
2700 (9 ft)	1-15M	-	1-15M	-	1-20M	300 (12)								
3300 (11 ft)	1-15M	-	1-20M	-										
3900 (13 ft)	1-15M	-												
4500 (15 ft)	1-20M	-												
5100 (17 ft)	1-20M	-												

Indicates engineering input is required.

Tables 11a, 11b and 11c are based on the following assumptions:

1. Stirrups are fabricated from 10M bars spaced at 100 mm (4") o.c. for Table 11a, 200 mm (8") o.c. for Tables 11b and 300 mm (12") o.c. for Table 11c.
2. The factored uniformly distributed load includes live and dead loads, not including lintel self weight.
3. The minimum height of lintel is 210 mm (8 ¼") for Table 11a, 419 mm (16 ½") for table 11b and 629 mm (24 ¾") for Table 11c.
4. Lintel reinforcing is located in bottom of lintel and projects 600 mm (24") into lintel support on each side.

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Table 11b – 419 mm (16 ½") Deep Lintels – Reinforcement in All Seismic Zones

Opening Width mm (ft)	Factored Uniformly Distributed Load - kN/m (lb/ft)													
	2 (137)		5 (342)		10 (685)		15 (1027)		20 (1370)		25 (1712)		30 (2055)	
	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)
900 (3 ft)	1-15M	-	1-15M	-	1-15M	-	1-15M	-	1-15M	-	1-15M	-	1-15M	-
1500 (5 ft)	1-15M	-	1-15M	-	1-15M	500 (20)	1-15M	500 (20)	1-15M	500 (20)	1-15M	500 (20)	1-15M	500 (20)
2100 (7 ft)	1-15M	-	1-15M	-	1-15M	500 (20)	1-15M	500 (20)	1-15M	500 (20)	1-15M	500 (20)	1-15M	500 (20)
2700 (9 ft)	1-15M	-	1-15M	-	1-15M	500 (20)	1-15M	500 (20)	1-15M	500 (20)	1-20M	500 (20)	1-20M	500 (20)
3300 (11 ft)	1-15M	-	1-15M	-	1-15M	500 (20)	1-20M	500 (20)	1-20M	500 (20)				
3900 (13 ft)	1-15M	-	1-15M	-	1-20M	500 (20)								
4500 (15 ft)	1-15M	-	1-15M	-	1-20M	500 (20)								
5100 (17 ft)	1-15M	-	1-20M	-										

Indicates engineering input is required.

Note: If lintels are less than 419mm (16 ½") deep, see Table 11a.

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Table 11c – 629 mm (24 ¾") Deep Lintels – Reinforcement in All Seismic Zones

Opening Width mm (ft)	Factored Uniformly Distributed Load - kN/m (lb/ft)													
	2 (137)		5 (342)		10 (685)		15 (1027)		20 (1370)		25 (1712)		30 (2055)	
	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)	Bottom Steel	Stirrup End Distance mm (in)
900 (3 ft)	1-20M	-	1-20M	-	1-20M	-	1-20M	-	1-20M	-	1-20M	-	1-20M	-
1500 (5 ft)	1-20M	-	1-20M	-	1-20M	700 (28)	1-20M	700 (28)	1-20M	700 (28)	1-20M	700 (28)	1-20M	700 (28)
2100 (7 ft)	1-20M	-	1-20M	-	1-20M	700 (28)	1-20M	700 (28)	1-20M	700 (28)	1-20M	700 (28)	1-20M	700 (28)
2700 (9 ft)	1-20M	-	1-20M	-	1-20M	700 (28)	1-20M	700 (28)	1-20M	700 (28)	1-20M	700 (28)	1-20M	700 (28)
3300 (11 ft)	1-20M	-	1-20M	-	1-20M	700 (28)	1-20M	700 (28)	1-20M	700 (28)	1-20M	700 (28)	1-20M	700 (28)
3900 (13 ft)	1-20M	-	1-20M	-	1-20M	700 (28)	1-20M	700 (28)	1-20M	700 (28)				
4500 (15 ft)	1-20M	-	1-20M	-	1-20M	700 (28)	1-20M	700 (28)						
5100 (17 ft)	1-20M	-	1-20M	-	1-20M	700 (28)								

Indicates engineering input is required.

Note: If lintels are less than 629mm (24 ¾") deep, use 629 mm (16 ½") table 11b.

MINIMUM SOLID WALL LENGTH FOR ADVANTAGE ICF SYSTEM

Table 12a – Minimum Solid Wall Length (m) for Wind Pressure q(1/50) = 0.4 kPa

Building width (m)	Building length (m)	Wall thickness (mm)							
		150				200			
		One story or top story of two-story		First story of two-story		One story or top story of two-story		First story of two-story	
		Gable	Eave	Gable	Eave	Gable	Eave	Gable	Eave
6.1	6.1	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
	12.2	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
	18.3	1.22	1.22	1.26	1.22	1.22	1.22	1.22	1.22
	24.4	1.22	1.22	1.67	1.22	1.22	1.22	1.26	1.22
12.2	6.1	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
	12.2	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
	18.3	1.22	1.22	1.53	1.22	1.22	1.22	1.22	1.22
	24.4	1.39	1.22	2.02	1.22	1.22	1.22	1.53	1.22

Notes: 1. The minimum solid wall length is for each side and roof slope is up to 1:1.
2. Storey height is maximum 3.66 m (12 ft) for each floor.
3. Concrete compressive strength is 20 Mpa.
4. Reinforcement yield strength is 400 Mpa.

Table 12b – Minimum Solid Wall Length (m) for Wind Pressure q(1/50) = 0.6 kPa

Building width (m)	Building length (m)	Wall thickness (mm)							
		150				200			
		One story or top story of two-story		First story of two-story		One story or top story of two-story		First story of two-story	
		Gable	Eave	Gable	Eave	Gable	Eave	Gable	Eave
6.1	6.1	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
	12.2	1.22	1.22	1.26	1.22	1.22	1.22	1.22	1.22
	18.3	1.22	1.22	1.87	1.22	1.22	1.22	1.41	1.22
	24.4	1.53	1.22	2.48	1.22	1.22	1.22	1.87	1.22
12.2	6.1	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
	12.2	1.22	1.22	1.53	1.22	1.22	1.22	1.22	1.22
	18.3	1.55	1.22	2.27	1.22	1.22	1.22	1.71	1.22
	24.4	2.06	1.22	3.01	1.22	1.55	1.22	2.27	1.22

Notes: 1. The minimum solid wall length is for each side and roof slope is up to 1:1.
2. Storey height is maximum 3.66 m (12 ft) for each floor.
3. Concrete compressive strength is 20 Mpa.
4. Reinforcement yield strength is 400 Mpa.

Table 12c – Minimum Solid Wall Length (m) for Wind Pressure q(1/50) = 0.8 kPa

Building width (m)	Building length (m)	Wall thickness (mm)							
		150				200			
		One story or top story of two-story		First story of two-story		One story or top story of two-story		First story of two-story	
		Gable	Eave	Gable	Eave	Gable	Eave	Gable	Eave
6.1	6.1	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
	12.2	1.22	1.22	1.67	1.22	1.22	1.22	1.26	1.22
	18.3	1.53	1.22	2.48	1.22	1.22	1.22	1.87	1.22
	24.4	2.02	1.22	3.30	1.22	1.53	1.22	2.48	1.22
12.2	6.1	1.22	1.22	1.22	1.34	1.22	1.22	1.22	1.22
	12.2	1.39	1.22	2.02	1.34	1.22	1.22	1.53	1.22
	18.3	2.06	1.22	3.01	1.34	1.55	1.22	2.27	1.22
	24.4	2.73	1.22	4.00	1.34	2.06	1.22	3.01	1.22

Notes: 1. The minimum solid wall length is for each side and roof slope is up to 1:1.
2. Storey height is maximum 3.66 m (12 ft) for each floor.
3. Concrete compressive strength is 20 Mpa.
4. Reinforcement yield strength is 400 Mpa.

Table 12d – Minimum Solid Wall Length (m) for Wind Pressure q(1/50) = 1.0 kPa

Building width (m)	Building length (m)	Wall thickness (mm)							
		150				200			
		One story or top story of two-story		First story of two-story		One story or top story of two-story		First story of two-story	
		Gable	Eave	Gable	Eave	Gable	Eave	Gable	Eave
6.1	6.1	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
	12.2	1.28	1.22	2.08	1.22	1.22	1.22	1.57	1.22
	18.3	1.90	1.22	3.09	1.22	1.43	1.22	2.33	1.22
	24.4	2.52	1.22	4.11	1.22	1.90	1.22	3.09	1.22
12.2	6.1	1.22	1.22	1.28	1.67	1.22	1.22	1.22	1.26
	12.2	1.72	1.22	2.52	1.67	1.30	1.22	1.90	1.26
	18.3	2.56	1.22	3.76	1.67	1.93	1.22	2.83	1.26
	24.4	3.40	1.22	5.00	1.67	2.56	1.22	3.76	1.26

Notes: 1. The minimum solid wall length is for each side and roof slope is up to 1:1.
2. Storey height is maximum 3.66 m (12 ft) for each floor.
3. Concrete compressive strength is 20 Mpa.
4. Reinforcement yield strength is 400 Mpa.

Table 12e – Minimum Solid Wall Length (m) for Wind Pressure q(1/50) = 1.2 kPa

Building width (m)	Building length (m)	Wall thickness (mm)							
		150				200			
		One story or top story of two-story		First story of two-story		One story or top story of two-story		First story of two-story	
		Gable	Eave	Gable	Eave	Gable	Eave	Gable	Eave
6.1	6.1	1.22	1.22	1.26	1.22	1.22	1.22	1.22	1.22
	12.2	1.53	1.22	2.48	1.22	1.22	1.22	1.87	1.22
	18.3	2.27	1.22	3.70	1.22	1.71	1.22	2.79	1.22
	24.4	3.01	1.22	4.93	1.22	2.27	1.22	3.70	1.22
12.2	6.1	1.22	1.31	1.53	2.00	1.22	1.22	1.22	1.51
	12.2	2.06	1.31	3.01	2.00	1.55	1.22	2.27	1.51
	18.3	3.07	1.31	4.50	2.00	2.31	1.22	3.39	1.51
	24.4	4.08	1.31	5.99	2.00	3.07	1.22	4.50	1.51

Notes: 1. The minimum solid wall length is for each side and roof slope is up to 1:1.
2. Storey height is maximum 3.66 m (12 ft) for each floor.
3. Concrete compressive strength is 20 Mpa.
4. Reinforcement yield strength is 400 Mpa.

Table 13a – Minimum Solid Wall Length (m) for Spectral Acceleration $S_a(0.2) = 0.4$

Building width (m)	Building length (m)	Wall thickness (mm)							
		150				200			
		One story or top story of two-story		First story of two-story		One story or top story of two-story		First story of two-story	
		Gable	Eave	Gable	Eave	Gable	Eave	Gable	Eave
6.1	6.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	12.2	1.2	1.2	1.8	1.9	1.2	1.2	1.6	1.7
	18.3	1.2	1.2	2.4	2.6	1.2	1.2	2.0	2.3
	24.4	1.2	1.5	2.9	3.3	1.2	1.4	2.5	2.9
12.2	6.1	1.2	1.2	1.9	1.8	1.2	1.2	1.7	1.6
	12.2	1.2	1.2	2.5	2.5	1.2	1.2	2.2	2.2
	18.3	1.4	1.6	3.1	3.2	1.3	1.4	2.7	2.8
	24.4	1.6	1.9	3.7	3.9	1.5	1.7	3.2	3.4

Notes: 1. The minimum solid wall length is for each side and roof slope is up to 1:1.
2. Storey height is maximum 3.66 m (12 ft) for each floor.
3. Concrete compressive strength is 20 Mpa.
4. Reinforcement yield strength is 400 Mpa.
5. Seismic effects for Site Class C are considered
6. Brick veneer of maximum 7.32 m (24 ft) high is included.

Table 13b – Minimum Solid Wall Length (m) for Spectral Acceleration $S_a(0.2) = 0.6$

Building width (m)	Building length (m)	Wall thickness (mm)							
		150				200			
		One story or top story of two-story		First story of two-story		One story or top story of two-story		First story of two-story	
		Gable	Eave	Gable	Eave	Gable	Eave	Gable	Eave
6.1	6.1	1.2	1.2	1.8	1.8	1.2	1.2	1.6	1.6
	12.2	1.2	1.3	2.7	2.8	1.2	1.2	2.3	2.5
	18.3	1.4	1.8	3.5	3.9	1.2	1.6	3.0	3.4
	24.4	1.7	2.3	4.4	5.0	1.5	2.0	3.8	4.3
12.2	6.1	1.6	1.4	2.9	2.7	1.4	1.2	2.6	2.4
	12.2	1.8	1.8	3.8	3.8	1.7	1.7	3.3	3.3
	18.3	2.1	2.3	4.6	4.8	1.9	2.1	4.1	4.2
	24.4	2.4	2.8	5.5	5.9	2.2	2.5	4.8	5.1

Notes: 1. The minimum solid wall length is for each side and roof slope is up to 1:1.
2. Storey height is maximum 3.66 m (12 ft) for each floor.
3. Concrete compressive strength is 20 Mpa.
4. Reinforcement yield strength is 400 Mpa.
5. Seismic effects for Site Class C are considered
6. Brick veneer of maximum 7.32 m (24 ft) high is included.

Table 13c – Minimum Solid Wall Length (m) for Spectral Acceleration $S_a(0.2) = 0.8$

Building width (m)	Building length (m)	Wall thickness (mm)							
		150				200			
		One story or top story of two-story		First story of two-story		One story or top story of two-story		First story of two-story	
		Gable	Eave	Gable	Eave	Gable	Eave	Gable	Eave
6.1	6.1	1.2	1.2	2.4	2.4	1.2	1.2	2.1	2.1
	12.2	1.5	1.7	3.5	3.8	1.3	1.5	3.1	3.3
	18.3	1.9	2.4	4.7	5.2	1.6	2.1	4.0	4.5
	24.4	2.3	3.0	5.8	6.6	2.0	2.7	5.0	5.7
12.2	6.1	2.1	1.8	3.9	3.6	1.9	1.6	3.4	3.2
	12.2	2.5	2.5	5.0	5.0	2.2	2.2	4.4	4.4
	18.3	2.8	3.1	6.2	6.4	2.5	2.8	5.4	5.6
	24.4	3.2	3.7	7.3	7.8	2.9	3.3	6.4	6.8

Notes: 1. The minimum solid wall length is for each side and roof slope is up to 1:1.
2. Storey height is maximum 3.66 m (12 ft) for each floor.
3. Concrete compressive strength is 20 Mpa.
4. Reinforcement yield strength is 400 Mpa.
5. Seismic effects for Site Class C are considered
6. Brick veneer of maximum 7.32 m (24 ft) high is included.

Table 13d – Minimum Solid Wall Length (m) for Spectral Acceleration $S_a(0.2) = 1.0$

Building width (m)	Building length (m)	Wall thickness (mm)							
		150				200			
		One story or top story of two-story		First story of two-story		One story or top story of two-story		First story of two-story	
		Gable	Eave	Gable	Eave	Gable	Eave	Gable	Eave
6.1	6.1	1.4	1.4	3.0	3.0	1.2	1.2	2.6	2.6
	12.2	1.8	2.2	4.4	4.7	1.6	1.9	3.8	4.1
	18.3	2.3	3.0	5.8	6.5	2.0	2.6	5.0	5.6
	24.4	2.8	3.8	7.3	8.2	2.5	3.3	6.3	7.1
12.2	6.1	2.6	2.2	4.8	4.5	2.3	2.0	4.3	4.0
	12.2	3.1	3.1	6.2	6.2	2.7	2.7	5.5	5.5
	18.3	3.5	3.9	7.7	8.0	3.2	3.4	6.7	7.0
	24.4	4.0	4.7	9.1	9.8	3.6	4.2	8.0	8.5

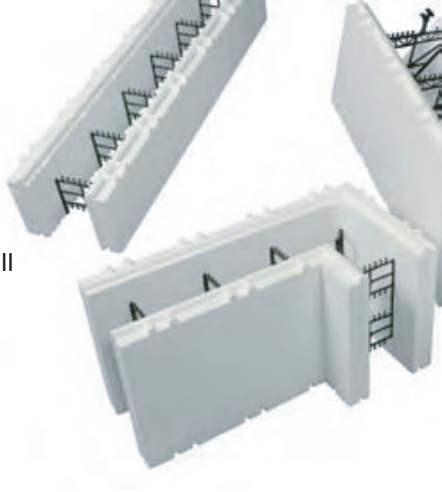
Notes: 1. The minimum solid wall length is for each side and roof slope is up to 1:1.
2. Storey height is maximum 3.66 m (12 ft) for each floor.
3. Concrete compressive strength is 20 Mpa.
4. Reinforcement yield strength is 400 Mpa.
5. Seismic effects for Site Class C are considered
6. Brick veneer of maximum 7.32 m (24 ft) high is included.

Table 13e – Minimum Solid Wall Length (m) for Spectral Acceleration $S_a(0.2) = 1.2$

Building width (m)	Building length (m)	Wall thickness (mm)							
		150				200			
		One story or top story of two-story		First story of two-story		One story or top story of two-story		First story of two-story	
		Gable	Eave	Gable	Eave	Gable	Eave	Gable	Eave
6.1	6.1	1.6	1.6	3.5	3.5	1.4	1.4	3.1	3.1
	12.2	2.2	2.6	5.3	5.7	1.9	2.3	4.6	4.9
	18.3	2.8	3.6	7.0	7.8	2.4	3.1	6.0	6.7
	24.4	3.4	4.5	8.7	9.9	2.9	4.0	7.5	8.6
12.2	6.1	3.1	2.7	5.8	5.4	2.8	2.4	5.1	4.8
	12.2	3.7	3.7	7.5	7.5	3.3	3.3	6.6	6.6
	18.3	4.2	4.6	9.2	9.6	3.8	4.1	8.1	8.4
	24.4	4.8	5.6	10.9	11.7	4.3	5.0	9.5	10.2

Notes: 1. The minimum solid wall length is for each side and roof slope is up to 1:1.
2. Storey height is maximum 3.66 m (12 ft) for each floor.
3. Concrete compressive strength is 20 Mpa.
4. Reinforcement yield strength is 400 Mpa.
5. Seismic effects for Site Class C are considered
6. Brick veneer of maximum 7.32 m (24 ft) high is included.

Advantage ICF System Specifications



General Product Description

EPS Insulation:	Complies with CAN/ULC-S701, Type 2 and ASTM C578, Type II Contains no CFCs, HCFCs, HFCs or formaldehyde. ECP-Certified Insulation
Concrete:	20 MPa (2900 psi) at 28 days Nominal thickness 152-mm (6") or 203-mm (8")
Sound Transmission:	STC Rating 50
Fire Resistance Rating:	3-hour rating for 152-mm (6") or 4-hour 203-mm (8") concrete wall per National Building Code of Canada 2005, Table D-2.1.1.
Air & Vapour Barrier:	Provided by combination of monolithic concrete thickness and EPS insulation.
Code Evaluation Reports:	CCMC 13101-R (Canada) and ICC-ES ESR-1578 (USA)

Energy Efficiency - Typical Effective Thermal Resistance (R-Value):

Below Grade: Advantage ICF System @ R-22.7 (RSI - 3.99)

Note: R-Value based upon typical construction with 1/2" (127 mm) gypsum board on interior face.

Above Grade: Advantage ICF System @ R-23.5 (RSI - 4.14)

Note: R-Value based upon typical construction with 1/2" (127 mm) gypsum board on interior face and vinyl or metal siding on exterior face.

Contact Information

Contact Plasti-Fab® Ltd.
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ADVANTAGE ICF SYSTEM®

P·F·B™ CORPORATION
Better building ideas

MADE IN CANADA

Made with ECP-Certified Insulation
Certified Climate Protection