

CCMC 13043-R

CCMC Canadian code compliance evaluation

CCMC number:	13043-R
Status:	Active
Issue date:	2001-10-23
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Evaluation holder:	<p>Amvic Corporation 501 McNicoll Avenue Toronto ON M2H 2E2 Canada Website: www.amvicsystem.com Telephone: 416-410-5674 or 877-470-9991 Email: info@amvicsystem.com</p>
Product name:	Amvic Building System (ICF)
Compliance:	NBC 2010
Criteria:	CCMC-TG-031119.01-10 "CCMC Technical Guide for Flat, Modular, Expanded-Polystyrene Concrete Forms"

In most jurisdictions this document is sufficient evidence for approval by Canadian authorities.
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Compliance opinion

It is the opinion of the Canadian Construction Materials Centre that the evaluated product, when used as an insulated concrete form in accordance with the conditions and limitations stated in this evaluation, complies with the following code:

National Building Code of Canada 2010

Code provision	Solution type
4.1.1.3. Design Requirements	<u>Acceptable</u>
4.3.3.1. Design Basis for Plain, Reinforced and Pre-stressed Concrete	<u>Acceptable</u>
9.3.1. Concrete	<u>Acceptable</u>
9.4. Structural Requirements	<u>Acceptable</u>
9.15.1.1.(1)(c) flat insulating concrete form ...	<u>Acceptable</u>
9.15.3.3. Application of Footing Width and Area Requirements	<u>Acceptable</u>
9.15.3.5.(1)(c) 150 mm for each storey...	<u>Acceptable</u>
9.15.4. Foundation Walls	<u>Alternative</u>
9.20.1.1.(2) For walls other than those described in ...	<u>Acceptable</u>
9.20.1.1.(1)(b) flat insulating concrete form ...	<u>Acceptable</u>
9.20.1.2. Earthquake Reinforcement	<u>Alternative</u>
9.20.17. Above-Ground Flat Insulating Concrete Form Walls	<u>Acceptable</u>

The above opinion(s) is/are based on the evaluation by the CCMC of technical evidence provided by the evaluation holder, and is bound by the stated conditions and limitations. For the benefit of the user, a summary of the technical information that forms the basis of this evaluation has been included.

Product information

Product name

Amvic Building System (ICF)

Product description

The product is a modular, interlocking concrete form system consisting of two expanded polystyrene panels. Embedded in the polystyrene panels are polypropylene connectors that are equally spaced at 150 mm horizontally and 200 mm vertically. The extremities of the polypropylene connectors are embedded close to the exterior surface of the polystyrene panels.

The polystyrene face panels have a preformed symmetrical interlocking expanded polystyrene (EPS) design along the top and side edges which makes the forms reversible (top and bottom, left and right) to facilitate stacking and alignment, as well as to prevent leakage of freshly placed concrete.

The units are dry-laid and stacked in a running (staggered) configuration. The stacked units form a rectangular space that, after being filled with concrete, results in an insulated, monolithic concrete wall of uniform thickness. Reinforcement may be placed where required to satisfy strength requirements for above- or below-grade loadbearing walls, beams, lintels and shear walls.

The units have external dimensions of 1 213 mm in length and 406 mm in height. The polystyrene panels are each 64-mm thick, resulting in an overall wall thickness of 228 mm, 278 mm, 328 mm or 378 mm that in turn encloses a 100-mm-, 150-mm-, 200-mm- or 250-mm-thick concrete wall.

The product units are available in straight, 90° or 45° corner forms, tapered top and brick ledge forms.

Two units are illustrated in the figures below.



Figure 1. Amvic ICF Straight Reversible Block



Figure 2. Amvic ICF 90 Corner Reversible Block

Manufacturing plant

This evaluation is valid only for products produced at the following plant:

Product name	Manufacturing plant
	Toronto, ON, CA
Amvic Building System (ICF)	☑

☑ Indicates that the product from this manufacturing facility has been evaluated by the CCMC

Conditions and limitations

The CCMC's compliance opinion is bound by this product being used in accordance with the conditions and limitations set out below.

- The product is permitted to be used in the construction of houses and small buildings up to two storeys above grade that do not include residences with walkout basements, and fall under the provisions of Part 9 of Division B of the NBC 2010, and subject to all of the conditions listed below.
- The structural applications of this product must be in strict accordance with the design analysis as prepared by Amvic Inc. and included in Report No. 110822.1, dated 23 July 2012, from which the tables in the Design requirements section of this Report have been reproduced. When the product is used in structural applications outside the scope of the referenced design analysis, the engineering design analysis, related documents and drawings must bear the authorized seal of a registered professional engineer skilled in concrete design and licensed to practice under the appropriate provincial or territorial legislation. The engineer must certify that the construction provides a level of performance equivalent to that required by Part 4 and/or Part 9 of the NBC 2010.
- The maximum permitted building plan dimensions are 24 m × 18 m. Engineering is required on a case-by-case basis for buildings that exceed these dimensions.
- For loadbearing wall and shear wall applications, the minimum core thickness of the product must be 150 mm.
- For non-loadbearing wall applications, the minimum core thickness of the product must be 100 mm.
- Concrete used with this system must comply with Subsection 9.3.1. of Division B of the NBC 2010. It must be Type 10 or Type 30 with a minimum compressive strength of 20 MPa and a maximum slump of 150 ± 12 mm.
- The maximum aggregate size to be used in conjunction with this product must be no greater than 14 mm.
- For the wall heights indicated in the Vertical and horizontal steel reinforcement for above- and below-grade walls tables, the pouring of concrete must be made at a rate of 1.3 m per hour in consecutive lifts; each lift is limited to a maximum height of 1.3 m.
- All point loads, such as concentrated loads created by girder trusses, columns and beams, must bear directly on top of the concrete wall and must not be supported in any manner to create an eccentric loading on the concrete wall.
- Floor and roof connections to ICF walls must be designed to accommodate diaphragm action in seismic zones and zones of high wind pressure.
- The concrete must be cured a minimum of seven days before backfilling. The wall must be laterally supported at the top and bottom prior to backfilling.
- The EPS insulation used in this system must comply with CAN/ULC-S701-05, "Thermal Insulation, Polystyrene, Boards and Pipe Covering," Type 2, as a minimum.
- The product's EPS insulation panels must be aged for at least three weeks from their date of manufacturing.
- The concrete wall must be constructed on a footing designed as per Article 9.15.3.4., Basic Footing Widths and Areas, of Division B of the NBC 2010.
- The attachment of exterior cladding and interior finishing materials has not been assessed by the present evaluation.
- The interior face of the EPS panels must be protected from the inside of the building in accordance with Sentence 9.10.17.10.(1), Protection of Foamed Plastics, of Division B of the NBC 2010.
- For above-grade installations, the exterior face of the product must be protected with materials conforming to Article 9.20.6.4., Masonry Veneer, and Sections 9.27., Cladding, and/or 9.28., Stucco, of Division B of the NBC 2010.
- For below-grade installations, dampproofing must be provided in accordance with Article 9.13.2., Dampproofing, of Division B of the NBC 2010.
- Where hydrostatic pressure exists, waterproofing must be provided in accordance with Article 9.13.3., Waterproofing, of Division B of the NBC 2010.
- For foundation-wall installations, the backfill must be placed in such a way as to avoid damaging the wall, the exterior insulation panel and the waterproofing and dampproofing protection. The backfill material must be well drained and a drainage system must be installed around the footing in accordance with the requirements of the NBC 2010.

The installation of the product must be in strict compliance with the latest edition of “Amvic Technical Manual” without conflicting with the requirements stated in the NBC 2010 or in this Report. The wall system must be set up only installers trained and authorized by Amvic Inc.

Technical information

This evaluation is based on demonstrated conformance with the following criteria:

Criteria number	Criteria name
CCMC-TG-031119.01-10	CCMC Technical Guide for Flat, Modular, Expanded-Polystyrene Concrete Forms

The Report Holder has submitted technical documentation for the CCMC's evaluation. Testing was conducted at laboratories recognized by the CCMC. The corresponding technical evidence for this product is summarized below.

Material requirements

Conformance of the EPS

Compliance of the expanded polystyrene thermal insulation with the requirements of CAN/ULC-S701-05 is covered under Intertek Testing Services (NA) Ltd. Certificate and /or Label service.

Design requirements

Conformance of structural capacity (steel reinforcement designs)

The design analysis in the Engineering Analysis Report provided to the CCMC of walls using the product provides a level of performance equivalent to that required by applicable provisions in Part 4 and/or Part 9 of Division B of the NBC 2010. The corresponding design analysis is summarized in the tables below. The tables provide steel reinforcement specifications for a number of different wall and lintel applications based on specific structural loads. The design assumptions are indicated below each table.

Vertical and horizontal steel reinforcement for below-grade walls ⁽¹⁾ ⁽²⁾

Wall height (m)	Backfill height (m)	Max. spacing for vertical reinforcement (mm)			Max. spacing for horizontal reinforcement (mm)		
		150-mm wall	200-mm wall	250-mm wall	150-mm wall	200-mm wall	250-mm wall
2.44	1.22	10M @ 300	10M @ 300	10M @ 150	15M @ 400	15M @ 400	15M @ 400
	1.52	10M @ 300	10M @ 300	10M @ 150	15M @ 400	15M @ 400	15M @ 400
	1.82	10M @ 150	10M @ 300	10M @ 150	15M @ 400	15M @ 400	15M @ 400
	2.12	10M @ 150	10M @ 300	10M @ 150	15M @ 400	15M @ 400	15M @ 400
3.05	1.22	10M @ 300	10M @ 300	10M @ 150	15M @ 400	15M @ 400	15M @ 400
	1.52	10M @ 300	10M @ 300	10M @ 150	15M @ 400	15M @ 400	15M @ 400
	1.82	10M @ 150	10M @ 300	10M @ 150	15M @ 400	15M @ 400	15M @ 400
	2.12	15M @ 300	10M @ 300	10M @ 150	15M @ 400	15M @ 400	15M @ 400
	2.42	15M @ 150	10M @ 300	10M @ 150	15M @ 400	15M @ 400	15M @ 400
	2.74	15M @ 150	10M @ 300	10M @ 150	15M @ 400	15M @ 400	15M @ 400
3.66	1.22	10M @ 300	10M @ 300	10M @ 150	15M @ 400	15M @ 400	15M @ 400

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Wall height (m)	Backfill height (m)	Max. spacing for vertical reinforcement (mm)			Max. spacing for horizontal reinforcement (mm)		
		150-mm wall	200-mm wall	250-mm wall	150-mm wall	200-mm wall	250-mm wall
	1.52	10M @ 150	10M @ 300	10M @ 150	15M @ 400	15M @ 400	15M @ 400
	1.82	10M @ 150	10M @ 300	10M @ 150	15M @ 400	15M @ 400	15M @ 400
	2.12	15M @ 300	10M @ 300	10M @ 150	15M @ 400	15M @ 400	15M @ 400
	2.52	15M @ 150	10M @ 300	10M @ 150	15M @ 400	15M @ 400	15M @ 400
	2.82	–	–	10M @ 150	–	–	15M @ 400
	3.12	–	–	10M @ 150	–	–	15M @ 400
	3.35	–	–	10M @ 150	–	–	15M @ 400

Notes:

- 1 The table above is based on the following assumptions:
- The design is applicable to all seismic zones.
 - Maximum building width is 12.2 m.
 - Maximum building length is 24.4 m.
 - Maximum floor clear span is 6.1 m.
 - Maximum roof clear span is 12.2 m with supports at mid-point.
 - Maximum number of stories above grade is two (2).
 - Maximum number of stories below grade is one (1).
 - Roof slope from flat to maximum 1:1.
 - Roof dead load is 0.72 kPa.
 - Floor dead load is 0.72 kPa.
 - Floor live load is 1.92 kPa.
 - Snow load is 4.44 kPa.
 - Surcharge load is 2.4 kPa.
 - Loads include earth pressure and surcharge loads, plus gravity load. Gravity load assumes 2 ICF storeys and a wood roof frame.
 - Below-grade walls are assumed to support a brick veneer with a maximum height of 7 320 mm, with an eccentricity of 220 mm for the 150-mm thick wall system and 245 mm for the 200-mm thick wall system.
 - Design earth pressure of 960 kg/m³ (equivalent fluid density).
 - All above-grade walls are assumed to be on top of the ICF foundation walls.
 - Openings in the foundation wall must be less than 1 220 mm in width and the total openings in the wall must be less than 25% of the wall area.
 - When the length of the wall between windows is less than the average length of the windows, the wall is considered unsupported and additional engineering is required.
 - Reinforcing bars must be hard grade deformed bars conforming to CSA G30.18-09, "Carbon Steel Bars for Concrete Reinforcement," Grade 400. Specified yield strength of reinforcement, f_y , is 400 MPa.
 - Wall design detailing bends, placement, spacing, splicing and protection of reinforcement must be in accordance with CSA A23.3-04 (R2010), "Design of Concrete Structures."
 - Minimum concrete cover for vertical reinforcement is 38 mm from the inside face (tension face) of concrete.
 - Minimum concrete cover for horizontal reinforcement is 28 mm from the inside face of concrete.
 - Two 10M bars must be placed around all openings and extend 600 mm (24 in.) beyond each side of the openings.
 - Minimum 28-day concrete yield strength of 20 MPa. Mix designs in accordance with the manufacturer's recommendations.
 - Concrete must be allowed to cure for a minimum of seven days prior to backfilling.
 - Below-grade walls are considered to be supported by the floor system at the top.
 - All materials and workmanship must conform to the requirements of the NBC 2010 including any Revisions and Errata that have been released as of the issue date of this table.

2 Table cells without a value indicate that the spacing is not feasible with respect to the proposed backfill height.

Table 1. Vertical and horizontal steel reinforcement for above-grade walls ⁽¹⁾

Wall height (m)	Max. spacing for vertical reinforcement (mm)			Max. spacing for horizontal reinforcement (mm)		
	150-mm wall	200-mm wall	250-mm wall	150-mm wall	200-mm wall	250-mm wall
Single-storey concrete construction supporting a wood-frame roof structure						
2.44	10M @ 450	10M @ 300	10M @ 150	15M @ 400	15M @ 400	15M @ 400
3.05	10M @ 450	10M @ 300	10M @ 150	15M @ 400	15M @ 400	15M @ 400
3.66	10M @ 450	10M @ 300	10M @ 150	15M @ 400	15M @ 400	15M @ 400
Ground floor concrete construction supporting a second storey wood frame and wood-frame roof structure						
2.44	10M @ 450	10M @ 300	10M @ 150	15M @ 400	15M @ 400	15M @ 400
3.05	10M @ 450	10M @ 300	10M @ 150	15M @ 400	15M @ 400	15M @ 400
3.66	10M @ 450	10M @ 300	10M @ 150	15M @ 400	15M @ 400	15M @ 400
Ground floor concrete construction supporting a second storey concrete construction and a wood-frame roof structure						
2.44	10M @ 450	10M @ 300	10M @ 150	15M @ 400	15M @ 400	15M @ 400
3.05	10M @ 450	10M @ 300	10M @ 150	15M @ 400	15M @ 400	15M @ 400
3.66	10M @ 450	10M @ 300	10M @ 150	15M @ 400	15M @ 400	15M @ 400

Notes:

- 1 The table above is based on the following assumptions:
- The design is applicable to seismic zones up to $S_a(0.2) = 1.2$ for Site Class C.
 - Applicable to a maximum wind pressure of 3.18 kPa.
 - For allowable building dimensions and floor and roof clear spans, see Note 1 to the Vertical and horizontal steel reinforcement for below-grade walls table.
 - For assumed loads, see Note 1 to the Vertical and horizontal steel reinforcement for below-grade walls table.
 - For concrete and steel material properties, see Note 1 to the Vertical and horizontal steel reinforcement for below-grade walls table.
 - Minimum concrete cover for vertical reinforcement is 38 mm from the inside face (tension face) of concrete.
 - Minimum concrete cover for horizontal reinforcement is 28 mm from the inside face of concrete.
 - A minimum of two 10M bars should be placed around all openings and must extend at least 600 mm beyond each corner of the opening.

Minimum steel reinforcement of lintels with a 250-mm core ⁽¹⁾ ⁽²⁾

Opening width (mm)	Factored uniformly distributed load (kN/m)													
	2.0		5.0		10.0		15.0		20.0		25.0		30.0	
	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)
1 000	1-15M	0	1-15M	0	1-15M	0	1-15M	0	1-15M	0	1-15M	0	1-15M	0
1 500	1-15M	0	1-15M	0	1-15M	0	1-15M	0	1-15M	0	1-15M	0	1-15M	55
2 000	1-15M	0	1-15M	0	1-15M	0	1-15M	0	1-15M	0	1-15M	167	1-15M	305
2 500	1-15M	0	1-15M	0	1-15M	0	1-15M	0	1-15M	208	1-15M	417	1-20M	555
3 000	1-15M	0	1-15M	0	1-15M	0	1-15M	111	1-15M	458	1-20M	667	1-20M	805
3 500	1-15M	0	1-15M	0	1-15M	0	1-15M	361	1-20M	708	2-15M	917	1-25M	1 055
4 000	1-15M	0	1-15M	0	1-15M	0	1-20M	611	2-15M	958	1-25M	1 167	2-20M	1 305
4 500	1-15M	0	1-15M	0	1-20M	166	2-15M	861	1-25M	1208	2-20M	1 417	2-25M	1 555
5 000	1-15M	0	1-15M	0	1-20M	416	1-25M	1 111	2-20M	1458	2-25M	1 667	2-25M	1 805

Notes:

- 1 The table above is based on the following assumptions:
- The factored uniformly distributed load includes live and dead loads, not including the weight of the lintel.
 - The minimum height of the lintel is 200 mm.
 - Stirrups are single leg fabricated from 10M bars spaced at 100 mm on centre.
 - Lintel reinforcing is located at the bottom of the lintel and projects 600 mm into the lintel support on each side.
 - Specified compressive strength of concrete, @ 28 days f_c , is 20 MPa.
 - Specified yield strength of reinforcement, f_y , is 400 MPa.
 - A minimum of two 10M bars should be placed around all openings and must extend at least 600 mm beyond each corner of the opening.
- 2 Table cells without a value indicate that the load is not feasible. Engineering input is required.

Minimum steel reinforcement of lintels with a 200-mm core ⁽¹⁾ ⁽²⁾

Opening width (mm)	Factored uniformly distributed load (kN/m)													
	2.0		5.0		10.0		15.0		20.0		25.0		30.0	
	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)
1 000	1-15M	0	1-15M	0	1-15M	0	1-15M	0	1-15M	0	1-15M	0	1-15M	0

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Opening width (mm)	Factored uniformly distributed load (kN/m)													
	2.0		5.0		10.0		15.0		20.0		25.0		30.0	
	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)
1 500	1-15M	0	1-15M	0	1-15M	0	1-15M	0	1-15M	0	1-15M	83	1-15M	194
2 000	1-15M	0	1-15M	0	1-15M	0	1-15M	0	1-15M	167	1-15M	333	1-15M	444
2 500	1-15M	0	1-15M	0	1-15M	0	1-15M	139	1-15M	417	1-15M	583	1-20M	694
3 000	1-15M	0	1-15M	0	1-15M	0	1-15M	389	1-15M	667	1-20M	83	2-15M	944
3 500	1-15M	0	1-15M	0	1-15M	83	1-15M	639	1-20M	917	2-15M	1 083	1-25M	1 194
4 000	1-15M	0	1-15M	0	1-15M	333	1-20M	889	2-15M	1 167	1-25M	1 333	2-20M	1 444
4 500	1-15M	0	1-15M	0	1-20M	583	2-15M	1 139	1-25M	1 417	1-30M	1 583	2-25M	1 694
5 000	1-15M	0	1-15M	0	1-20M	833	1-25M	1 389	1-30M	1 667	2-25M	1 833	–	–

Notes:

- 1 The table above is based on the following assumptions:
- The factored uniformly distributed load includes live and dead loads, not including the weight of the lintel.
 - The minimum height of the lintel is 419 mm.
 - Stirrups are single leg fabricated from 10M bars spaced at 200 mm on centre.
 - Lintel reinforcing is located at the bottom of the lintel and projects 600 mm into the lintel support on each side.
 - Specified compressive strength of concrete, @ 28 days f'_c , is 20 MPa.
 - Specified yield strength of reinforcement, f_y , is 400 MPa.
 - A minimum of two 10M bars should be placed around all openings and must extend at least 600 mm beyond each corner of the opening.
- 2 Table cells without a value indicate that the load is not feasible. Engineering input is required.

Minimum steel reinforcement of lintels with a 150-mm core (1) (2)

Opening width (mm)	Factored uniformly distributed load (kN/m)													
	2.0		5.0		10.0		15.0		20.0		25.0		30.0	
	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)
1 000	1-15M	0	1-15M	0	1-15M	0	1-15M	0	1-15M	0	1-15M	0	1-15M	83
1 500	1-15M	0	1-15M	0	1-15M	0	1-15M	0	1-15M	125	1-15M	250	1-15M	333
2 000	1-15M	0	1-15M	0	1-15M	0	1-15M	167	1-15M	375	1-15M	500	1-15M	583
2 500	1-15M	0	1-15M	0	1-15M	0	1-15M	417	1-15M	625	1-15M	750	1-20M	833
3 000	1-15M	0	1-15M	0	1-15M	250	1-15M	667	1-15M	875	1-20M	1 000	2-15M	1 083

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Opening width (mm)	Factored uniformly distributed load (kN/m)													
	2.0		5.0		10.0		15.0		20.0		25.0		30.0	
	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)	Bottom steel	Stirrup end dist. (mm)
3 500	1-15M	0	1-15M	0	1-15M	500	1-20M	917	1-20M	1 125	2-15M	1 250	1-25M	1 333
4 000	1-15M	0	1-15M	0	1-15M	750	1-20M	1 167	2-15M	1 375	1-25M	1 500	–	–
4 500	1-15M	0	1-15M	0	1-20M	1 000	2-15M	1 417	1-25M	1 625	–	–	–	–
5 000	1-15M	0	1-15M	0	1-20M	1 250	1-25M	1 667	–	–	–	–	–	–

Notes:

- 1 The table above is based on the following assumptions:
- The factored uniformly distributed load includes live and dead loads, not including the weight of the lintel.
 - The minimum height of the lintel is 629 mm.
 - Stirrups are single leg fabricated from 10M bars spaced at 300 mm on centre.
 - Lintel reinforcing is located at the bottom of the lintel and projects 600 mm into the lintel support on each side.
 - Specified compressive strength of concrete, @ 28 days f'_c , is 20 MPa.
 - Specified yield strength of reinforcement, f_y , is 400 MPa.
 - A minimum of two 10M bars should be placed around all openings and must extend at least 600 mm beyond each corner of the opening.
- 2 Table cells without a value indicate that the load is not feasible. Engineering input is required.

Table 2.
Minimum solid shear wall length for wind pressure equal to 0.35 kPa ⁽¹⁾

Length (m)	Width (m)	150-mm thick wall (mm)				200-mm thick wall (mm)				250-mm thick wall (mm)			
		2 nd floor		1 st floor		2 nd floor		1 st floor		2 nd floor		1 st floor	
		Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.
9	6	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	12	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	15	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	18	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	21	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	24	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83

Length (m)	Width (m)	150-mm thick wall (mm)				200-mm thick wall (mm)				250-mm thick wall (mm)			
		2 nd floor		1 st floor		2 nd floor		1 st floor		2 nd floor		1 st floor	
		Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.
18	6	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	12	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	15	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	18	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	21	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	24	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83

Notes:

- 1 The table above is based on the following assumptions:
- Linear interpolation is permitted between hourly wind pressure and building lengths.
 - Design applicable to type A soil.
 - The minimum shear wall length is the maximum of either 1.2 m or height/2 or 6 × wall thickness.
 - Specified compressive strength of concrete, @ 28 days f'_c , is 20 MPa.
 - Specified yield strength of reinforcement, f_y , is 400 MPa.

Minimum solid shear wall length for wind pressure equal to 0.45 kPa ⁽¹⁾

Length (m)	Width (m)	150-mm-thick wall (mm)				200-mm-thick wall (mm)				250-mm-thick wall (mm)			
		2 nd floor		1 st floor		2 nd floor		1 st floor		2 nd floor		1 st floor	
		Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.
9	6	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	12	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	15	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	18	1.83	1.83	1.83	1.87	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	21	1.83	1.83	1.83	1.87	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	24	1.83	1.83	1.83	2.18	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
18	6	1.83	1.83	1.83	2.49	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	12	1.83	1.83	1.83	1.87	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	15	1.83	1.83	1.83	1.87	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	18	1.83	1.83	1.87	1.87	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83

Length (m)	Width (m)	150-mm-thick wall (mm)				200-mm-thick wall (mm)				250-mm-thick wall (mm)			
		2 nd floor		1 st floor		2 nd floor		1 st floor		2 nd floor		1 st floor	
		Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.
	21	1.83	1.83	1.87	2.18	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	24	1.83	1.83	1.87	2.49	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83

Note:

- 1 The table above is based on the following assumptions:
- Linear interpolation is permitted between hourly wind pressure and building lengths.
 - Design applicable to type A soil.
 - The minimum shear wall length is the maximum of either 1.2 m or height/2 or 6 × wall thickness.
 - Specified compressive strength of concrete, @ 28 days f'_c , is 20 MPa.
 - Specified yield strength of reinforcement, f_y , is 400 MPa.

Minimum solid shear wall length for wind pressure equal to 0.55 kPa ⁽¹⁾

Length (m)	Width (m)	150-mm-thick wall (mm)				200-mm-thick wall (mm)				250-mm-thick wall (mm)			
		2 nd floor		1 st floor		2 nd floor		1 st floor		2 nd floor		1 st floor	
		Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.
9	6	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	12	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	15	1.83	1.83	1.83	1.90	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	18	1.83	1.83	1.83	2.29	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	21	1.83	1.83	1.83	2.67	1.83	1.83	1.83	1.91	1.83	1.83	1.83	1.83
	24	1.83	1.83	1.83	3.05	1.83	1.83	1.83	2.18	1.83	1.83	1.83	1.83
18	6	1.83	1.83	1.83	2.29	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	12	1.83	1.83	1.83	2.29	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	15	1.83	1.83	1.90	2.29	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	18	1.83	1.83	2.29	2.29	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	21	1.83	1.83	2.29	2.67	1.83	1.83	1.83	1.91	1.83	1.83	1.83	1.83
	24	1.83	1.83	2.29	3.05	1.83	1.83	1.83	2.18	1.83	1.83	1.83	1.83

Note:

1 The table above is based on the following assumptions:

- Linear interpolation is permitted between hourly wind pressure and building lengths.
- Design applicable to type A soil.
- The minimum shear wall length is the maximum of either 1.2 m or height/2 or 6 × wall thickness.
- Specified compressive strength of concrete, @ 28 days f_c , is 20 MPa.
- Specified yield strength of reinforcement, f_y , is 400 MPa.

Minimum solid shear wall length for wind pressure equal to 0.65 kPa ⁽¹⁾

Length (m)	Width (m)	150-mm-thick wall (mm)				200-mm-thick wall (mm)				250-mm-thick wall (mm)			
		2 nd floor		1 st floor		2 nd floor		1 st floor		2 nd floor		1 st floor	
		Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.
9	6	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	12	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	15	1.83	1.83	1.83	2.25	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	18	1.83	1.83	1.83	2.70	1.83	1.83	1.83	1.93	1.83	1.83	1.83	1.83
	21	1.83	1.83	1.83	3.15	1.83	1.83	1.83	2.26	1.83	1.83	1.83	1.83
	24	1.83	1.83	1.83	3.60	1.83	1.83	1.83	2.58	1.83	1.83	1.83	1.83
18	6	1.83	1.83	1.83	2.70	1.83	1.83	1.83	1.93	1.83	1.83	1.83	1.83
	12	1.83	1.83	1.83	2.70	1.83	1.83	1.83	1.93	1.83	1.83	1.83	1.83
	15	1.83	1.83	2.25	2.70	1.83	1.83	1.83	1.93	1.83	1.83	1.83	1.83
	18	1.83	1.83	2.70	2.70	1.83	1.83	1.93	1.93	1.83	1.83	1.83	1.83
	21	1.83	1.83	2.70	3.15	1.83	1.83	1.93	2.26	1.83	1.83	1.83	1.83
	24	1.83	1.83	2.70	3.60	1.83	1.83	1.93	2.58	1.83	1.83	1.83	1.93

Note:

1 The table above is based on the following assumptions:

- Linear interpolation is permitted between hourly wind pressure and building lengths.
- Design applicable to type A soil.
- The minimum shear wall length is the maximum of either 1.2 m or height/2 or 6 × wall thickness.
- Specified compressive strength of concrete, @ 28 days f_c , is 20 MPa.
- Specified yield strength of reinforcement, f_y , is 400 MPa.

Minimum solid shear wall length for wind pressure equal to 0.75 kPa ⁽¹⁾

Length (m)	Width (m)	150-mm-thick wall (mm)				200-mm-thick wall (mm)				250-mm-thick wall (mm)			
		2 nd floor		1 st floor		2 nd floor		1 st floor		2 nd floor		1 st floor	
		Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.
9	6	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	12	1.83	1.83	1.83	2.08	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	15	1.83	1.83	1.83	2.60	1.83	1.83	1.83	1.86	1.83	1.83	1.83	1.83
	18	1.83	1.83	1.83	3.12	1.83	1.83	1.83	2.23	1.83	1.83	1.83	1.83
	21	1.83	1.83	1.83	3.64	1.83	1.83	1.83	2.60	1.83	1.83	1.83	1.95
	24	1.83	2.08	1.83	4.15	1.83	1.83	1.83	2.98	1.83	1.83	1.83	2.23
18	6	1.83	1.83	1.83	3.12	1.83	1.83	1.83	2.23	1.83	1.83	1.83	1.83
	12	1.83	1.83	2.08	3.12	1.83	1.83	1.83	2.23	1.83	1.83	1.83	1.83
	15	1.83	1.83	2.60	3.12	1.83	1.83	1.86	2.23	1.83	1.83	1.83	1.83
	18	1.83	1.83	3.12	3.12	1.83	1.83	2.23	2.23	1.83	1.83	1.83	1.83
	21	1.83	1.83	3.12	3.64	1.83	1.83	2.23	2.60	1.83	1.83	1.83	1.95
	24	1.83	2.08	3.12	4.15	1.83	1.83	2.23	2.98	1.83	1.83	1.83	2.23

Note:

- 1 The table above is based on the following assumptions:
- Linear interpolation is permitted between hourly wind pressure and building lengths.
 - Design applicable to type A soil.
 - The minimum shear wall length is the maximum of either 1.2 m or height/2 or 6 × wall thickness.
 - Specified compressive strength of concrete, @ 28 days f_c , is 20 MPa.
 - Specified yield strength of reinforcement, f_y , is 400 MPa.

Minimum solid shear wall length for wind pressure equal to 0.85 kPa ⁽¹⁾

Length (m)	Width (m)	150-mm-thick wall (mm)				200-mm-thick wall (mm)				250-mm-thick wall (mm)			
		2 nd floor		1 st floor		2 nd floor		1 st floor		2 nd floor		1 st floor	
		Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.
9	6	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	12	1.83	1.83	1.83	2.08	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	15	1.83	1.83	1.83	2.60	1.83	1.83	1.83	2.11	1.83	1.83	1.83	1.83
	18	1.83	1.83	1.83	3.12	1.83	1.83	1.83	2.53	1.83	1.83	1.83	1.90

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Length (m)	Width (m)	150-mm-thick wall (mm)				200-mm-thick wall (mm)				250-mm-thick wall (mm)			
		2 nd floor		1 st floor		2 nd floor		1 st floor		2 nd floor		1 st floor	
		Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.
	21	1.83	2.06	1.83	3.64	1.83	1.83	1.83	2.95	1.83	1.83	1.83	2.21
	24	1.83	2.35	1.83	4.15	1.83	1.83	1.83	3.37	1.83	1.83	1.83	2.53
18	6	1.83	1.83	1.83	3.12	1.83	1.83	1.83	2.53	1.83	1.83	1.83	1.90
	12	1.83	1.83	2.35	3.12	1.83	1.83	1.83	2.53	1.83	1.83	1.83	1.90
	15	1.83	1.83	2.94	3.12	1.83	1.83	2.11	2.53	1.83	1.83	1.83	1.90
	18	1.83	1.83	3.53	3.12	1.83	1.83	2.53	2.53	1.83	1.83	1.90	1.90
	21	1.83	2.06	3.53	3.64	1.83	1.83	2.53	2.95	1.83	1.83	1.90	2.21
	24	1.47	2.35	3.53	4.15	1.83	1.83	2.53	3.37	1.83	1.83	1.90	2.53

Note:

- 1 The table above is based on the following assumptions:
- Linear interpolation is permitted between hourly wind pressure and building lengths.
 - Design applicable to type A soil.
 - The minimum shear wall length is the maximum of either 1.2 m or height/2 or 6 × wall thickness.
 - Specified compressive strength of concrete, @ 28 days f_c , is 20 MPa.
 - Specified yield strength of reinforcement, f_y , is 400 MPa.

Minimum solid shear wall length for wind pressure equal to 0.95 kPa ⁽¹⁾

Length (m)	Width (m)	150-mm-thick wall (mm)				200-mm-thick wall (mm)				250-mm-thick wall (mm)			
		2 nd floor		1 st floor		2 nd floor		1 st floor		2 nd floor		1 st floor	
		Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.
9	6	1.83	1.83	1.83	1.97	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	12	1.83	1.83	1.97	2.63	1.83	1.83	1.83	1.88	1.83	1.83	1.83	1.83
	15	1.83	1.83	1.97	3.29	1.83	1.83	1.83	2.36	1.83	1.83	1.83	1.83
	18	1.83	1.97	1.97	3.95	1.83	1.83	1.83	2.83	1.83	1.83	1.83	2.12
	21	1.83	2.30	1.97	4.60	1.83	1.83	1.83	3.30	1.83	1.83	1.83	2.47
	24	1.83	2.63	1.97	5.26	1.83	1.88	1.83	3.77	1.83	1.83	1.83	2.82
18	6	1.83	1.97	1.83	3.95	1.83	1.83	1.83	2.83	1.83	1.83	1.83	2.12
	12	1.83	1.97	2.63	3.95	1.83	1.83	1.88	2.83	1.83	1.83	1.83	2.12
	15	1.83	1.97	3.29	3.95	1.83	1.83	2.36	2.83	1.83	1.83	1.83	2.12
	18	1.97	1.97	3.95	3.95	1.83	1.83	2.83	2.83	1.83	1.83	2.12	2.12

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Length (m)	Width (m)	150-mm-thick wall (mm)				200-mm-thick wall (mm)				250-mm-thick wall (mm)			
		2 nd floor		1 st floor		2 nd floor		1 st floor		2 nd floor		1 st floor	
		Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.
	21	1.97	2.30	3.95	4.60	1.83	1.83	2.83	3.30	1.83	1.83	2.12	2.47
	24	1.97	2.63	3.95	5.26	1.83	1.88	2.83	3.77	1.83	1.83	2.12	2.82

Note:

- 1 The table above is based on the following assumptions:
- Linear interpolation is permitted between hourly wind pressure and building lengths.
 - Design applicable to type A soil.
 - The minimum shear wall length is the maximum of either 1.2 m or height/2 or 6 × wall thickness.
 - Specified compressive strength of concrete, @ 28 days f'_c , is 20 MPa.
 - Specified yield strength of reinforcement, f_y , is 400 MPa.

Minimum solid shear wall length for wind pressure equal to 1.05 kPa ⁽¹⁾

Length (m)	Width (m)	150-mm-thick wall (mm)				200-mm-thick wall (mm)				250-mm-thick wall (mm)			
		2 nd floor		1 st floor		2 nd floor		1 st floor		2 nd floor		1 st floor	
		Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.
9	6	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	12	1.83	1.83	2.18	2.91	1.83	1.83	1.83	2.08	1.83	1.83	1.83	1.83
	15	1.83	1.83	2.18	3.64	1.83	1.83	1.83	2.60	1.83	1.83	1.83	1.95
	18	1.83	2.18	2.18	4.36	1.83	1.83	1.83	3.12	1.83	1.83	1.83	2.34
	21	1.83	2.54	2.18	5.09	1.83	1.83	1.83	3.65	1.83	1.83	1.83	2.73
	24	1.83	2.91	2.18	5.82	1.83	2.08	1.83	4.17	1.83	1.83	1.83	3.12
18	6	1.83	2.18	1.83	4.36	1.83	1.83	1.83	3.12	1.83	1.83	1.83	2.34
	12	1.83	2.18	2.91	4.36	1.83	1.83	2.08	3.12	1.83	1.83	1.83	2.34
	15	1.83	2.18	3.64	4.36	1.83	1.83	2.60	3.12	1.83	1.83	1.95	2.34
	18	2.18	2.18	4.36	4.36	1.83	1.83	3.12	3.12	1.83	1.83	2.34	2.34
	21	2.18	2.54	4.36	5.09	1.83	1.83	3.12	3.65	1.83	1.83	2.34	2.73
	24	2.18	2.91	4.36	5.82	1.83	2.08	3.12	4.17	1.83	1.83	2.34	3.12

Note:

1 The table above is based on the following assumptions:

- Linear interpolation is permitted between hourly wind pressure and building lengths.
- Design applicable to type A soil.
- The minimum shear wall length is the maximum of either 1.2 m or height/2 or 6 × wall thickness.
- Specified compressive strength of concrete, @ 28 days f_c , is 20 MPa.
- Specified yield strength of reinforcement, f_y , is 400 MPa.

Minimum solid shear wall length for wind pressure equal to 1.25 kPa ⁽¹⁾

Length (m)	Width (m)	150-mm-thick wall (mm)				200-mm-thick wall (mm)				250-mm-thick wall (mm)			
		2 nd floor		1 st floor		2 nd floor		1 st floor		2 nd floor		1 st floor	
		Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.	Short dir.	Long dir.
9	6	1.83	1.83	1.83	2.60	1.83	1.83	1.83	1.86	1.83	1.83	1.83	1.83
	12	1.83	1.83	2.60	3.46	1.83	1.83	1.86	2.48	1.83	1.83	1.83	1.86
	15	1.83	2.16	2.60	4.33	1.83	1.83	1.86	3.10	1.83	1.83	1.83	2.32
	18	1.83	2.60	2.60	5.19	1.83	1.86	1.86	3.72	1.83	1.83	1.83	2.79
	21	1.83	3.03	2.60	6.06	1.83	2.17	1.86	4.34	1.83	1.83	1.83	3.25
	24	1.83	3.46	2.60	6.92	1.83	2.48	1.86	4.96	1.83	1.86	1.83	3.72
18	6	1.83	2.60	1.83	5.19	1.83	1.86	1.83	3.72	1.83	1.83	1.83	2.79
	12	1.83	2.60	3.46	5.19	1.83	1.86	2.48	3.72	1.83	1.83	1.86	2.79
	15	2.16	2.60	4.33	5.19	1.83	1.86	3.10	3.72	1.83	1.83	2.32	2.79
	18	2.60	2.60	5.19	5.19	1.86	1.86	3.72	3.72	1.83	1.83	2.79	2.79
	21	2.60	3.03	5.19	6.06	1.86	2.17	3.72	4.34	1.83	1.83	2.79	3.25
	24	2.60	3.46	5.19	6.92	1.86	2.48	3.72	4.96	1.83	1.86	2.79	3.72

Note:

1 The table above is based on the following assumptions:

- Linear interpolation is permitted between hourly wind pressure and building lengths.
- Design applicable to type A soil.
- The minimum shear wall length is the maximum of either 1.2 m or height/2 or 6 × wall thickness.
- Specified compressive strength of concrete, @ 28 days f_c , is 20 MPa.
- Specified yield strength of reinforcement, f_y , is 400 MPa.

Minimum solid wall length for $S_a(0.2) \leq 0.2$ ⁽¹⁾ and type D soil

Width (m)	Length (m)	Wall thickness (mm)					
		150 mm		200 mm		250 mm	
		2 nd floor	1 st floor	2 nd floor	1 st floor	2 nd floor	1 st floor
12	6	1.83	1.83	1.83	1.83	1.83	1.83
	12	1.83	1.83	1.83	1.83	1.83	1.83
	15	1.83	1.83	1.83	1.83	1.83	1.83
	18	1.83	1.83	1.83	1.83	1.83	1.83
	21	1.83	1.83	1.83	1.83	1.83	1.83
	24	1.83	1.83	1.83	1.83	1.83	1.83
18	6	1.83	1.83	1.83	1.83	1.83	1.83
	12	1.83	1.83	1.83	1.83	1.83	1.83
	15	1.83	1.93	1.83	1.83	1.83	1.83
	18	1.83	2.18	1.83	1.83	1.83	1.83
	21	1.83	2.43	1.83	2.00	1.83	1.83
	24	1.83	2.68	1.83	2.20	1.83	1.86

Note:

- 1 The table above is based on the following assumptions:
- Linear interpolation is permitted between hourly wind pressures and building lengths.
 - The design is applicable to type D soil.
 - The maximum wall height is 3.66 m for each floor.
 - Specified compressive strength of concrete, @ 28 days, f'_c , is 20 MPa.
 - Specified yield strength of reinforcement, f_y , is 400 MPa.

Minimum solid wall length for $S_a(0.2) = 0.3$ ⁽¹⁾ and type D soil

Width (m)	Length (m)	Wall thickness (mm)					
		150 mm		200 mm		250 mm	
		2 nd floor	1 st floor	2 nd floor	1 st floor	2 nd floor	1 st floor
12	6	1.83	1.83	1.83	1.83	1.83	1.83
	12	1.83	1.83	1.83	1.83	1.83	1.83
	15	1.83	1.84	1.83	1.83	1.83	1.83
	18	1.83	2.11	1.83	1.83	1.83	1.83
	21	1.83	2.38	1.83	2.00	1.83	1.83
	24	1.83	2.64	1.83	2.22	1.83	1.91

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Width (m)	Length (m)	Wall thickness (mm)					
		150 mm		200 mm		250 mm	
		2 nd floor	1 st floor	2 nd floor	1 st floor	2 nd floor	1 st floor
18	6	1.83	1.83	1.83	1.83	1.83	1.83
	12	1.83	2.48	1.83	2.07	1.83	1.83
	15	1.83	2.85	1.83	2.37	1.83	2.02
	18	1.83	3.22	1.83	2.66	1.83	2.26
	21	2.01	3.59	1.83	2.96	1.83	2.51
	24	2.22	3.96	1.83	3.25	1.83	2.75

Note:

- 1 The table above is based on the following assumptions:
- Linear interpolation is permitted between hourly wind pressures and building lengths.
 - The design is applicable to type D soil.
 - The maximum wall height is 3.66 m for each floor.
 - Specified compressive strength of concrete, @ 28 days, f_c , is 20 MPa.
 - Specified yield strength of reinforcement, f_y , is 400 MPa.

Minimum solid wall length for $S_a(0.2) = 0.45$ ⁽¹⁾ and type D soil

Width (m)	Length (m)	Wall thickness (mm)					
		150 mm		200 mm		250 mm	
		2 nd floor	1 st floor	2 nd floor	1 st floor	2 nd floor	1 st floor
12	6	1.83	1.83	1.83	1.83	1.83	1.83
	12	1.83	2.25	1.83	1.91	1.83	1.83
	15	1.83	2.63	1.83	2.22	1.83	1.92
	18	1.83	3.01	1.83	2.54	1.83	2.19
	21	1.83	3.40	1.83	2.86	1.83	2.46
	24	2.04	3.78	1.83	3.17	1.83	2.73
18	6	1.83	2.48	1.83	2.12	1.83	1.84
	12	1.93	3.54	1.83	2.96	1.83	2.54
	15	2.24	4.07	1.83	3.38	1.83	2.89
	18	2.55	4.60	2.07	3.81	1.83	3.23
	21	2.87	5.13	2.32	4.23	1.93	3.58
	24	3.18	5.66	2.56	4.65	2.13	3.93

Note:

- 1 The table above is based on the following assumptions:
- Linear interpolation is permitted between hourly wind pressures and building lengths.
 - The design is applicable to type D soil.
 - The maximum wall height is 3.66 m for each floor.
 - Specified compressive strength of concrete, @ 28 days, f_c , is 20 MPa.
 - Specified yield strength of reinforcement, f_y , is 400 MPa.

Minimum solid wall length for $S_a(0.2) = 0.66$ ⁽¹⁾ and type D soil

Width (m)	Length (m)	Wall thickness (mm)					
		150 mm		200 mm		250 mm	
		2 nd floor	1 st floor	2 nd floor	1 st floor	2 nd floor	1 st floor
12	6	1.83	2.07	1.83	1.83	1.83	1.83
	12	1.83	3.14	1.83	2.67	1.83	2.31
	15	1.96	3.68	1.83	3.11	1.83	2.69
	18	2.26	4.21	1.87	3.55	1.83	3.06
	21	2.56	4.75	2.11	4.00	1.83	3.44
	24	2.86	5.29	2.36	4.44	2.00	3.82
18	6	1.83	3.47	1.83	2.96	1.93	2.58
	12	2.70	4.96	2.22	4.14	1.87	3.55
	15	3.14	5.70	2.56	4.73	2.15	4.04
	18	3.58	6.44	2.90	5.33	2.43	4.52
	21	4.01	7.18	3.24	5.92	2.71	5.01
	24	4.45	7.92	3.59	6.51	2.98	5.50

Note:

- 1 The table above is based on the following assumptions:
- Linear interpolation is permitted between hourly wind pressures and building lengths.
 - The design is applicable to type D soil.
 - The maximum wall height is 3.66 m for each floor.
 - Specified compressive strength of concrete, @ 28 days, f_c , is 20 MPa.
 - Specified yield strength of reinforcement, f_y , is 400 MPa.

Minimum solid wall length for $S_a(0.2) = 0.75$ ⁽¹⁾ and type D soil

Width (m)	Length (m)	Wall thickness (mm)					
		150 mm		200 mm		250 mm	
		2 nd floor	1 st floor	2 nd floor	1 st floor	2 nd floor	1 st floor
12	6	1.83	2.22	1.83	1.91	1.83	1.83
	12	1.83	3.37	1.83	2.86	1.83	2.48
	15	2.11	3.95	1.83	3.34	1.83	2.89
	18	2.43	4.53	2.01	3.82	1.83	3.29
	21	2.75	5.10	2.27	4.29	1.93	3.69
	24	3.07	5.68	2.53	4.77	2.15	4.10
18	6	1.96	3.73	1.83	3.18	1.83	2.77
	12	2.90	5.32	2.38	4.45	2.01	3.81
	15	3.37	6.12	2.75	5.08	2.31	3.34
	18	3.84	6.92	3.11	5.72	2.61	4.86
	21	4.31	7.71	3.48	6.35	2.91	5.38
	24	4.78	8.51	3.85	6.99	3.20	5.91

Note:

- 1 The table above is based on the following assumptions:
- Linear interpolation is permitted between hourly wind pressures and building lengths.
 - The design is applicable to type D soil.
 - The maximum wall height is 3.66 m for each floor.
 - Specified compressive strength of concrete, @ 28 days, f'_c , is 20 MPa.
 - Specified yield strength of reinforcement, f_y , is 400 MPa.

Minimum solid wall Length for $S_a(0.2) = 0.94$ ⁽¹⁾ and type D soil

Width (m)	Length (m)	Wall thickness (mm)					
		150 mm		200 mm		250 mm	
		2 nd floor	1 st floor	2 nd floor	1 st floor	2 nd floor	1 st floor
12	6	1.83	2.78	1.83	2.39	1.83	2.09
	12	2.24	4.23	1.87	3.59	1.83	3.11
	15	2.64	4.95	2.19	4.19	1.87	3.62
	18	3.04	5.67	2.52	4.78	2.14	4.12
	21	3.44	6.40	2.85	5.38	2.42	4.63
	24	3.84	7.12	3.17	5.98	2.69	5.14

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Width (m)	Length (m)	Wall thickness (mm)					
		150 mm		200 mm		250 mm	
		2 nd floor	1 st floor	2 nd floor	1 st floor	2 nd floor	1 st floor
18	6	2.45	4.68	2.06	3.99	1.83	3.47
	12	3.63	6.67	2.98	5.58	2.52	4.78
	15	4.22	7.67	3.44	6.37	2.89	5.43
	18	4.81	8.76	3.90	7.17	3.27	6.09
	21	5.40	9.67	4.36	7.96	3.64	6.75
	24	5.99	10.66	4.83	8.76	4.02	7.40

Note:

- 1 The table above is based on the following assumptions:
- Linear interpolation is permitted between hourly wind pressures and building lengths.
 - The design is applicable to type D soil.
 - The maximum wall height is 3.66 m for each floor.
 - Specified compressive strength of concrete, @ 28 days, f_c , is 20 MPa.
 - Specified yield strength of reinforcement, f_y , is 400 MPa.

Minimum solid wall length for $S_a(0.2) = 1.2$ ⁽¹⁾ and type D soil

Width (m)	Length (m)	Wall thickness (mm)					
		150 mm		200 mm		250 mm	
		2 nd floor	1 st floor	2 nd floor	1 st floor	2 nd floor	1 st floor
12	6	1.83	3.49	1.83	3.00	1.83	2.62
	12	2.81	5.30	2.34	4.50	2.00	3.90
	15	3.31	6.21	2.75	5.25	2.35	4.53
	18	3.8	7.11	3.16	6.00	2.69	5.17
	21	4.31	8.02	3.57	6.47	3.03	5.80
	24	4.82	8.92	3.97	7.49	3.37	6.44
18	6	3.07	5.86	2.58	5.00	2.22	4.35
	12	4.55	8.36	3.74	6.99	3.16	5.99
	15	5.29	9.61	4.32	7.99	3.63	6.81
	18	6.03	10.86	4.89	8.98	4.10	7.63
	21	6.77	12.11	5.47	9.98	4.56	8.45
	24	7.51	13.36	6.05	10.98	5.03	9.28

Note:

- 1 The table above is based on the following assumptions:
- Linear interpolation is permitted between hourly wind pressures and building lengths.
 - The design is applicable to type D soil.
 - The maximum wall height is 3.66 m for each floor.
 - Specified compressive strength of concrete, @ 28 days, f_c , is 20 MPa.
 - Specified yield strength of reinforcement, f_y , is 400 MPa.

Minimum solid wall length for $S_a(0.2) = 2.3$ ⁽¹⁾ and type D soil ⁽²⁾

Width (m)	Length (m)	Wall thickness (mm)					
		150 mm		200 mm		250 mm	
		2 nd floor	1 st floor	2 nd floor	1 st floor	2 nd floor	1 st floor
12	6	–	–	2.71	5.32	2.35	4.66
	12	–	–	4.16	7.98	3.56	6.91
	15	–	–	–	–	4.16	8.04
	18	–	–	–	–	–	–
	21	–	–	–	–	–	–
	24	–	–	–	–	–	–
18	6	–	–	–	–	–	–
	12	–	–	–	–	5.60	10.63
	15	–	–	7.66	14.18	6.44	12.09
	18	–	–	8.68	15.94	7.27	13.55
	21	–	–	9.71	17.71	8.10	15.00
	24	–	–	–	–	8.93	16.46

Notes:

- 1 The table above is based on the following assumptions:
- Linear interpolation is permitted between hourly wind pressures and building lengths.
 - The design is applicable to type D soil.
 - The maximum wall height is 3.66 m for each floor.
 - Specified compressive strength of concrete, @ 28 days, f_c , is 20 MPa.
 - Specified yield strength of reinforcement, f_y , is 400 MPa.

- 2 Table cells without a value indicate that the design is not feasible.

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Code compliance as an acceptable solution

Code Compliance via Acceptable Solutions

If a building design (e.g. material, component, assembly or system) can be shown to meet all provisions of the applicable **acceptable solutions** in Division B (e.g. it complies with the applicable provisions of a referenced standard), it is deemed to have satisfied the objectives and functional statements linked to those provisions and thus to have complied with that part of the Code.

— National Building Code of Canada, Sentence A-1.2.1.1.(1)(a)

The CCMC has determined that compliance with this provision of the Code has been demonstrated as an **Acceptable Solution**. The evaluation report provides a summary of the basis of CCMC's compliance opinion.

CCMC's code compliance opinions

All CCMC evaluation reports are opinions of code compliance established in accordance with the National Building Code of Canada, Subsection 1.2.1. "Compliance with this Code," which requires compliance to be achieved by:

- complying with the applicable acceptable solutions in Division B, or
- using an alternative solution that will achieve at least the minimum level of performance required by Division B in the areas defined by the objective and functional statements attributed to the applicable acceptable solutions.

The CCMC assesses compliance with Canadian building, energy and safety codes, and is trusted by over 6,000 regulators across Canada.

Code compliance as an alternative solution

Code Compliance via Alternative Solutions

Where a design differs from the acceptable solutions in Division B, then it should be treated as an "**alternative solution**." A proponent of an alternative solution must demonstrate that the alternative solution addresses the same issues as the applicable acceptable solutions in Division B and their attributed objectives and functional statements. However, because the objectives and functional statements are entirely qualitative, demonstrating compliance with them in isolation is not possible. Therefore, Clause 1.2.1.1.(1)(b) identifies the principle that Division B establishes the quantitative performance targets that alternative solutions must meet. In many cases, these targets are not defined very precisely by the acceptable solutions [...] Nevertheless, Clause 1.2.1.1.(1)(b) makes it clear that an effort must be made to demonstrate that an alternative solution will perform as well as a design that would satisfy the applicable acceptable solutions in Division B—not "well enough" but "as well as."

— National Building Code of Canada, Sentence A-1.2.1.1.(1)(b)

The CCMC has determined that compliance with this provision of the Code has been demonstrated as an **Alternative Solution**. The evaluation report provides a summary of the basis of CCMC's compliance opinion.

CCMC's code compliance opinions

All CCMC evaluation reports are opinions of code compliance established in accordance with the National Building Code of Canada, Subsection 1.2.1. "Compliance with this Code," which requires compliance to be achieved by:

- complying with the applicable acceptable solutions in Division B, or
- using an alternative solution that will achieve at least the minimum level of performance required by Division B in the areas defined by the objective and functional statements attributed to the applicable acceptable solutions.

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