



Evaluation Report

CCMC 12938-R

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IntegraSpec®

1. Opinion

It is the opinion of the Canadian Construction Materials Centre (CCMC) that “IntegraSpec®,” when used as a wall forming system resulting in a monolithic concrete wall in accordance with the conditions and limitations stated in Section 3 of this Report, complies with the National Building Code of Canada (NBC) 2005:

- Clause 1.2.1.1.(1)(a), Division A, as an acceptable solution from Division B:
 - Article 4.3.3.1.,
 - Subsection 9.3.1.,
 - Section 9.4., and
 - Subsection 9.15.4.

This opinion is based on CCMC’s evaluation of the technical evidence in Section 4.1 provided by the Report holder.

Ruling No. 04-19-123 (12938-R) authorizing the use of this product in Ontario, subject to the terms and conditions contained in the Ruling, was made by the Minister of Municipal Affairs and Housing on 23-11-2004 pursuant to s.29 of the *Building Code Act, 1992* (see Ruling for terms and conditions). This Ruling is subject to periodic revisions and updates.

2. Description

“IntegraSpec®” units are modular, interlocking, concrete forms consisting of two expanded polystyrene (EPS) panels with equally spaced plastic inserts molded into the EPS panels. Interlocking plastic webs are inserted and locked during on-site assembly. The extremities of the plastic webs are flush with the exterior surface of the molds. The forms are dry-laid and stacked in a running (staggered) configuration. The stacked units form a rectangular space that, after being filled with concrete, form 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 1 219 mm in length and 311 mm in height with an overall wall thickness of 279 mm that, in turn, enclose a 152-mm-thick concrete wall.

The EPS face panels have a preformed interlocking mechanism along their top and bottom edges to facilitate stacking and to prevent the leakage of freshly placed concrete.

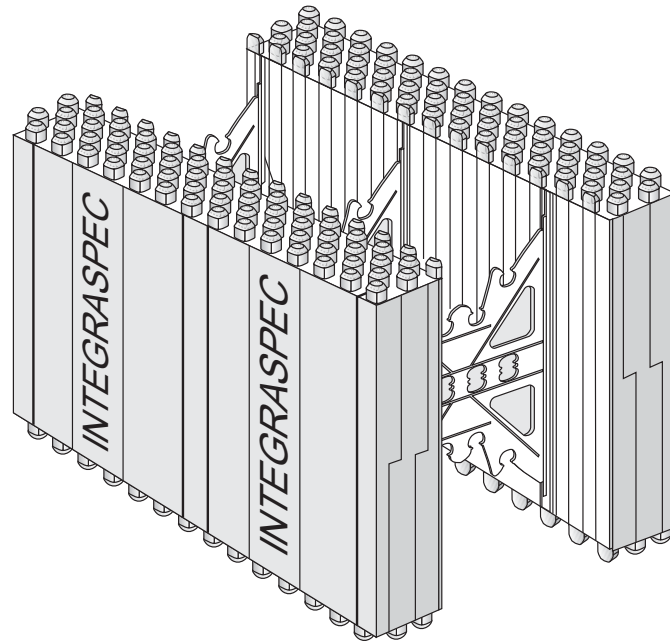


Figure 1. “IntegraSpec®” standard wall system unit.

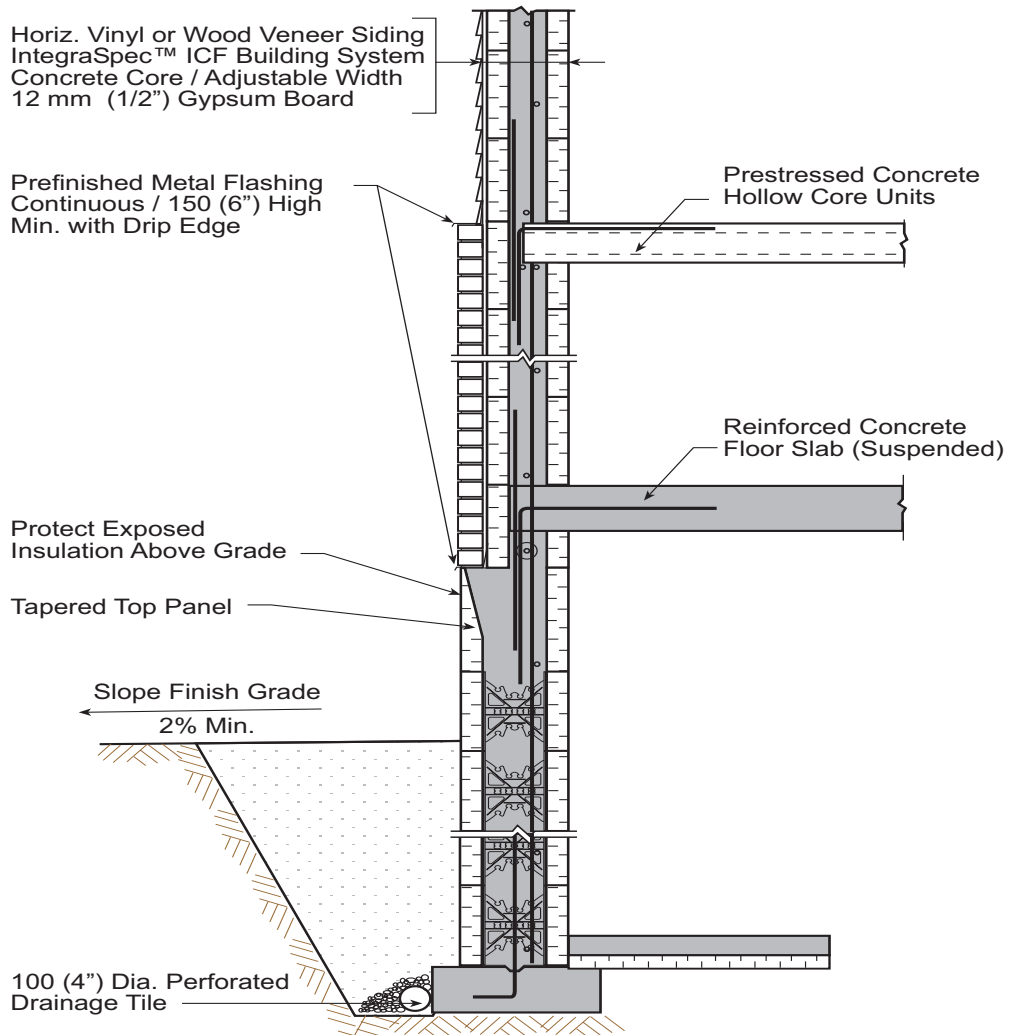


Figure 2. Typical section of “IntegraSpec®” wall system supporting brick, stone or concrete veneer.

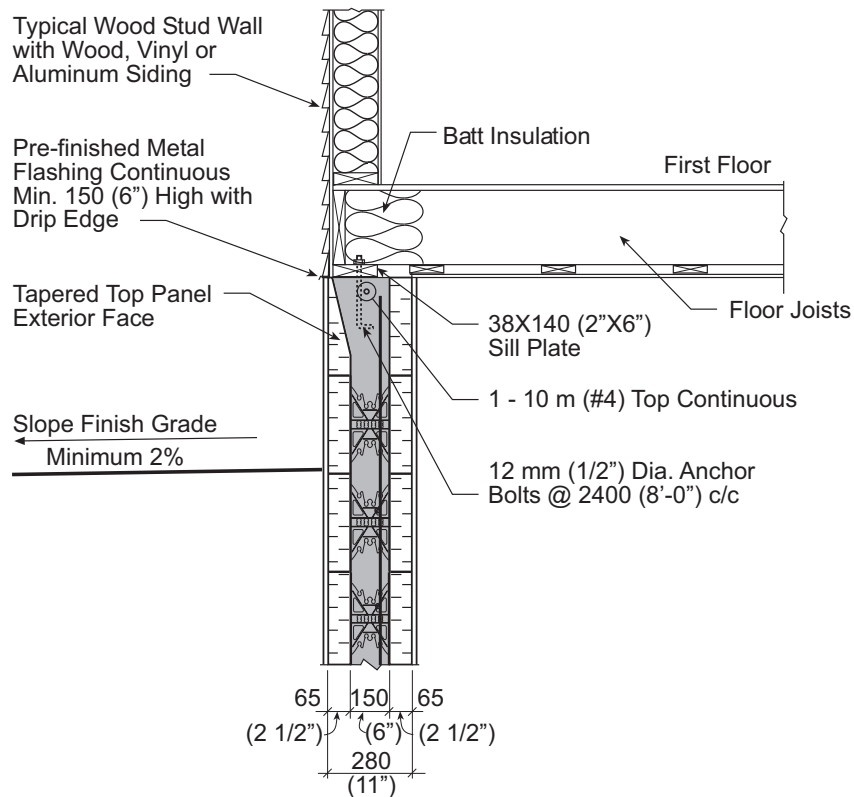


Figure 3. Typical section of “IntegraSpec®” wall system supporting wood, vinyl or aluminum siding.

3. Conditions and Limitations

CCMC’s compliance opinion in Section 1 is bound by “IntegraSpec®” being used in accordance with the conditions and limitations set out below.

The use of “IntegraSpec®” is permitted in the construction of houses and small buildings up to three storeys high, falling under the provisions of Part 9 of Division B of the NBC 2005, subject to the following conditions:

- The structural applications for “IntegraSpec®” must be in strict accordance with the design analysis as prepared for Phil-Insul Corporation by Adjeleian Allen Rubeli Limited, dated August 2003 (from which Tables 4.1.1, 4.1.2 and 4.1.3 have been reproduced). Detailed construction procedures are provided in the “Installation Manual Version 8.0,” dated March 2006.
- Aging of the “IntegraSpec®” EPS panels must be not less than three weeks from the date of manufacturing.
- The interior face of the “IntegraSpec®” panels shall be protected from the inside of the building in accordance with the NBC 2005, Division B, Sentence 9.10.17.10.(1).
- The exterior face of “IntegraSpec®” shall be protected with masonry veneer, siding or stucco conforming to the NBC 2005, Division B, Sections 9.20., 9.27. and/or 9.28. for above-grade installations.
- Concrete must be cured for a minimum of seven days before backfilling. The top of the foundation wall must be supported by the first floor prior to backfilling.

- For below-grade installations, dampproofing material compatible with the EPS must be provided in accordance with the NBC 2005, Division B, Section 9.13.
- Backfill material must be well drained and a drainage system must be installed around the footing as per the requirements of the NBC 2005.
- Erection of “IntegraSpec®” shall be under the direct supervision of Phil-Insul Corporation or a qualified installer. Only trained and authorized installers shall be contracted to set up the wall system.
- For a standard wall height (2.44 m), the pouring of concrete must be made in consecutive lifts; each lift is limited to a maximum height of 1 m.
- EPS insulation used in this system complies with CAN/ULC-S701-01, “Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering,” Type 2.

“IntegraSpec®” used in structural applications outside the scope of this Report and the design analysis as prepared for Phil-Insul Corporation, dated August 2003, must be designed by a registered professional engineer skilled in such design. The engineer shall certify that the construction provides a level of performance equivalent to that required by Part 3, 4, 5 and/or Part 9 of Division B of the NBC 2005.

4. Technical Evidence

CCMC’s Technical Guide for “Modular, Expanded Polystyrene Concrete Forms” sets out the nature of the technical evidence required by CCMC to enable it to evaluate a product as an acceptable or alternative solution in compliance with the NBC 2005. The Report holder has submitted test results, engineering design and analysis for CCMC’s evaluation. Testing was conducted at independent laboratories recognized by CCMC. The corresponding test results for “IntegraSpec®” are summarized below.

4.1 NBC 2005 Compliance Data for “IntegraSpec®” on which CCMC Based its Opinion in Section 1

Table 4.1.1. Wall Capacities for Varying Heights of Reinforced, Above-grade Walls (150 mm/6")*

Factored Wind Load (kPa)	Horizontal Reinforcing Bars (mm)	Vertical Reinforcing (mm)	Maximum Factored Axial Load P_f (kN/m)		
			Wall Height (mm)		
			2 400	3 000	3 600
0.50	10M @ 600	10M @ 400	180	165	135
		15M @ 400	330	270	225
0.75	10M @ 600	10M @ 400	175	155	120
		15M @ 400	325	265	215
1,00	10M @ 600	10M @ 400	170	145	105
		15M @ 400	320	260	205
1.25	10M @ 600	10M @ 400	165	130	90
		15M @ 400	315	250	195
1.50	10M @ 600	10M @ 400	160	120	70
		15M @ 400	310	240	180

- * Based on the these assumptions:
- concrete compressive strength $f_c = 20$ MPa (@ 28 days)
 - yield strength reinforcing $f_y = 400$ MPa
 - vertical steel placed at the centre of the wall
 - maximum eccentricity of applied vertical load = 25 mm
 - single curvature bending assumed
 - the top of the wall laterally supported

Table 4.1.2. Vertical Reinforcement Requirements for Basement Walls in Seismic Zones (150 mm/6")*

Backfill Height (m)	Seismic Zones 0, 1 and 2		Seismic Zones 3 and above	
	2.4-m Wall	3.0-m Wall	2.4-m Wall	3.0-m Wall
1.2	10M @ 400	10M @ 400	15M @ 400	15M @ 400
1.35	10M @ 400	10M @ 400	15M @ 400	15M @ 400
1.6	10M @ 400	10M @ 400	15M @ 400	15M @ 400
1.8	10M @ 400	15M @ 400	15M @ 400	15M @ 400
2.0	15M @ 400	15M @ 400	15M @ 400	15M @ 400
2.2	15M @ 400	15M @ 400	15M @ 400	15M @ 400
2.35	15M @ 400	15M @ 400	15M @ 400	15M @ 400
2.6	n/a	15M @ 200	n/a	15M @ 200
2.8	n/a	15M @ 200	n/a	15M @ 200
3.0	n/a	15M @ 200	n/a	15M @ 200

General notes to Table 4.1.2:

- Walls designed for additional earth pressure resulting from seismic activity (shaking).
- Seismic zones 0, 1 and 2 are equivalent to the factor Z_v in the seismic date of the NBC 2005.
- “n/a” means not applicable.
- * Based on these assumptions:
 - concrete compressive strength of 20 MPa @ 28 days
 - reinforcing steel yield strength = 400 MPa
 - vertical steel to be placed on the tension side, 110 mm from exterior concrete face
 - the top and bottom of the wall laterally supported
 - 4.8 kPa surcharge applied adjacent to the wall
 - subfloor installation to be completed or adequate bracing to resist lateral earth pressure to be installed prior to the backfilling of the wall
 - level backfill adjacent to the wall
 - backfill consists of free draining granular material

Table 4.1.3. Minimum Steel Reinforcement of Lintels (150 mm/6" or 200 mm/8" concrete core)*

Factored Uniformly Distributed Load (kN/m)	Lintel Span (m)								
	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
1.5	2-10M	2-10M	2-10M	2-10M	2-10M	2-10M	2-10M	2-10M	2-10M
2.9	2-10M	2-10M	2-10M	2-10M	2-10M	2-10M	2-10M	2-10M	2-10M
4.4	2-10M	2-10M	2-10M	2-10M	2-10M	2-10M	2-10M	2-10M	2-15M
5.8	2-10M	2-10M	2-10M	2-10M	2-10M	2-10M	2-10M	2-15M	2-15M
7.3	2-10M	2-10M	2-10M	2-10M	2-10M	2-10M	2-15M	2-15M	2-15M
11.0	2-10M	2-10M	2-10M	2-10M	2-10M	2-15M	2-15M	2-15Mt 2-20Mb	2-15Mt 2-20Mb
14.6	2-10M	2-10M	2-10M	2-10M	2-15M	2-15M	2-15Mt 2-20Mb	2-15Mt 2-20Mb	n/a
18.3	2-10M	2-10M	2-10M	2-15M	2-15M	2-15Mt 2-20Mb	2-15Mt 2-20Mb	n/a	n/a
21.9	2-10M	2-10M	2-10M	2-15M	2-15M	2-15Mt 2-20Mb	n/a	n/a	n/a

General notes to Table 4.1.3:

- t = top, b = bottom
- * Based on the these assumptions: – minimum lintel height = 300 mm

- clear concrete cover = 25 mm, reinforced steel $f_y = 400$ MPa
- concrete strength $f_c = 20$ MPa, design to CSA A23.3-04, “Design of Concrete Structures”

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