

Project **Marpole Place**
Address **1305 West 70th Street,**
Location **Vancouver, BC**

Apex Project No. **5567**
Date: **May 25, 2016**

Per VBBL 2014
Part 10 (10.2.1.1.1.b)
i.e. NECB 2011 (Section 9.36)
For Zone 4

Occupancy Class	Group A	
Minimum Required R Value for Wall (Above Ground)	RSI 2.78	(R 15.8)

Thermal Characteristics of Exterior Building Wall (Above Ground) @ Heritage Building

W1	Exterior Wall - Stucco Cladding @ 1st Floor (with R22 Batt Insulation)			
S.No.	WALL ASSEMBLY COMPONENTS	RSI	R	
1	Exterior Air Film	0.03	0.17	
2	Existing Stucco Cladding	0.02	0.10	
3	Existing Sheathing Membrane	0.00	0.00	
4	Existing Exterior Plywood Sheathing (1/2" thick)	0.11	0.63	
5	2 X 6 (38 x 140) Studs at @ 16"(406 mm) o.c.(Existing) Cavity filled with R22 (RSI 3.87) Batt Insulation (Roxul Comfortbatt) - New (taking 23% framing & 77% cavity)	2.55	14.48	
6	Polyethylene (6 mil - Vapour Barrier) - New	0.00	0.00	
7	5/8" Gypsum Wall Board - New	0.10	0.57	
8	Paint Finish (1 coat latex primer & latex paint) - New	0.00	0.00	
9	Interior Air Film	0.12	0.68	
Effective RSI / R Value of Entire Assembly		2.93	16.62	

W2	Exterior Wall - Stucco Cladding @ 2nd & 3rd Floor (with R14 Batt Insulation)			
S.No.	WALL ASSEMBLY COMPONENTS	RSI	R	
1	Exterior Air Film	0.03	0.17	
2	Existing Stucco Cladding	0.02	0.10	
3	Existing Sheathing Membrane	0.00	0.00	
4	Existing Exterior Plywood Sheathing (1/2" thick)	0.11	0.63	
5	2 X 4 (38 x 89) Studs at @ 16"(406 mm) o.c.(Existing) Cavity filled with R14 (RSI 2.46) Batt Insulation (Roxul Comfortbatt) - New (taking 23% framing & 77% cavity)	1.62	9.20	
6	Polyethylene (6 mil - Vapour Barrier) - New	0.00	0.00	
7	5/8" Gypsum Wall Board - New	0.10	0.57	
8	Paint Finish (1 coat latex primer & latex paint) - New	0.00	0.00	
9	Interior Air Film	0.12	0.68	
Effective RSI / R Value of Entire Assembly		2.00	11.35	

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Occupancy Class	Group A	
Minimum Required R Value for Wall (Above Ground)	RSI 2.78	(R 15.8)

Thermal Characteristics of Exterior Building Wall (Above Ground) @ New Addition

W3	Exterior Wall - 1 Hour Fire Rated (with R22 Batt Insulation)			
	S.No.	WALL ASSEMBLY COMPONENTS	RSI	R
	1	Exterior Air Film	Effective Thermal Resistance of a Building Envelope Assembly consisting of Steel Framing, RSI _{eff} , the following equation is being used per section 9.36.2.4.(1) of NECB RSI (effective) = K1 * RSI T1 + K2 * RSI T3	
	2	Existing Ceraclad Siding		
	3	Ventilated Rainscreen Cavity (1/2" Ceraclad Panel Clip)		
	4	Existing EPS (Min. R 7.5) c/w horizontal Z- Girts @ 1'-6" o.c.		
	5	Existing Gypsum Wall Board (5/8")		
	6	1-5/8" x 6" (41.3 mm x 203 mm) Steel Studs at @16"(406 mm) o.c.(Existing) Cavity filled with R22 (RSI 3.87) Batt. Insulation (Roxul Comfortbatt) - New		
	7	New 6 mil. U.V. rated poly (vapour barrier)		
	8	New 1 layer of Gypsum Wall Board (5/8")		
	9	Paint Finish (1 coat latex primer & latex paint)		
	10	Interior Air Film		
	Effective RSI / R Value of Entire Assembly		2.78	15.80

where

RSI T1 = effective thermal resistance of building envelope assembly determined using parallel-path flow method for wood-frame assemblies (use framing and cavity percentages in Table A-9.36.2.4.(1)C.),

RSI T3 = RSI T2 + thermal resistance values of all other components except steel studs and insulation,

where RSI T2 = effective thermal resistance of steel studs and insulation determined using parallel-path flow method for wood-frame assemblies,

K1 = applicable value from Table A-9.36.2.4.(1)B., and

K2 = applicable value from Table A-9.36.2.4.(1)B.

PLEASE TURN OVER TO SEE THE CALCULATION

CALCULATIONS

Calculate RSI T1			
S.No.	WALL ASSEMBLY COMPONENTS	RSIF (Thermal Resistance Through Steel Stud Framing)	RSIC (Thermal Resistance Through Cavity)
1	Exterior Air Film	0.00	0.00
2	Existing Ceraclad Siding	0.00	0.00
3	Ventilated Rainscreen Cavity (10mm Ceraclad Panel Clip)	0.13	0.13
4	Existing EPS (Min. R 7.5 / RSI 1.32) c/w horizontal Z- Girts @ 1'-6" o.c.	0.660	0.660
5	Existing Gypsum Wall Board (5/8")	0.100	0.10
6	1-5/8" x 6" (41.3 mm x 203 mm) Steel Studs at @ 16"(406 mm)	0.002	
7	Cavity filled with R22 (RSI 3.87) Batt. Insulation (Roxul Comfortbatt)		3.87
8	New 6 mil. U.V. rated poly (vapour barrier)	0.00	0.00
9	New 1 layer of Gypsum Wall Board (5/8")	0.10	0.10
10	Paint Finish (1 coat latex primer & latex paint)	0.00	0.00
11	Interior Air Film	0.12	0.12
Total		1.11	4.98
RSI T1		4.85	

Calculate RSI T2			
S.No.	WALL ASSEMBLY COMPONENTS	RSIF (Thermal Resistance Through Steel Stud Framing)	RSIC (Thermal Resistance Through Cavity)
1	1-5/8" x 8" (41.3 mm x 203 mm) Steel Studs at @ 16"(406 mm) o.c.	0.002	
2	Cavity filled with R24 (RSI 4.22) Batt. Insulation (Roxul Comfortbatt)		3.87
Total		0.002	3.87
RSI T2		0.29	

Calculate RSI T3			
S.No.	WALL ASSEMBLY COMPONENTS	RSI (Thermal Resistance Through Assembly)	
1	Exterior Air Film	0.00	
2	Existing Ceraclad Siding	0.00	
3	Ventilated Rainscreen Cavity (10mm Ceraclad Panel Clip)	0.13	
4	Existing EPS (Min. R 7.5) c/w horizontal Z- Girts @ 1'-6" o.c.	0.66	
5	Existing Gypsum Wall Board (5/8")	0.10	
6	RSI T2	0.29	
7	New 6 mil. U.V. rated poly (vapour barrier)	0.00	
8	New 1 layer of Gypsum Wall Board (5/8")	0.10	
9	Paint Finish (1 coat latex primer & latex paint)	0.00	
10	Interior Air Film	0.12	
RSI T3		1.40	

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Occupancy Class	Group A	
Minimum Required R Value for Wall (Above Ground)	RSI 2.78	(R 15.8)

Thermal Characteristics of Exterior Building Wall (Above Ground) @ New Addition

W4	Exterior Wall - 2 Hour Fire Rated (with R22 Batt Insulation)		
S.No.	WALL ASSEMBLY COMPONENTS	RSI	R
1	Exterior Air Film	Effective Thermal Resistance of a Building Envelope Assembly consisting of Steel Framing, RS _{ieff} , the following equation is being used per section 9.36.2.4.(1) of NECB RSI (effective) = K1 * RSI T1 + K2 * RSI T3	
2	Existing Ceraclad Siding		
3	Ventilated Rainscreen Cavity (1/2" Ceraclad Panel Clip)		
4	Existing EPS (Min. R 7.5) c/w horizontal Z- Girts @ 1'-6" o.c.		
5	Existing Gypsum Wall Board (5/8")		
6	1-5/8" x 6" (41.3 mm x 203 mm) Steel Studs at @16"(406 mm) o.c.(Existing) Cavity filled with <u>R22 (RSI 3.87) Batt. Insulation (Roxul Comfortbatt) - New</u>		
7	New 6 mil. U.V. rated poly (vapour barrier)		
8	New 2 layer of Gypsum Wall Board (5/8")		
9	Paint Finish (1 coat latex primer & latex paint)		
10	Interior Air Film		
Effective RSI / R Value of Entire Assembly		2.85	16.17

where

RSI T1 = effective thermal resistance of building envelope assembly determined using parallel-path flow method for wood-frame assemblies (use framing and cavity percentages in Table A-9.36.2.4.(1)C.),

RSI T3 = RSI T2 + thermal resistance values of all other components except steel studs and insulation,

where RSI T2 = effective thermal resistance of steel studs and insulation determined using parallel-path flow method for wood-frame assemblies,

K1 = applicable value from Table A-9.36.2.4.(1)B., and

K2 = applicable value from Table A-9.36.2.4.(1)B.

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CALCULATIONS

Calculate RSI T1			
S.No.	WALL ASSEMBLY COMPONENTS	RSIF (Thermal Resistance Through Steel Stud Framing)	RSIC (Thermal Resistance Through Cavity)
1	Exterior Air Film	0.00	0.00
2	Existing Ceraclad Siding	0.00	0.00
3	Ventilated Rainscreen Cavity (10mm Ceraclad Panel Clip)	0.13	0.13
4	Existing EPS (Min. R 7.5 / RSI 1.32) c/w horizontal Z- Girts @ 1'-6" o.c.	0.660	0.660
5	Existing Gypsum Wall Board (5/8")	0.100	0.10
6	1-5/8" x 6" (41.3 mm x 203 mm) Steel Studs at @ 16"(406 mm)	0.002	
7	Cavity filled with R22 (RSI 3.87) Batt. Insulation (Roxul Comfortbatt)		3.87
8	New 6 mil. U.V. rated poly (vapour barrier)	0.00	0.00
9	New 2 layer of Gypsum Wall Board (5/8")	0.20	0.10
10	Paint Finish (1 coat latex primer & latex paint)	0.00	0.00
11	Interior Air Film	0.12	0.12
Total		1.21	4.98
RSI T1		4.86	

Calculate RSI T2			
S.No.	WALL ASSEMBLY COMPONENTS	RSIF (Thermal Resistance Through Steel Stud Framing)	RSIC (Thermal Resistance Through Cavity)
1	1-5/8" x 8" (41.3 mm x 203 mm) Steel Studs at @ 16"(406 mm) o.c.	0.002	
2	Cavity filled with R24 (RSI 4.22) Batt. Insulation (Roxul Comfortbatt)		3.87
Total		0.002	3.87
RSI T2		0.29	

Calculate RSI T3			
S.No.	WALL ASSEMBLY COMPONENTS	RSI (Thermal Resistance Through Assembly)	
1	Exterior Air Film	0.00	
2	Existing Ceraclad Siding	0.00	
3	Ventilated Rainscreen Cavity (10mm Ceraclad Panel Clip)	0.13	
4	Existing EPS (Min. R 7.5) c/w horizontal Z- Girts @ 1'-6" o.c.	0.66	
5	Existing Gypsum Wall Board (5/8")	0.10	
6	RSI T2	0.29	
7	New 6 mil. U.V. rated poly (vapour barrier)	0.00	
8	New 2 layer of Gypsum Wall Board (5/8")	0.20	
9	Paint Finish (1 coat latex primer & latex paint)	0.00	
10	Interior Air Film	0.12	
RSI T3		1.50	

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Occupancy Class	Group A	
Effective R Value for Roof Joist Assemblies (Cathedral Ceiling / Flat Roof)	RSI 4.67	R 26.5

Thermal Characteristics of Roof @ New Addition

R1	Roof - (Steel / Metal Roof)			
S.No.	WALL ASSEMBLY COMPONENTS	RSI	R	
1	Exterior Air Film	Effective Thermal Resistance of a Building Envelope Assembly consisting of Steel Framing, RSI_{eff}, the following equation is being used per section 9.36.2.4.(1) of NECB RSI (effective) = K1 * RSI T1 + K2 * RSI T3		
2	Existing Build Up Roof			
3	Existing Water Resistant GB (1/2")			
4	Existing Steel Decking			
5	Air Cavity			
6	Existing Steel Structure			
7	R28 Batt. Insulation in Joist Cavity - New			
8	New 6 mil. U.V. rated poly (vapour barrier)			
9	New 1 layer of Gypsum Wall Board (1/2")			
10	Paint Finish (1 coat latex primer & latex paint)			
11	Interior Air Film			
Effective RSI / R Value of Entire Assembly		3.57	20.28	

where

RSI T1 = effective thermal resistance of building envelope assembly determined using parallel-path flow method for wood-frame assemblies (use framing and cavity percentages in Table A-9.36.2.4.(1)C.),

RSI T3 = RSI T2 + thermal resistance values of all other components except steel studs and insulation,

where RSI T2 = effective thermal resistance of steel studs and insulation determined using parallel-path flow method for wood-frame assemblies,

K1 = applicable value from Table A-9.36.2.4.(1)B., and

K2 = applicable value from Table A-9.36.2.4.(1)B.

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CALCULATIONS

Calculate RSI T1			
S.No.	WALL ASSEMBLY COMPONENTS	RSIF (Thermal Resistance Through Steel Stud / Metal Framing)	RSIC (Thermal Resistance Through Cavity)
1	Exterior Air Film	0.03	0.00
2	Existing Build Up Roof	0.00	0.00
3	Existing Water Resistant GB (1/2")	0.08	0.13
4	Existing Steel Decking	0.000	0.660
5	Air Cavity	0.160	0.160
6	Existing Steel Structure	0.003	0.10
7	R28 Batt. Insulation in Joist Cavity - New		4.93
8	New 6 mil. U.V. rated poly (vapour barrier)	0.00	0.00
9	New 1 layer of Gypsum Wall Board (1/2")	0.08	0.10
10	Paint Finish (1 coat latex primer & latex paint)	0.00	0.00
11	Interior Air Film	0.11	0.12
Total		0.46	6.20
RSI T1		5.96	

Calculate RSI T2			
S.No.	WALL ASSEMBLY COMPONENTS	RSIF (Thermal Resistance Through Steel Stud Framing)	RSIC (Thermal Resistance Through Cavity)
1	Existing Steel Structure	0.003	
2	R28 Batt. Insulation in Joist Cavity - New		4.93
Total		0.003	4.93
RSI T2		0.73	

Calculate RSI T3			
S.No.	WALL ASSEMBLY COMPONENTS	RSI (Thermal Resistance Through Assembly)	
1	Exterior Air Film	0.03	
2	Existing Build Up Roof	0.00	
3	Existing Water Resistant GB (1/2")	0.08	
4	Existing Steel Decking	0.00	
5	Air Cavity	0.16	
6	RSI T2	0.73	
7	New 6 mil. U.V. rated poly (vapour barrier)	0.00	
8	New 1 layer of Gypsum Wall Board (1/2")	0.08	
9	Paint Finish (1 coat latex primer & latex paint)	0.00	
10	Interior Air Film	0.11	
RSI T3		1.19	