

Patrick C. Hayes
Energy Consultant
PO Box 65052
Seattle, WA 98155

206.819.7684
patrickchayes1@msn.com

Page

1.1

2018 SEC Energy Code

Energy Code Compliance Cover Sheet

Project:

9059 16th Ave SW, Seattle, WA

Date

2/16/2024

Permit Intake Set

Item # Top Down

Response

1a

?

1b

Please see page 1.1 of the Energy Calculations, C406 is listed there.

1c

Architect

2

Architect

3

C412 Mandatory Solar, C412 Exception 1.2, See Energy Calculations.
Architect to Add a not to the Roof Plan.

4

FW1a/A5.00

- 5 **Wall Type W1ip/A5.00, is in the calculations**
- 6 **Architect and PCH**
- 7 **Architect and PCH**
- 8 **Architect and PCH**
- 9 **Architect and PCH**
- 10 **N/A**
- 11a **This has been corrected**
- 11b **The Floor Assembly over unheated Space is Fw1a/A500, this has been added to the calculations.**
- 11c **The Aluminum Entrance Door has been Removed, and Replaced by a Insulated Steel Entrance Door B06**
- 11d **Reference C406.8, was a Typo Error, this has been corrected**
- 11e **The Floor Plans have been Updated, to reflect the comment.**

Patrick C. Hayes
Energy Consultant
PO Box 65052
Seattle, WA 98155

206.819.7684
patrickchayes1@msn.com

Page 1.1

2018 SEC Energy Code

Energy Code Compliance Cover Sheet

Project: 9059 16th Ave SW, Seattle, WA

Date: 7/26/2023 Permit Intake Set

Whole Building

Energy Code	2018 WSEC Energy Code
Compliance Method	C402.1.3, Component performance building envelope option
Glazing % of Gross Wall	18.77

C406

Credit #	Description	Credits
8	High Efficiency Service Water Heating per C406.8	5
3	Reduced lighting Power Allowance per C406.3.2	3
6	Dedicated Outdoor air system in accordance with C406.6	2
10	Envelope is 20% Better than the code Baseline	6
Total Credits		16

C412, Renewable Energy, Exception 1.2, See Above 14 C406 Credits

Total SF of Heated Space, Page CS3	29,230	
Multiplier .25	7308	C412 Total Watts
Exception 1.2, Reduced by 2/3 Multiplier .333	2433	Total Watts Installed
450 Watt Panels, # of Panels to be installed	5	

Table of Contents	
Description	Page
Cover Sheet	1 Series
UA Calculations	2 series
Fenistration Schedules	3 series
Assembly Calculations	4 series
SF Calculations	5 series
Unit by Unit heat Loss Calculations	6 Series

Patrick C. Hayes

Patrick C. Hayes
Energy Consultant

Patrick C. Hayes Energy Consultant patrickchayes1@msn.com		206.819.7684 PO Box 65052 Seattle, WA 98155		Date: 7/26/2023 Project: 9059 16th Ave SW, Seattle, WA			
<div>2018 SEC Energy Code</div> <div>Section C402.1.3 UA Compliance Calculations Whole Building</div>							
Gross Wall Total SF of Glazing Glazing % of Gross Wall		19629 3684 18.77		Average SHGC Maximum Glazing Vertical & Overhead, 30% of Gross Wall		0.163 0.163	
<div>Page 2.1</div>							
Building Component		Proposed UA		Table C402.1.2Code UA		UA Net Difference	
Roofs		U-Factor	Area	UA	U-Factor	Area	UA
Insulation Entirely Above Roof							UA Diff
Deck		0.000	0	0.00	0.027	0	0.00
Metal Building				0.00	0.031	0	0.00
Attic or other		0.000	0	0.00	0.021	0	0.00
Joist or Rafter		0.010	4580	45.24	0.027	4580	123.66
Above Grade Walls		U-Factor	Area	UA	U-Factor	Area	UA
Mass, Wall		0.028	1824	51.48	0.057	1824	103.97
Mass Wall All Other		0.000	0	0.00	0.104	0	0.00
Mass Transfer Deck slab Edge		0.000	0	0.00	0.200	0	0.00
Steel Framed Metal Stud Walls		0.000	0	0.00	0.055	0	0.00
Wood Framed and other		0.054	13995	755.71	0.051	13995	713.73
Below Grade Mass Walls		U-Factor	Area	UA	U-Factor	Area	UA
Below Grade Mass, Wall		0.028	1824	51.48	0.07	1824	127.68

							Page 2.2
Building Component	Proposed UA			Table C402.1.2Code UA			UA Net Difference
Floors	U-Factor	Area	UA	U-Factor	Area	UA	UA Diff
Mass	0.000	0	0.00	0.031	0	0.00	0.00
Joist/framing	0.025	311	7.78	0.029	311	9.019	1.24
Slab on Grade	F-Factor	Area	UA	F-Factor	Area	UA	UA Diff
Unheated	0.730	286	208.78	0.54	286	154.44	-54.34
Heated			0.00	0.55	0	0	0.00
Opaque Doors	U-Factor	Area	UA	U-Factor	Area	UA	UA Diff
Swinging	0.310	126	39.06	0.37	126	46.62	7.56
Roll-Uo or Sliding			0.00	0.34	0	0	0.00
Fenestration	U-Factor	Area	UA	U-Factor	Area	UA	UA Diff
Non-Metal Framing (all)	0.225	3684	828.97	0.300	3684	1105.31	276.34
Metal Framing Fixed	0.330	0	0.00	0.380	0	0.00	0.00
Metal Framing Operable			0.00	0.400	0	0.00	0.00
Entrance Doors	0.460	0	0.00	0.600	0	0.00	0.00
Skylights			0.00	0.500			0.00
Summary	Proposed Totals	26630	1988.50	Code Totals	26630	2384.42	395.92
Area Net Difference	0.000	Section C406.10 Enhanced Envelope Performance Complies With C406.10 83.40 This Number Can not Exceed 85					
UA Net Difference	395.92						
% Over or Under the Code	19.91						
Glazing %	18.77	Overall Average R-Factor			13.39		
Average SHGC	0.163	Overall Average U-Factor			0.075		

Window Type	Quantity	Width	Height	Framing & Glazing Description	Framing Ref., Glazing Ref., Spacer Ref.	NFRC Test Report #	SF Each	Total SF	U-Factor	UA	SHGC	SHGC A	VT	VT A
Place Holder	0.0001	5	7	Kawneer 451 UT SB60 90% Argon Fill, TGI Wave	FW-KAW-39113, GA-PPG-4718, SA-TNC-3958	P-KAW-39858	35.00	0.00	0.33	0.001155	0.33	0.00	0.61	0.00
Door Deduct	1			Kawneer 451 UT SB60 90% Argon Fill, TGI Wave	FW-KAW-39113, GA-PPG-4718, SA-TNC-3958	P-KAW-39858	0.00	0.00	0.33	-0.00069	0.33	0.00	0.61	0.00
				Kawneer 451 UT SB60 90% Argon Fill, TGI Wave	FW-KAW-39113, GA-PPG-4718, SA-TNC-3958	P-KAW-39858	0.00	0.00	0.33	0	0.33	0.00	0.61	0.00
Place Holder				Kawneer 451 UT SB60 90% Argon Fill, TGI Wave	FW-KAW-39113, GA-PPG-4718, SA-TNC-3958	P-KAW-39858	0.00	0.00	0.33	0	0.33	0.00	0.61	0.00
Summary							Totals	0.00	0.00		0.00			
Total SF of Fenestration			0											
Average U-Factor			0.330											
Average SHGC			0.33											
Average VT			0.61											

2018 SEC Energy Code Fenestration Schedule, Entrance Doors Code Compliance														
Window Type	Quantity	Width	Height	Description	Glazing Description	NFRC CPD #	SF Each	Total SF	U-Factor	UA	SHGC	SHGC A	VT	VT A
Place Holder	0.0001	3	7	KAW AA425 Pair. 1" IG SB60#2, 90% Argon TGI Wave	FW-KAW-40224, GA-PPG-4718, SA-TNC-4263	P-KAW-38775	21.00	0.00	0.46	0.000966	0.22	0.00	0.37	0.00
				KAW AA425 Pair. 1" IG SB60#2, 90% Argon TGI Wave	FW-KAW-40224, GA-PPG-4718, SA-TNC-4263	P-KAW-38775	0.00	0.00	0.46	0	0.22	0.00	0.37	0.00
Summary							Totals	0.00	0.00	0.000.00				
Total SF of Fenestration			0											
Average U-Factor			0.46											
Average SHGC			0.22											
Average VT			0.37											

Overall Average SHGC & VT					
	Avg. SHGC	Avg. VT	SF	A SHGC	A VT
Non Metal All	0.16	0.34	3684	599.38	1268.59
Metal Entrance Doors	0.22	0.37	0	0.00	0.00
Metal Fixed	0.33	0.61	0	0.00	0.00
Totals			3684	599	1268.59
Average SHGC	0.16	Total SF of Store Front 0			
Average VT	0.34				

Patrick C. Hayes
Energy Consultant
patrickchayes1@msn.com

206.819.7684
PO Box 65052
Seattle, WA 98155

Date: 7/26/2023

Project: 9059 16th Ave SW, Seattle, WA

Page 3.3

2018 SEC Energy Code

Fenestration Schedule, Non Metal, (All) for Energy Code Compliance

Window Type	Quantity	Width	Height	Description	Glazing Description	NFRC CPD #	SF Each	Total SF	U-Factor	UA	SHGC	SHGC A	VT	VT A
A.1	1	1.5	5.66	Fixed Vinyl VPI	Double Glazed, Double Low E, Cardinal 366 over I89	VPI-A-18-03731-00003	8	8	0.22	1.87	0.18	1.53	0.40	3.40
B.1	3	2	6	Casement Vinyl VPI	Double Glazed, Double Low E, Cardinal 366 over I89	VPI-A-19-03897-00003	12	36	0.23	8.28	0.15	5.40	0.32	11.52
B.2L	2	2	7	Casement Vinyl VPI	Double Glazed, Double Low E, Cardinal 366 over I89	VPI-A-19-03897-00003	14	28	0.23	6.44	0.15	4.20	0.32	8.96
B.2R	5	2	7	Casement Vinyl VPI	Double Glazed, Double Low E, Cardinal 366 over I89	VPI-A-19-03897-00003	14	70	0.23	16.10	0.15	10.50	0.32	22.40
C.1	4	3	5.66	Fixed Vinyl VPI	Double Glazed, Double Low E, Cardinal 366 over I89	VPI-A-18-03731-00003	17	68	0.22	14.94	0.18	12.23	0.40	27.17
C.2	1	3	6	Fixed Vinyl VPI	Double Glazed, Double Low E, Cardinal 366 over I89	VPI-A-18-03731-00003	18	18	0.22	3.96	0.18	3.24	0.40	7.20
C.3	1	3	7	Fixed Vinyl VPI	Double Glazed, Double Low E, Cardinal 366 over I89	VPI-A-18-03731-00003	21	21	0.22	4.62	0.18	3.78	0.40	8.40
D.1	1	3.5	4.33	Fixed Vinyl VPI	Double Glazed, Double Low E, Cardinal 366 over I89	VPI-A-18-03731-00003	15	15	0.22	3.33	0.18	2.73	0.40	6.06
D.2	3	3.5	6	Fixed Vinyl VPI	Double Glazed, Double Low E, Cardinal 366 over I89	VPI-A-18-03731-00003	21	63	0.22	13.86	0.18	11.34	0.40	25.20
D.3	10	3.5	7	Fixed Vinyl VPI	Double Glazed, Double Low E, Cardinal 366 over I89	VPI-A-18-03731-00003	25	245	0.22	53.90	0.18	44.10	0.40	98.00

D.4	4	3.5	7.5	Casement Vinyl VPI	Double Glazed, Double Low E, Cardinal 366 over I89	VPI-A-19- 03897-00003	26	105	0.23	24.15	0.15	15.75	0.32	33.60
E.1	3	4.5	4.33	Fixed Vinyl VPI	Double Glazed, Double Low E, Cardinal 366 over I89	VPI-A-18- 03731-00003	19	58	0.22	12.86	0.18	10.52	0.40	23.38

Window Type	Quantity	Width	Height	Description	Glazing Description	NFRC CPD #	SF Each	Total SF	U-Factor	UA	SHGC	SHGC A	VT	VT A
F.1	2	5	6	Fixed Vinyl VPI	Double Glazed, Double Low E, Cardinal 366 over I89	VPI-A-18- 03731-00003	30	60	0.22	13.20	0.18	10.80	0.40	24.00
F.2L	4	5	7	Casement Vinyl VPI	Double Glazed, Double Low E, Cardinal 366 over I89	VPI-A-19- 03897-00003	35	140	0.23	32.20	0.15	21.00	0.32	44.80
F.2R	6	5	6	Casement Vinyl VPI	Double Glazed, Double Low E, Cardinal 366 over I89	VPI-A-19- 03897-00003	30	180	0.23	41.40	0.15	27.00	0.32	57.60
G.1L	4	5.5	4.33	Fixed Vinyl Evolution Windows Eko Okna Ideal 4000 70 MM Tilt- Turn	Triple Glazed Double Low E	EKO-K-1- 00097-00001	24	95	0.19	18.10	0.23	21.91	0.37	35.25
G.1R	5	5.5	4.33	Fixed Vinyl Evolution Windows Eko Okna Ideal 4000 70 MM Tilt- Turn	Triple Glazed Double Low E	EKO-K-1- 00097-00001	24	119	0.19	22.62	0.23	27.39	0.37	44.06
G.2L	1	5.5	6	Fixed Vinyl VPI	Double Glazed, Double Low E, Cardinal 366 over I89	VPI-A-18- 03731-00003	33	33	0.22	7.26	0.18	5.94	0.40	13.20
G.2R	12	5.5	6	Fixed Vinyl VPI	Double Glazed, Double Low E, Cardinal 366 over I89	VPI-A-18- 03731-00003	33	396	0.22	87.12	0.18	71.28	0.40	158.40
G.3L	26	5.5	7	Casement Vinyl VPI	Double Glazed, Double Low E, Cardinal 366 over I89	VPI-A-19- 03897-00003	39	1001	0.23	230.23	0.15	150.15	0.32	320.32
G.3R	24	5.5	7	Casement Vinyl VPI	Double Glazed, Double Low E, Cardinal 366 over I89	VPI-A-19- 03897-00003	39	924	0.23	212.52	0.15	138.60	0.32	295.68
Place Holder							0	0	0.24	0.00	0.22	0.00	0.51	0.00
Total CK	122													

Totals	3684	828.97	599.38	1268.59
--------	------	--------	--------	---------

Average Window SF	30
-------------------	----

Summary

Total SF of Fenestration	3684
Average U-Factor	0.225
Average SHGC	0.16
Average VT	0.34

Patrick C. Hayes	206.819.7684	Date: 7/26/2023
Energy Consultant	PO Box 65052	Project: 9059 16th Ave SW, Seattle, WA
patrickchayes1@msn.com	Seattle, WA 98155	

Window Quantity Schedule for Energy Code Compliance Only. (Do Not Use for pricing), (Not to be Used by Suppliers)

Window Type	L1	L2	L3				Window Type
Steel Doors Elevator Doors							0 0
							0 Steel Doors
							0 Elevator Doors
							0 0
							0 0
							0 0
							0 0
							0 0
							0 T-Check
							0 Total
Totals	0	0	0	0	0	0	

Patrick C. Hayes 206.819.7684
 Energy Consultant PO Box 65052
patrickchayes1@msn.com Seattle, WA 98155

Date: 7/26/2023
 Project: 9059 16th Ave SW, Seattle, WA

Page 3.6

**2018 SEC Energy Code
 Opaque Door Schedule for Energy Code Compliance**

Door Type	Quantity	Width	Height	Description	SF Each	Total SF	U-Factor	UA	U-Factor Source
Steel Doors,	5	3	7	DbI Skin Steel Emergency Exit Door 1.75" Polyurathane Foam	21.00	105	0.31	32.55	Table 107.1(3) SEC
B06, Entrance door	1	3	7	DbI Skin Steel Emergency Exit Door 1.75" Polyurathane Foam	21.00	21	0.31	6.51	Table 107.1(3) SEC
Stair Shaft Doors	0	3	7	DbI Skin Steel Emergency Exit Door 1.75" Polyurathane Foam	21.00	0	0.31	0	Table 107.1(3) SEC
Total	6				0	0	0.3	0	
Totals						126		39	

Summary

Total SF of Opaque Doors 126
 Average Door U-Factor 0.310

Patrick C. Hayes	206.819.7684
Energy Consultant	PO Box 65052
patrickchayes1@msn.com	Seattle, WA 98155

Date:	7/26/2023
Project:	9059 16th Ave SW, Seattle, WA

**2018 SEC Energy Code
Assembly Calculations**

Below Grade Mass Wall Assembly Calculations

Description		Concrete Wall			Page	
Assembly ID		CC1/A5.00			4.1	
Assembly Components		Component R Factor	Net SF of Assembly	Assembly UA	Component U-Factor	U-Factor Source
2" XPS Rigid, R5/in		10				Table. A101.5 WSEC
3 5/8" Wood Studs, R13 Fiberglass, 16" OC		9.80			0.102	Table. A101.5 WSEC
10" concrete or CMU at R.0625/in		0.625				Table. A101.5 WSEC
Soil, R1.25/in. 12 "		15.00				
					SF Source	SF
					OA2 at .50 /5.1	1824
Total R Factor		35.43				
Total U Factor		0.03				
Total Net SF of Assembly			1824			
Assembly UA				51.48	Total Net SF	1824

Total SF of Mass Wall	1824	
Total UA		51.48
Average Mass Wall U-Factor	0.028	

Above Grade Mass Wall Assembly Calculations

Description	Concrete Wall				Page	4.2
Assembly ID	CF1/A5.00					
Assembly Components		Component R Factor	Net SF of Assembly	Assembly UA	Component U-Factor	U-Factor Source
2" XPS Rigid, R5/in		10				Table. A101.5 WSEC
3 5/8" Wood Studs, R13 Fiberglass, 16" OC		9.80			0.102	Table. A101.5 WSEC
10" concrete or CMU at R.0625/in		0.625				Table. A101.5 WSEC
Soil, R1.25/in. 12 "		15.00				
					SF Source	SF
					OA2 at .50 /5.1	1824
Total R Factor		35.43				
Total U Factor		0.03				
Total Net SF of Assembly			1824			
Assembly UA				51.48	Total Net SF	1824

Total SF of Mass Wall	1824	
Total UA		51.48
Average Mass Wall U-Factor	0.028	

Wood Stud Wall Assembly Calculations

Wood Frame Exterior Walls Type 5-A 1hr building		Page		4.3	
Description					
Assembly ID					
W1fb, WF1, WW1/A5.00					
Assembly Components		Component R Factor	Net SF of Assembly	Assembly UA	Component U- Factor U-Factor Source
2x6 Wd FR , R21 Fiberglass Batt, Intermediate Framing, Insulated headers, 2 Stud Corners , Headers in the floor system, R21 at Rim,		18.52			0.054
					SF Source SF
					OA3/5.1 3648
					OA8/5.1 13860
					Less Vinyl -3684
					Glazing, L1 -L5
					OA6/5.1 171
Total R Factor		18.519			
Total U Factor		0.054			
Total Net SF of Assembly			13995		
Assembly UA				755.71	
					Total Net SF 13995

Total SF of Wood Stud Wall	13995	
Total UA		755.71
Average Wood Stud Wall U-Factor	0.054	

Joist Floor Assembly Calculations

Description		Floor			Page	
Assembly ID		FW1a/A5.00			4.4	
Assembly Components		Component R Factor	Net SF of Assembly	Assembly UA	Component U-Factor	U-Factor Source
R38 Batt in Joist System		40.00			0.025	A105.1(3)
					SF Source	SF
Total R Factor		40.00				311
Total U Factor		0.025				
Total Net SF of Assembly			311			
Assembly UA				7.78	Total Net SF	311

Total SF of Floor	311	
Total UA		7.78
Average Mass Floor U-Factor	0.025	

Roof Assembly Calculations, Joist or Rafter

Averaging the R Value of the Sloped Rigid by Volume

Base Layer SF	Thickness of Base Layer in Ft.	Volume in CF	Sloped Rigid Volume From Revit
4980	0.33	1643.40	3146

.33Ft = 4" of Polyiso Rigid at R6.5/in. which = R26

Cross Multiply to Solve for the R Value of the Tapered Rigid

4" of plyiso Rigid R Value	<u>26</u>	Equals	<u>X</u>	Solving for
Volume of 4" on this project	1643.40		3146	Volume of Sloped Rigid
	1643.4 X,	Equals	81796	
		<u>81796</u>	49.77	
Solve for X, Divide 119730 by 1511.4		1643.40	X = Above	X = 49.77

Roof Assembly Calculations, Joist or Rafter

Description		Main Roof			Page	
Assembly ID		RW1/A5.00			4.6	
Assembly Components		Component R Factor	Net SF of Assembly	Assembly UA	Component U-Factor	U-Factor Source
Membrane						
Sloped Rigid Average R Value, See Above		49.77				
4" Base Layer Rigid, Polyiso, at R6.5/in		26.00				
Air Space		0.91				
R25 In Joist Cavity		24.00			0.027	
1 Extra layer of 5/8" GWB		0.56				
					SF Source	SF
Total R Factor		101.242			OA11/5.1	4580
Total U Factor		0.010				
Total Net SF of Assembly			4580			
Assembly UA				45.24	Total Net SF	4580

Total SF of Roof	4580	
Total UA		45.24
Average Roof Wall U-Factor	0.010	

Slab On Grade Assembly Calculations

Description		Not Insulated Slab on Grade			Page	
Assembly ID					4.7	
Assembly Components		Component F Factor	Net LF of Assembly	Assembly FA	Component F-Factor	F-Factor Source
Insulated R15 with a Thermal Break		0.73			0.73	A106.1 SEC
					SF Source	LF
Total F Factor		0.73			OA4/5.1	286
Total Net SF of Assembly			286			
Assembly UA				208.78	Total Net SF	286

Total LF of Slab on Grade	286	
Total FA		208.78
Average Slab on Grade F-Factor	0.73	

Patrick C. Hayes Energy Consultant patrickchayes1@msn.com	206.819.7684 PO Box 65052 Seattle, WA 98155	Date: 7/26/2023 Project: 9059 16th Ave SW, Seattle, WA	
---	---	---	--

Building Opaque Assembly SF Calculations

OA #										Page	5.1
	OA1	OA2	OA3	OA4	OA5	OA6	OA7	OA8	OA9	OA10	OA11
Level of OA	Basement	Basement	L1	L1	L1	L1		L2, L3, L4, L4 Lofts	Penthouse	Penthouse Roof	Main Roof
Description of OA	Gross P-Line	BG & AG Mass Wall	Gross P-Line	Not Insulated SOG	Insulated SE TD	Trash RM, Electrical Demising Wall		Gross P-Line			
Detail or Assembly						W1ip/A5.00					
Height of OA	1	9.5	9.5	1	1	9.5	1	35	10	1	1
LF of OA	104	384	384	384		12		384	20	360	4580
	104			-28		6		12	20		
	58			-22					18		
	58			-18					18		
	32			-30							
	12										
	16										
Total LF of OA	384	384	384	286	0	18	0	396	76	360	4580
1/16" to 1/8"	384	384	384	286	0	18	0	396	76	360	4580
Total SF of OA	384	3648	3648	286	0	171	0	13860	760	360	4580

Patrick C. Hayes
Energy Consultant

206.819.7684
PO Box 65052
Seattle, WA 98155

patrickchayes1@msn.com

Date: 7/26/2023
Project: 6th Ave SW, Seattle, WA

LPA Page 1

2018 SEC

C406.3.1 - Lighting & Power Allowance

Room #	Room Name	Net Area		Use	LPA Per Table C405.4.2(2), Space by Space	C406.3.1Maximum m LPA at 80%	Maximum Installed Watts
Per Floor	Elevator	34	SF	Mechanical	0.39	0.312	11
	Mech.	242	SF	Mechanical	0.39	0.312	76
	Electrical	199	SF	Mechanical	0.39	0.312	62
	Stair 1 & 2 Each	220	SF	Stair	0.44	0.352	77
	Trash	395	SF	Storage	0.46	0.368	145
	Lobby	273	SF	Lobby	0.76	0.608	166
	Laundry	158	SF	Laundry	0.48	0.384	61
Basement	Circulation	958	SF	Circulation	0.37	0.296	284
L1	Bikes	558	SF	Storage	0.46	0.368	205
L1	Mail	137	SF	Post Office	0.69	0.552	76
L1	Circulation	1055	SF	Circulation	0.37	0.296	312
L2	Circulation	1052	SF	Circulation	0.37	0.296	311
L3	Circulation	1052	SF	Circulation	0.37	0.296	311
L4	Circulation	1052	SF	Circulation	0.37	0.296	311

Patrick C. Hayes 206.819.7684

Energy Consultant PO Box 65052

patrickchayes1@msn.com Seattle, WA 98155

Date: 7/26/2023

9059 16th
Project: Ave SW,
Seattle, WA

Page 6.1a

2018 SEC Residential Energy Code for R Occupancy

Unit Heat Loss Calculations		Degree Delta 46 Deg					
Number of Units		4	10	4	1		
Unit #		B09, B10, B11, B12	111, 112, 213, 313, 214, 314, 215, 216, 315, 316	413, 414, 415, 416	L1 Bike Storage	Not Used	Not Used
Levels		Basement	L1 - L3	L4	L1 Bike Storage		
Unit Type		.1, .02	.1, .02	.1, .02	3/A2.6		0
Unit SF		294	294	390	551		0
Slab on Grade	LF	18	0	0	0		0
AG Slab Edge	SF	0	18	18	35	0	0
Floor	SF	0	0	0	0	0	0
Roof	SF	0	0	588	0	0	0
Volume	CF	2499	2499	3315	4684	0	0
Gross Wall	SF	162	162	162	315	0	0
Windows	SF	29	29	29	58	0	0
Opaque Door	SF	0	0	0	20	0	0
Net Wall	SF	133	133	133	237	0	0
Slab on Grade F	0.73	0.730	0.730	0.730	0.730	0.730	0.730
Slab on Grade Btu/hr		604	0	0	0	0	0
AG Slab Edge Avg. U	0.054	0.054	0.051	0.051	0.054	0.051	0.051
AG Slab Edge Btu/hr		0	42	42	87	0	0
Floor U	0.031	0.031	0.031	0.031	0.031	0.031	0.031
Floor Btu/hr		0	0	0	0	0	0
Roof U	0.019	0.019	0.019	0.019	0.019	0.019	0.019
Roof Btu/hr		0.00	0.00	513.91	0.00	0.00	0.00
Volume	Q=1.08 x CFM x Delta T	990	990	1313	1855	0	0
Glazing U	0.225	0.225	0.225	0.225	0.225	0.225	0.225
Window Btu/hr		300	300	300	600	0	0
Opaque Door U	0.310	0.310	0.310	0.310	0.310	0.310	0.310
Opaque Dr Btu/hr		0	0	0	285	0	0
Net Wall U	0.054	0.054	0.054	0.054	0.054	0.054	0.054
Net Wall Btu/hr		330	330	330	589	0	0

Summary, and Room by Room Heater Sizing

DHL Min. Btu/hr	2225	1662	2499	3416	0	0
DHL Max. Btu/hr	3337	2494	3749	5124	0	0
Unit Type	.1, .02	.1, .02	.1, .02	3/A2.6	0.00	0.00
DHL Watts	652	487	806	1001	0	0
Max DHL Watts	978	731	1208	1501	0	0
DHL Watts/SF	2.22	1.66	2.07	1.82	#DIV/0!	#DIV/0!
Max DHL Watts /SF	3.33	2.49	3.10	2.72	#DIV/0!	#DIV/0!
Average DHL, Watts/SF	2.77	2.07	2.58	2.27	#DIV/0!	#DIV/0!
Unit Type	.1, .02	.1, .02	.1, .02	3/A2.6	0.00	0.00
Electrical Heat Sizing	Watts	Watts	Watts	Watts	Watts	Watts
Bath	Heat Lamp	Heat Lamp	Heat Lamp	Heat Lamp	Heat Lamp	Heat Lamp
King Electric Model #	750 = W2015-W, 500W = W2010-W	750 = W2015-W, 500W = W2010-W	750 = W2015-W, 500W = W2010-W	750 = W2015-W, 500W = W2010-W	750 = W2015-W, 500W = W2010-W	750 = W2015-W, 500W = W2010-W
Living Area	750	750	750	1000	750	750
Total Installed Watts	750	750	750	1000	1000	750
Percent of Min. DHL in Watts	1.15	1.54	0.93	1.00	#DIV/0!	#DIV/0!
Unit Type	.1, .02	.1, .02	.1, .02	3/A2.6	0.00	0.00
Heat Pump Required, per C403.1.4 SEC	No	No	No	No	No	No
Heater Source						
King Electric Mfg. Co 9131 10th Ave S Seattle, WA 98108 206.762.0400	King-Electric.com					

Patrick C. Hayes 206.819.7684

Energy Consultant PO Box 65052

patrickchayes1@msn.com Seattle, WA 98155

Date: 7/26/2023

9059 16th
Project: Ave SW,
Seattle, WA

Page 6.2a

2018 SEC Residential Energy Code for R Occupancy

Unit Heat Loss Calculations		Degree Delta 46 Deg					
Number of Units		1	3	1	1	3	1
Unit #		B08	110, 212, 312	412	B03	103, 205, 305	405
Levels		Basement	L1 - L3	L4	Basement	L1 - L3	L4
Unit Type		0.04	0.04	0.04	0.1	0.1	0.1
Unit SF		271	271	271	326	326	326
Slab on Grade	LF	34	0	0	48	0	0
AG Slab Edge	SF	0	34	34	0	48	48
Floor	SF	0	0	0	0	0	0
Roof	SF	0	0	391	0	0	425
Volume	CF	2304	2304	2304	2771	2771	2771
Gross Wall	SF	306	306	306	432	432	432
Windows	SF	29	58	58	29	29	29
Opaque Door	SF	0	0	0	0	0	0
Net Wall	SF	277	248	248	403	403	403
Slab on Grade F	0.54	0.540	0.540	0.540	0.540	0.540	0.540
Slab on Grade Btu/hr		845	0	0	1192	0	0
AG Slab Edge Avg. U	0.075	0.075	0.051	0.051	0.075	0.051	0.051
AG Slab Edge Btu/hr		0	80	80	0	113	113
Floor U	0.031	0.031	0.031	0.031	0.031	0.031	0.031
Floor Btu/hr		0	0	0	0	0	0
Roof U	0.019	0.019	0.019	0.019	0.019	0.019	0.019
Roof Btu/hr		0.00	0.00	341.73	0.00	0.00	371.45
Volume	Q=1.08 x CFM x Delta T	912	912	912	1097	1097	1097
Glazing U	0.260	0.260	0.260	0.260	0.260	0.260	0.260
Window Btu/hr		347	694	694	347	347	347
Opaque Door U	0.310	0.310	0.310	0.310	0.310	0.310	0.310
Opaque Dr Btu/hr		0	0	0	0	0	0
Net Wall U	0.051	0.051	0.051	0.051	0.051	0.051	0.051
Net Wall Btu/hr		650	582	582	945	945	945

Summary, and Room by Room Heater Sizing

DHL Min. Btu/hr	2753	2267	2609	3582	2502	2874
DHL Max. Btu/hr	4130	3401	3914	5373	3753	4310
Unit Type	0.04	0.04	0.04	0.10	0.10	0.10
DHL Watts	807	664	841	1049	733	842
Max DHL Watts	1210	997	1261	1574	1100	1263
DHL Watts/SF	2.98	2.45	3.10	3.22	2.25	2.58
Max DHL Watts /SF	4.47	3.68	4.65	4.83	3.37	3.87
Average DHL, Watts/SF	3.72	3.06	3.88	4.02	2.81	3.23
Unit Type	0.04	0.04	0.04	0.10	0.10	0.10
Electrical Heat Sizing	Watts	Watts	Watts	Watts	Watts	Watts
Bath	Heat Lamp	Heat Lamp	Heat Lamp	Heat Lamp	Heat Lamp	Heat Lamp
King Electric Model #	750 = W2015-W, 500W = W2010-W	500W = W2010-W,	750 = W2015-W, 500W = W2010-W	750 = W2015-W, 500W = W2010-W	500W = W2010-W,	750 = W2015-W, 500W = W2010-W
Living Area	750	750	750	1000	750	750
Total Installed Watts	750	750	750	1000	750	750
Percent of Min. DHL in Watts	0.93	1.13	0.89	0.95	1.02	0.89
Unit Type	0.04	0.04	0.04	0.10	0.10	0.10
Heat Pump Required, per C403.1.4 SEC	No	No	No	No	No	No
Heater Source						
King Electric Mfg. Co 9131 10th Ave S Seattle, WA 98108 206.762.0400	King-Electric.com					

Patrick C. Hayes	206.819.7684
Energy Consultant	PO Box 65052
patrickchayes1@msn.com	Seattle, WA 98155

Date:	7/26/2023
Project:	9059 16th Ave SW, Seattle, WA

Page	6.3a
------	------

2018 SEC Residential Energy Code for R Occupancy
--

Unit Heat Loss Calculations		Degree Delta 46 Deg					
Number of Units		1	2	1	1	11	4
Unit #		107	209, 309	409	B07, B01,	108, 109, 101, 203, 210, 211, 303, 310, 311, 202, 302	402, 403, 410, 411
Levels		L1	L2 - L3	L4	Basement	L2 - L3	L4
Unit Type		0.03	0.03	0.03	.05.W, .05E,	.05.W, .05E,	.05.W, .05E,
Unit SF		311	311	311	263	263	263
Slab on Grade	LF	46	0	0	18	0	0
AG Slab Edge	SF	0	46	46	0	18	18
Floor	SF	311	0	0	0	0	0
Roof	SF	0	0	407	0	0	359
Volume	CF	2644	2644	2644	2236	2236	2236
Gross Wall	SF	414	414	414	162	162	162
Windows	SF	58	58	58	29	29	29
Opaque Door	SF	0	0	0	0	0	0
Net Wall	SF	356	356	356	133	133	133
Slab on Grade F	0.54	0.540	0.540	0.540	0.540	0.540	0.540
Slab on Grade Btu/hr		1143	0	0	447	0	0
AG Slab Edge Avg. U	0.075	0.075	0.051	0.051	0.075	0.051	0.051
AG Slab Edge Btu/hr		0	108	108	0	42	42
Floor U	0.025	0.025	0.025	0.025	0.025	0.025	0.025
Floor Btu/hr		358	0	0	0	0	0
Roof U	0.019	0.019	0.019	0.019	0.019	0.019	0.019
Roof Btu/hr		0.00	0.00	355.72	0.00	0.00	313.77
Volume	Q=1.08 x CFM x Delta T	1047	1047	1047	885	885	885
Glazing U	0.260	0.260	0.260	0.260	0.260	0.260	0.260
Window Btu/hr		694	694	694	347	347	347
Opaque Door U	0.310	0.310	0.310	0.310	0.310	0.310	0.310
Opaque Dr Btu/hr		0	0	0	0	0	0
Net Wall U	0.051	0.051	0.051	0.051	0.051	0.051	0.051
Net Wall Btu/hr		835	835	835	312	312	312

Summary, and Room by Room Heater Sizing

DHL Min. Btu/hr	4076	2684	3039	1991	1586	1900
DHL Max. Btu/hr	6114	4025	4559	2987	2380	2850
Unit Type	0.03	0.03	0.03	.05.W, .05E,	.05.W, .05E,	.05.W, .05E,
DHL Watts	1194	786	980	583	465	557
Max DHL Watts	1791	1179	1469	875	697	835
DHL Watts/SF	3.84	2.53	3.15	2.22	1.77	2.12
Max DHL Watts /SF	5.76	3.79	4.72	3.33	2.65	3.18
Average DHL, Watts/SF	4.80	3.16	3.94	2.77	2.21	2.65
Unit Type	0.03	0.03	0.03	.05.W, .05E,	.05.W, .05E,	.05.W, .05E,
Electrical Heat Sizing	Watts	Watts	Watts	Watts	Watts	Watts
Bath	Heat Lamp	Heat Lamp	Heat Lamp	Heat Lamp	Heat Lamp	Heat Lamp
King Electric Model #	750 = W2015-W, 500W = W2010-W	500W = W2010-W,	750 = W2015-W, 500W = W2010-W	750 = W2015-W, 500W = W2010-W	500W = W2010-W,	750 = W2015-W, 500W = W2010-W
Living Area	1000	1000	1000	750	750	750
Total Installed Watts	1000	1000	1000	750	750	750
Percent of Min. DHL in Watts	0.84	1.27	1.02	1.29	1.61	1.35
Unit Type	0.03	0.03	0.03	.05.W, .05E,	.05.W, .05E,	.05.W, .05E,
Heat Pump Required, per C403.1.4 SEC	No	No	No	No	No	No
Heater Source						
King Electric Mfg. Co		King-Electric.com				
9131 10th Ave S						
Seattle, WA 98108						

Patrick C. Hayes	206.819.7684
Energy Consultant	PO Box 65052
patrickchayes1@msn.com	Seattle, WA 98155

Date:	7/26/2023
Project:	9059 16th Ave SW, Seattle, WA

2018 SEC Residential Energy Code for R Occupancy
--

Unit Heat Loss Calculations					Degree Delta 46 Deg		
Number of Units					1	11	4
Unit #					B02	102, 204, 304	404
Levels					Basement	0	0
Unit Type					0.06	0.06	0.06
Unit SF		0	0	0	263	263	263
Slab on Grade	LF	0	0	0	30	0	0
AG Slab Edge	SF	0	0	0	0	30	30
Floor	SF	0	0	0	0	0	0
Roof	SF	0	0	0	0	0	359
Volume	CF	0	0	0	2236	2236	2236
Gross Wall	SF	0	0	0	270	270	270
Windows	SF	0	0		29	58	58
Opaque Door	SF	0	0	0	0	0	0
Net Wall	SF	0	0	0	241	212	212
Slab on Grade F	0.54	0.540	0.540	0.540	0.540	0.540	0.540
Slab on Grade Btu/hr		0	0	0	745	0	0
AG Slab Edge Avg. U	0.075	0.075	0.051	0.051	0.075	0.051	0.051
AG Slab Edge Btu/hr		0	0	0	0	70	70
Floor U	0.025	0.025	0.025	0.025	0.025	0.025	0.025
Floor Btu/hr		0	0	0	0	0	0
Roof U	0.019	0.019	0.019	0.019	0.019	0.019	0.019
Roof Btu/hr		0.00	0.00	0.00	0.00	0.00	313.77
Volume	Q=1.08 x CFM x Delta T	0	0	0	885	885	885
Glazing U	0.260	0.260	0.260	0.260	0.260	0.260	0.260
Window Btu/hr		0	0	0	347	694	694
Opaque Door U	0.310	0.310	0.310	0.310	0.310	0.310	0.310
Opaque Dr Btu/hr		0	0	0	0	0	0
Net Wall U	0.051	0.051	0.051	0.051	0.051	0.051	0.051
Net Wall Btu/hr		0	0	0	565	497	497

Summary, and Room by Room Heater Sizing

DHL Min. Btu/hr	0	0	0	2543	2147	2460
DHL Max. Btu/hr	0	0	0	3814	3220	3691
Unit Type	0.00	0.00	0.00	0.06	0.06	0.06
DHL Watts	0	0	0	745	629	721
Max DHL Watts	0	0	0	1117	943	1081
DHL Watts/SF	#DIV/0!	#DIV/0!	#DIV/0!	2.83	2.39	2.74
Max DHL Watts /SF	#DIV/0!	#DIV/0!	#DIV/0!	4.25	3.59	4.11
Average DHL, Watts/SF	#DIV/0!	#DIV/0!	#DIV/0!	3.54	2.99	3.43
Unit Type	0.00	0.00	0.00	0.06	0.06	0.06
Electrical Heat Sizing	Watts	Watts	Watts	Watts	Watts	Watts
Bath	Heat Lamp	Heat Lamp	Heat Lamp	Heat Lamp	Heat Lamp	Heat Lamp
King Electric Model #	750 = W2015-W, 500W = W2010-W	500W = W2010-W,	750 = W2015-W, 500W = W2010-W	750 = W2015-W, 500W = W2010-W	500W = W2010-W,	750 = W2015-W, 500W = W2010-W
Living Area				1000	1000	1000
Total Installed Watts	0	0	0	1000	1000	1000
Percent of Min. DHL in Watts	#DIV/0!	#DIV/0!	#DIV/0!	1.34	1.59	1.39
Unit Type	0.00	0.00	0.00	0.06	0.06	0.06
Heat Pump Required, per C403.1.4 SEC				No	No	No
Heater Source						
King Electric Mfg. Co 9131 10th Ave S Seattle, WA 98108	King-Electric.com					

Patrick C. Hayes 206.819.7684

Energy Consultant PO Box 65052

patrickchayes1@msn.com Seattle, WA 98155

Date: 7/26/2023

9059 16th
Project: Ave SW,
Seattle, WA

Page 6.5a

2018 SEC Residential Energy Code for R Occupancy

Unit Heat Loss Calculations			Degree Delta 46 Deg					
Number of Units			1	2	1	2	6	2
Unit #			B04	104, 206, 306	406	B05, B06	105, 106, 207, 208, 307, 308	407, 408
Levels			Basement	L2 - L3	L4	Basement	L2 - L3	L4
Unit Type			0.09	0.09	0.09	.07, .08	.07, .08	.07, .08
Unit SF			306	306	306	265	265	265
Slab on Grade	LF		9	0	0	16	0	0
AG Slab Edge	SF		0	9	9	0	16	16
Floor	SF		306	0	0	0	0	0
Roof	SF		0	0	414	0	0	361
Volume	CF		2601	2601	2601	2253	2253	2253
Gross Wall	SF		81	81	81	144	144	144
Windows	SF		29	29	29	29	29	29
Opaque Door	SF		0	0	0	0	0	0
Net Wall	SF		52	52	52	115	115	115
Slab on Grade F	0.54		0.540	0.540	0.540	0.540	0.540	0.540
Slab on Grade Btu/hr			224	0	0	397	0	0
AG Slab Edge Avg. U	0.075		0.075	0.051	0.051	0.075	0.051	0.051
AG Slab Edge Btu/hr			0	21	21	0	38	38
Floor U	0.025		0.025	0.025	0.025	0.025	0.025	0.025
Floor Btu/hr			352	0	0	0	0	0
Roof U	0.019		0.019	0.019	0.019	0.019	0.019	0.019
Roof Btu/hr			0.00	0.00	361.84	0.00	0.00	315.51
Volume	Q=1.08 x CFM x Delta T		1030	1030	1030	892	892	892
Glazing U	0.260		0.260	0.260	0.260	0.260	0.260	0.260
Window Btu/hr			347	347	347	347	347	347
Opaque Door U	0.310		0.310	0.310	0.310	0.310	0.310	0.310
Opaque Dr Btu/hr			0	0	0	0	0	0
Net Wall U	0.051		0.051	0.051	0.051	0.051	0.051	0.051
Net Wall Btu/hr			122	122	122	270	270	270

Summary, and Room by Room Heater Sizing

DHL Min. Btu/hr	2074	1520	1882	1906	1546	1862
DHL Max. Btu/hr	3111	2280	2823	2859	2319	2793
Unit Type	0.09	0.09	0.09	.07, .08	.07, .08	.07, .08
DHL Watts	608	445	606	558	453	545
Max DHL Watts	912	668	910	838	680	818
DHL Watts/SF	1.99	1.46	1.98	2.11	1.71	2.06
Max DHL Watts /SF	2.98	2.18	2.97	3.16	2.56	3.09
Average DHL, Watts/SF	2.48	1.82	2.48	2.63	2.14	2.57
Unit Type	0.09	0.09	0.09	.07, .08	.07, .08	.07, .08
Electrical Heat Sizing	Watts	Watts	Watts	Watts	Watts	Watts
Bath	Heat Lamp	Heat Lamp	Heat Lamp	Heat Lamp	Heat Lamp	Heat Lamp
King Electric Model #	750 = W2015-W, 500W = W2010-W	500W = W2010-W,	750 = W2015-W, 500W = W2010-W	750 = W2015-W, 500W = W2010-W	500W = W2010-W,	750 = W2015-W, 500W = W2010-W
Living Area	750	750	750	750	750	750
Total Installed Watts	750	750	750	750	750	750
Percent of Min. DHL in Watts	1.23	1.68	1.24	1.34	1.66	1.37
Unit Type	0.09	0.09	0.09	.07, .08	.07, .08	.07, .08
Heat Pump Required, per C403.1.4 SEC	No	No	No	No	No	No
Heater Source						
King Electric Mfg. Co		King-Electric.com				
9131 10th Ave S						
Seattle, WA 98108						
206.762.0400						